

AMERICAN RHINOLOGIC SOCIETY

49th Annual Fall Scientific Meeting September 20, 2003 Orlando, Florida

Objectives: This program has been assembled to fulfill the educational needs of the membership of the American Rhinologic Society based partly on feedback from last year's meeting, as well as on conversations among the various members of the Board of Directors and Counselors.

From a large number of submitted abstracts the very best were blindly selected for presentation with a goal, however, to fulfill the perceived educational needs of the membership.

In addition, special panels were put together to augment the proper papers with the same goal in mind.

Learning Objectives: With full participation in the Scientific Sessions, the participant should be able to:

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Target Audience: The Scientific Sessions are designed to enhance opportunities in continuing medical education for physicians and other health care professionals in otolaryngology-head and neck surgery. Paid registration and badge are required for admission to the Scientific Sessions.

Credit Designation: The American Rhinologic Society designates this educational activity for a maximum of 8 hours in Category 1 credit towards the AMA Physician's Recognition Award. Physicians should claim those hours of credit actually spent in the activity.

Program Evaluation and Certificates of Attendance: Participant comments on program evaluation forms assist Program Advisory Committees in determining the direction of future educational activities. We appreciate your input and request that you complete a program evaluation in exchange for a certificate of attendance.

Records of attendance are maintained in the Secretary's Office of the American Rhinologic Society. Requests for certificates may be made by sending a self addressed, stamped envelope to:

American Rhinologic Society
Marvin P. Fried, MD, Secretary
Montefiore Medical Center
3400 Bainbridge Avenue, 3rd floor
Bronx, New York 10467

Commercial Support: This scientific program has been partially supported by unrestricted educational grants from Aventis Pharmaceuticals, Glaxo, Wellcome, Schering Pharmaceuticals, Bayer Pharmaceuticals, Bristol-Myers Squibb Co., Karl Storz Endoscopy-America, Inc., Medtronic Xomed, Ortho-McNeil, Smith & Nephew-ENT, Surgical Laser Technologies, Visualization Technology, Inc., Linvatec, Richard Wolf Medical Instruments Corporation.

As an accredited sponsor of CME activities, the American Rhinologic Society has adopted the standards of the ACCME and formulated a policy with regard to commercial support of educational activities. This educational program has been prepared in accordance with these standards and policies.

DISCLOSURE STATEMENT: In accordance with the Essentials and Standards of the Accreditation Council for Continuing Medical Education, information about relationship of presenters with commercial interests will be disclosed in printed materials furnished to all participants and announced from the podium.

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October 3, 2003

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December 6, 2003

Winter Board of Directors Meeting, New York, NY

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COSM 2004, Desert Ridge, AZ

September 17–18, 2004

**ARS 50th Anniversary Fall Meeting,
Hilton New York, New York, NY**

May 12–17, 2005

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Conference Schedule

September 20, 2003

American Rhinologic Society

8:00 am

Introductions and Meeting Agenda

Donald C. Lanza, MD

James A. Hadley, MD

Surgical Techniques

Moderators

Richard Orlandi, MD

Stilianos E. Kountakis, MD, PhD

8:05 am

Surgical Revision of the Obliterated Frontal Sinus

Joseph Han, MD

Evanjon Bilstrom, MD

Todd Kingdom, MD

Peter Hwang, MD

Portland, OR

Introduction: Surgical revision of failed frontal sinus obliteration has traditionally been limited to repeat obliteration. However endoscopic techniques may be successful in select cases. We review our experience in surgical revision of failed frontal obliteration. A management algorithm is proposed.

Methods: Retrospective chart review was performed over a 6 year period for patients who underwent surgical revision of an obliterated frontal sinus. Selection for an endoscopic versus external approach was guided by CT and MRI findings as well as endoscopic examination.

Results: Eighteen patients were identified, presenting an average of 9 years from the initial obliteration. 83% (n=15) were approached endoscopically and 17% were approached with revision obliteration. The mean follow up was 18 months. In the endoscopic group, patients either had mucoceles in the inferior-medial aspect of the frontal sinus or incomplete obliteration of the frontal sinus with disease in the pneumatized frontal remnant. 85% were successfully managed with a single endoscopic procedure. 15% required a subsequent obliteration or ablation due to retained infection or osteomyelitis. All the patients are disease free. In the revision obliteration group, patients had mucoceles in the lateral or superior frontal sinus. All the patients are disease free.

Conclusion: Select group of patients undergoing revision of frontal obliteration may benefit from endoscopic approach. Disease is localized in the frontal recess or inferior-medial frontal sinus, endoscopic management may be successful in majority of these patients. Superior-lateral frontal disease is best approached externally. Patients undergoing endoscopic salvage should be counseled about possible revision obliteration if disease persists.

8:12 am

Management of the Inferior Turbinate in Chronic Sinusitis

Peter J. Catalano, MD, FACS
Burlington, MA

Introduction: Nasal obstruction associated with chronic sinusitis can have multiple etiologies. Despite objective data from computer tomography, nasal endoscopy, and rhinomanometry, it can be difficult to determine what portion of these subjective complaints are due to the inferior turbinate(IT). This study examines this question and offers recommendations for management of the IT in patients with chronic rhinosinusitis(CRS).

Methods: 91 patients with chronic sinusitis (58 atopics) and documented IT hypertrophy underwent endoscopic sinus surgery(ESS) for CRS. 76/91 underwent septoplasty. No middle turbinates were resected; the IT was not manipulated. Post-operatively, the ability of the IT to autoregulate was monitored (mean follow-up 8.3 months). Persistent IT hypertrophy was treated with radiofrequency(RF).

Results: 46/91 (52%) required radiofrequency of the IT (37% unilateral). 30/58 atopic patients in this group required RF (52%); 37% unilateral. 37/76 who also had septoplasty required RF (49%). 47 patients were atopic and required septoplasty; 25/47 required RF (53%). Overall, 15% of patients, regardless of atopic status, required more than 1 RF session. An average of 765 joules were delivered per lesion; 11/46 required > 2 lesions per turbinate. On average, RF of the IT was performed 5.4 months after surgery.

Conclusion: 52% of patients undergoing ESS for CRS required treatment of the IT to alleviate nasal obstruction. Atopic status or associated septoplasty did not effect results. The IT can autoregulate after ESS, but predetermination is difficult. Therefore treatment of the IT is best delayed a minimum of 3 months following ESS

8:19 am

Three Wall Orbital Deompression: Results Using Image Guided Surgery and Lateral Orbitotomy

Howard L. Levine, MD
Mark Levine, MD
Cleveland, OH

Introduction: Graves' ophthalmopathy is a devastating complication from hyperthyroidism causing both cosmetic deformity and ophthalmologic morbidity. When corticosteroids and/or radiation is unsuccessful or there is unrelenting inflammation or visual loss, orbital decompression surgery is performed.

Methods: Twenty-four patients were operated upon using endoscopic image guided computer assistance to manage the medial and inferior walls. A lateral orbitotomy was used for the third (lateral) wall.

Results: Preoperatively, 13 patients had exposure keratopathy and 11 compressive optic neuropathy. There was an average improvement in exophthalmus of 5.0mm. Eight patients had preoperative diplopia. Four developed diplopia postoperatively. No patient developed postoperative sinusitis.

Conclusions: These technologically improved methods of decompression have reduced morbidity to the sinus and provided functional and cosmetic excellent outcome.

Conflict details: SinuCare-medical director , Medtronic Xomed-consultant, Glaxo Smith Kline-medical advisory board, Astra Zeneca-medical advisory board

8:26 am

Comparison of Traditional Craniofacial Resection and Minimally Invasive Endoscopic Resection of Anterior Skull Base Neoplasms

Pete S. Batra, MD
Martin J. Citardi, MD, FACS
Donald C. Lanza, MD, FACS
Cleveland, OH

Introduction: Craniofacial resection (CFR) has been traditionally utilized for resection of anterior skull base (ASB) tumors. The minimally invasive endoscopic resection (MIER) has also been recently employed; this strategy facilitates superior visualization, avoids facial incisions and preserves local structures. The goal of this study was to compare the outcome for these two approaches. Methods: Retrospective chart analysis was conducted to identify patients undergoing resection of ASB tumors between January 1995 and January 2003. Demographic data, tumor histology, and the surgical approach utilized were determined. The average operative (OR) time, blood loss (EBL), hospital stay, and complications were analyzed. Disease-free (DF), overall survival (OS), and recurrence rates were calculated.

Results: Nine patients were managed with the MIER approach, while fourteen patients were treated with the traditional open approach. Average OR time and EBL for the MIER group were 7 hours and 35 minutes and 730 cc, respectively. Average OR time and EBL for the CFR group were 8 hours and 56 minutes and 770 cc, respectively. The average hospital stay for the MIER and CFR groups was 8 and 11.6 days, respectively. Major complications were encountered in 2 (22%) and 7 (50%) patients in the MIER and CFR groups, respectively. The DF, OS, and recurrence rates for the MIER group were 56%, 100%, and 44% at 1.6 years, respectively. The DF, OS, and recurrence rates for the CFR group were 57%, 71%, and 43% at 3 years, respectively.

Conclusions: MIER of ASB neoplasia was associated with decreased operative time and blood loss, fewer complications, and decreased hospital stay compared with traditional CFR. Survival and recurrence rates were comparable. MIER should be considered as a viable alternative for the surgical management of ASB lesions.

8:34 am

Discussion

Moderators

James Stankiewicz, MD
Howard Levine, MD

8:39 am

Endonasal Surgery of Juvenile Nasopharyngeal Angiofibroma

Metin Önerci, MD
Ođuz Öđretmenođlu, MD
Taskýn Yücel, MD
Ankara, Turkey

Introduction : Juvenile Nasopharyngeal Angiofibroma (JNA) is one of the benign tumours behaving locally in malignant fashion which challenges the surgeon. It originates at the superior margin of the sphenopalatine foramen. It predominantly occurs in adolescent males and accounts for 0.05% of all head and neck neoplasms. Although JNA is histologically benign, it can cause significant morbidity and on some occasions mortality due to extensive submucosal spread to adjacent structures. The extension of the tumour and the bleeding during surgery makes the surgery more and more difficult. However with new and the developing facilities such as endoscopy, navigation and embolization we are experiencing a revolution in the surgery of angiofibroma. Patients : 13 patients with JNA between stage I and IIIA and endoscopic nasopharyngeal surgery performed.

Results: All patients operated through the nose. The operation time averaged between 35 minutes and 5 hours. One patient recurred.

Conclusions : Endoscopic removal of JNA with preoperative embolization is appropriate for JNA in selected cases. Complete tumour removal with minimal morbidity is possible. The classification system and endonasal surgery of JNA will be discussed.

8:46 am

Endoscopic Frontal Sinusotomy: A Six Year Experience

Thianchai Tangsujarittham, MD
Rakesh K. Chandra, MD
James N. Palmer, MD
David W. Kennedy
Philadelphia, PA

Background: Preliminary data has correlated failure of frontal sinusotomy with advanced disease by preoperative CT. This has led us to review our experience with endoscopic frontal sinusotomy over a 6-year period.

Study Design: Retrospective review.

Patients and Methods: Data was collected regarding patient demographics, co-morbidities, previous surgery, preoperative CT findings, and operative technique. Outcome measures included patency at last follow-up and the need for revision after our initial procedure. Results: The study group had a high prevalence of asthma (44.6%), documented environmental allergies (54.2%), nasal polyposis (60.1%), and history of previous endoscopic sinus surgery (67.9 %). None of these factors individually correlated with outcome. Patency was achieved in 262/301 (87%) after our initial surgery. Sinusotomies that were not patent at last follow-up (n=14) or those requiring revision (n=25) were considered failures (39/301; 13%). Failure was associated with a higher incidence of total frontal sinus opacification by preoperative CT (p=.0004). The success rate was highest for frontal sinuses undergoing a Draf IIa procedure (91.9%) and lowest for those undergoing Draf III (60%). Sinuses in the latter group, however, had more extensive disease by preoperative CT (p=.009). After revision surgery, 285/301 (94.7%) were patent at last follow-up. Mean follow-up was 21.4 months for the successes and 23.3 months for the failures (p=NS).

Conclusions: Chronic frontal sinusitis is associated with airway reactivity and atopic disease. Co-morbid factors may have varying influences in any individual patient, but the overall extent of disease, as measured by preoperative CT, appears to correlate with surgical outcome.

8:53 am

Endoscopic Sphenopalatine Artery Ligation for Epistaxis: Clinical Experience

Allison C. Ford, MD
Ricardo L. Carrau, MD
Carl H. Snyderman, MD
Pittsburgh, PA

Objectives: We reviewed our surgical experience with endoscopic ligation of the sphenopalatine artery for the treatment of severe epistaxis to establish its effectiveness and determine reasons for failure.

Methods: A retrospective review of medical records was performed to identify patients undergoing endoscopic sphenopalatine artery ligation at our institution, from 1998-2003. Records were reviewed for evidence of postoperative complications or recurrent episodes of epistaxis. Routine postoperative care included 1-2 visits for endoscopic debridement until healing was complete.

Results: Fifty-eight patients underwent endoscopic sphenopalatine artery ligation with or without concurrent anterior ethmoid artery ligation. In all cases, epistaxis was immediately controlled. There were no perioperative complications. One early recurrence was due to failure to identify the main trunk of the sphenopalatine artery with clipping of the lateral nasal branch only. This was associated with early bifurcation in the pterygopalatine fossa. A late recurrence in one patient was associated with collateral flow through a branch of the internal maxillary artery. This patient was treated with embolization.

Conclusions: Endoscopic sphenopalatine artery ligation with or without concurrent anterior ethmoid artery ligation is an effective treatment for severe epistaxis and is associated with minimal morbidity. In our opinion, endoscopic ligation is the preferred treatment for this patient population.

9:00 am

Race and Gender Differences in Frequency of Skull Base Erosion in Allergic Fungal Sinusitis

*John M. DelGaudio, MD
Sarah Wise, MD
Giridhar Venkatraman, MD
Atlanta, GA*

Background: Allergic fungal sinusitis (AFS) is a condition that can result in significant bone expansion and erosion. The frequency of bone erosion with extrasinus extension has been reported in the range of 20%. Previous reports have not described racial or sex differences in the frequency or degree of bone erosion.

Methods: A review of all patients with a diagnosis of allergic fungal sinusitis at a single institution was performed using operative logs and retrospective chart review. Records were reviewed to assure that patients met the criteria for AFS. Radiology reports and films were reviewed to determine the presence of sinus expansion and erosion. Since erosion of bone is common in AFS, only bone erosion with extension of disease into adjacent extrasinus areas, such as the orbit and intracranial cavity, was evaluated.

Results: 42 patients, 24 males and 18 females, were identified with AFS. Mean age at diagnosis was 24.4 years in 20 African American patients, and 38 years in 22 Caucasian patients. Skull base or orbital erosion was found in 65% of African American patients, involving 56 separate sites (4.31 per patient), and in 27% of Caucasian patients, involving 17 separate sites (2.83 per patient). Erosion was present in 54% of males (53 sites, 4.1/patient), and 33% of females (20 sites, 3.3/patient). Frequency of erosion was similar in the ethmoid, frontal, and sphenoid sinuses.

Conclusions: In this series there was a greater incidence and severity of bone erosion in African American patients and in males. This is most likely related to later diagnosis, but may also represent differences in the disease process.

9:07 am

Discussion

Medical Outcomes

Moderators

*Joseph Jacobs, MD
Kathy Yaremchuk, MD*

9:14 am

Outcomes of the Extended Endoscopic Approach for Management of Inverted Papilloma

*Gehua Zhang, MD
Xavier Rodriguez, M.Sc.
Abdulmohsen Hussain, MD
Martin Desrosiers, MD
Montreal, Canada*

Introduction: Inverted papilloma (IP) is a benign tumor involving the paranasal sinuses. Complete removal of the papilloma remains the treatment of choice given its tendency to recurrence and potential for malignancy. Since 1994, we have routinely employed an extended endoscopic approach for the resection of inverted papillomas. We present our methods and outcomes.

Methods: IP is diagnosed by biopsy before surgery. With CT and MRI, we attempt to identify the sites of origin and extent of IP. Cases with previous medial maxillectomy or invasive disease are treated via the open approach. Otherwise, the extended endoscopic approach is used. The tumor is debulked and its attachment point(s) identified. Endoscopic medial maxillectomy is then performed. If maxillary sinus involvement in its anterior, inferior, superior or lateral portion is suspected, a Caldwell-Luc approach is performed to allow for mucosal excision and complete removal of the anterior lateral nasal wall. When lamina papyracea, ceiling of the ethmoid or sphenoid sinus are involved, the bony wall is resected. The frontal recess can be approached via Lynch incision or an endoscopic trans-orbital approach.

Results: 22 patients were referred for IP. 19 patients were treated via the extended endoscopic approach. Average follow-up period was 23 (3-66) months. Only 3 of 19 patients (16%) presented a recurrence, which required revision surgery.

Conclusion: The extended endoscopic approach offers a safe, effective and esthetically acceptable treatment of most cases of IP.

9:21 am

Correlation Between Preoperative Symptom Scores, Quality of Life Questionnaires and Staging with Computed Tomography in Patients with Chronic Rhinosinusitis

*Peter John Wormald
David Wabnitz
Salil Nair*

South Australia, Australia

This study evaluates the correlation between pre-operative symptoms, quality of life questionnaires (chronic sinusitis survey and SNOT-20) and staging on computer tomography.

Design: Prospective cohort study of all consecutive patients undergoing surgery for medically non-responsive chronic sinusitis.

Setting: Tertiary Care Centre

Materials and Methods: Two hundred and thirty two patients completed the Chronic Sinusitis Survey questionnaire and the 20-item Sino-Nasal Outcome Test. A Visual Analogue Symptom score was also completed. The average age of the patients was 44.5 years and the male to female ratio was 1:1.3. The symptom scores of all three questionnaires were compared to the Lund and McKay CT scan score of the sinuses.

Results: The median Lund and McKay CT score was 12. There was no significant correlation between the SNOT-20 questionnaire and the Lund and McKay CT score ($\rho = 0.091$; $p = 0.281$). There was a significant correlation ($\rho = -0.21$; $p = 0.009$) between the CSS and the Lund and McKay CT score. There was also a significant correlation between a single VAS symptom score relating to overall sinonasal symptom severity and the Lund and McKay CT scan score ($\rho = 0.178$; $p = 0.035$) as well as a VAS score based on the sum of 5 sinonasal symptoms ($\rho = 0.258$; $p = 0.002$). Conclusions: The CSS and the VAS symptom scores correlate to the disease severity as measured by the Lund and McKay CT scan score. The SNOT-20 questionnaire does not correlate to the Lund and McKay CT scan score.

Conflict details: PJ Wormald receives royalties on instruments designed for Medtronic Xomed, Jacksonville, Florida.

9:28 am

Correlation Between CT Scores and Symptomatic Improvement After Endoscopic Sinus Surgery

*Dewayne T. Bradley, MD
Stilianos E. Kountakis, MD;PhD
Charlottesville, VA*

Objective: Determine the correlation between preoperative CT scores and the improvement of symptom scores in patients treated by Functional Endoscopic Sinus Surgery (FESS).

Methods: Prospective data collection of patients undergoing FESS at a tertiary medical center over a 2 year period for rhinosinusitis refractory to maximal medical therapy. CT scans were graded as per the Lund-Mackay system. Patient symptom scores were recorded from the SNOT-20 inventory preoperatively and at 3,6, and 12 months postoperatively. Correlation was assessed by the Pearson correlation-coefficient (R).

Results: One hundred and thirteen patients were identified with 1 year follow-up. The mean preoperative CT grade was 13.2 with mean SNOT-20 Symptom scores of 30.6. Preoperative CT scores did not correlate with preoperative symptom scores ($R=0.314$). SNOT-20 symptom scores improved 72%, 75%, and 77% at 3,6, and 12 month follow-up from preoperative values. Additionally, there was no correlation between preoperative CT scores and percent improvement at 3, 6, and 12 months follow-up ($R=-0.003$, $R=-0.015$, and $R=-0.059$).

Conclusion: The severity of rhinosinusitis on preoperative CT scan does not correlate with the severity of symptoms assessed by the SNOT-20 inventory in patients undergoing FESS. Further, preoperative CT scores fail to correlate with the degree of symptomatic improvement after FESS. Patients had a mean reduction in symptom scores of 77% after treatment with FESS regardless of the extent of sinusitis severity as assessed by preoperative CT.

9:35 am

Patterns of Fungal Infections in Patients with Cystic Fibrosis

*Sarah Wise, MD
John DelGaudio MD
Todd Kingdom
Giri Venkatraman
Atlanta, GA*

Objective: Our goals in this study were to determine whether fungi are present in patients with CF, and, more importantly whether the development of ABPA (Allergic Bronchopulmonary Aspergillosis) correlated with the development of AFS (Allergic Fungal Sinusitis) in the paranasal sinuses.

Methods: Cultures were collected intraoperatively from twenty consecutive patients undergoing endoscopic sinus surgery as part of their CF management. Cultures were obtained from within the sinuses and not from the nasal cavity. Fungal cultures and GMS stains were specifically requested.

Results: Four of the twenty patients undergoing FESS had positive fungal cultures. One patient was noted to have findings consistent with AFS. The remaining three patients did not have allergic mucin, and did not have elevated serum IgE levels. The two patients who had documented ABPA did not have either positive fungal cultures or AFS; conversely, the patient with documented AFS did not have ABPA.

Conclusions: The patients all have been treated for the fungi, and subsequent cultures have been negative (except for the patient with AFS). The patient with AFS is currently undergoing immunotherapy in addition to his CF therapies. Increasingly fungi are being recognized as putative pathogens in chronic sinusitis; this report documents that fungi could have potential roles in the pathogenesis of sinusitis in cystic fibrosis as well. More importantly, even though patients may have CF, they could carry concurrent diagnoses of AFS as well. Our report also seems to indicate that the presence of ABPA is not a predictor for the development of AFS.

9:42 am

Discussion

9:45 am

Break with Exhibitors

10:15 am

Invited Guest Lecture ARS Guest of Honor Prof Dr. Claus Bachert

Moderator

James A. Hadley, MD

Immunology of Rhinosinusitis—From Mediators to Classification

Claus Bachert, MD

10:45 am

Questions and Discussion

Basic Science and Rhinology

Moderators

Brent Senior, MD
Peter J. Wormold, MD

11:00 am

Immunohistologic Findings Suggest a Key Role of Cox-2 in Nasal Polyposis

Jan Gosepath, MD
Jurgen Brieger, PhD
Elefteria Gletsou, MD
Wolf J. Mann, MD, PhD, FACS
Mainz, Germany

Introduction: Cyclooxygenases 1 (Cox-1) and 2 (Cox-2) play a key role in arachidonic acid metabolism and in the regulation of eicosanoid production. The balance of prostaglandin and leukotrien release in respiratory mucosa is important in the pathophysiology and immunology of chronic rhinosinusitis (CRS) and nasal polyposis. **Methods:** 50 surgical specimens were immunohistochemically labeled for Cox-1 and Cox-2. Specimens were taken from chronically inflamed mucosa (n=25) and from nasal polyps (n=25) during endonasal sinus surgery. Controls were obtained from healthy nasal respiratory mucosa (n=15), harvested during turbinate surgery in patients with nasal obstruction without inflammatory disease.

Results: Analysis revealed that Cox-1 and Cox-2 were labeled in all 50 inflamed / polypoid tissue specimens and in all 15 controls. In chronically inflamed tissue the expression of Cox-1 and Cox-2 was strongly labeled in the respiratory epithelial lining and in mucosal glandular ducts. In nasal polyps the expression pattern of Cox-1 was similar, but Cox-2 was much less intensely labeled in the superficial epithelial cellular lining. Controls showed homogenous labeling of Cox-1 and Cox-2 in both tissues with little intensity.

Conclusions: These data suggest that Cox-2 is downregulated in epithelial cells of nasal polyps. Cox-1 and 2 are present in high concentrations in ductal structures of mucosal glands. The relevance of these findings has to be discussed with respect to the regulatory function of Cox-2 in eicosanoid release and the role of the latter in the immunology and pathophysiology of nasal polyps.

11:07 am

Analysis of Innate Immune Mediators in Sinonasal Mucosa

Andrew P. Lane, MD
Joseph Vandermeer, MD
Quan Sha, MD, PhD
Robert P. Schleimer, MD
Baltimore, MD

Introduction: There is a growing appreciation of the role that nasal mucosa plays in innate immunity. We have examined the expression of the innate immune receptor Toll-Like Receptor-3 (TLR-3) and effector molecules including complement factor 3 (C3), Properdin B (PB) and Serum Amyloid A (SAA) in cultured airway epithelial cells and human sinonasal mucosa.

Methods: Cultured BEAS2B airway epithelial cells were stimulated with the TLR3 agonist Poly(I:C) and then analyzed for mRNA for TLR3, C3, PB and SAA using microarrays. Messenger RNA was isolated and tested using Taqman Real Time Polymerase Chain Reaction (RT-PCR) with primer and probe sets for C3, PB and SAA. Immunohistochemistry was performed on surgically-obtained sinonasal mucosa using antibodies against C3

Results: Stimulation of cultured epithelial cells resulted in increased levels of mRNA for C3 (3 fold induction) PB (5.4 fold induction) SAA (3.3 fold induction) and TLR3 (2.0 fold induction.) All values achieved statistical significance (p <.05). Analysis of the sinonasal mucosa mRNA revealed expression of all four genes (SAA=PB>C3>TLR3). Immunohistochemical analysis of surgical specimens demonstrated C3 staining ranging from 20% to 80% of the sinonasal epithelium present.

Conclusions: These studies demonstrate that human airway epithelial cells and sinonasal mucosa express genes involved in innate immunity, including TLR3, and proteins involved in complement activation. We hypothesize that local production of complement proteins by airway epithelium may play an important role in host defense in the airway. Ongoing studies will assess the regulation of these genes in sinusitis and with corticosteroid treatment.

11:14 am

Endoscopic Biopsy of Human Olfactory Epithelium as a Source of Viable Neural Stem Cells

Welby Winstead, MD
Fred J. Roisen, PhD
C.L. Lu, PhD
Kathleen M. Klueber, PhD
Louisville, KY

Purpose: Stem cells have been found throughout the adult nervous system, however the invasive surgery required to harvest them diminishes their utility for obtaining cell populations for genetic studies, pharmacologic evaluation or replacement therapy for degenerative and traumatic diseases. Olfactory neuroepithelium (ONe) has attracted attention because of its relative accessibility and unique regenerative potential. ONe contains a stem cell population that accounts for its regenerative capacity. In our lab, cultures of ONe from cadavers have been shown to yield populations of mitotically active neurosphere forming cells (NSFC) that have characteristics of neural progenitors. We describe the results of our studies to develop safe, reliable techniques to harvest NSFC from living donors.

Materials and Methods: Endoscopic biopsy of the ONe was performed in 34 subjects recruited from individuals undergoing endoscopic sinus surgery. Olfactory function was assessed pre- and post-operatively. Biopsy specimens were cultured in vitro under conditions that favor the development of NSFC.

Results: NSFC emerged in cultures from 12 of 34 individuals. Successful harvest was not found to be dependent on the age or sex of the donor. The superior turbinate, biopsied with an angled punch forceps, was found to be a site of high yield for NSFC. There were no complications associated with the procedure. ONe biopsy does not have adverse impact on olfactory function.

Conclusion: We establish the feasibility of endoscopic biopsy of ONe for obtaining neural stem cells from living donors.

11:21 am

Discussion

Moderators

Jay Dutton, MD
Thomas Tami, MD

11:26 am

Evidence of Bacterial Biofilms on Frontal Recess Stents in Patients with Chronic Rhinosinusitis

Joel R. Perloff, MD
James N. Palmer, MD
Philadelphia, PA

Background: Bacterial biofilms have been documented on middle ear mucosa in patients with otitis media with effusion and on tympanostomy tubes removed from patients with chronic otitis media. It has been suggested that bacterial biofilms may be responsible for potentiating disease refractory to antibiotic therapy. We hypothesize that bacterial biofilms are present in mucosa of patients with chronic sinusitis. Moreover, we believe that frontal sinus stents placed during functional endoscopic sinus surgery (FESS) may serve as an easy way to study biofilms, similar to reports of bacterial biofilms on tympanostomy tubes.

Experiment: We studied frontal sinus stents made of silastic that were removed from XX patients up to 4 weeks after FESS. These stents underwent formalin fixation and subsequent study with scanning electron microscopy (SEM) for the presence of bacterial biofilms.

Results: We identified evidence of bacterial biofilms on the frontal recess stents in 3 of 4 patients under visualization by SEM. 2 of these patients had sinus cultures positive for *Pseudomonas Aeruginosa* and *Staphylococcus Aureus*, organisms known to form biofilms. Bacterial biofilms were identified by standard morphology, including evidence of glycocalyx, water channels, and three-dimensional structure. These images were similar when compared to other images in the literature of known biofilms.

Conclusions: This is evidence of the presence of bacterial biofilms on frontal sinus stents in patients with chronic sinusitis. Some of these patients have also shown cultures positive for organisms known to form biofilms. Further study into the role of bacterial biofilms in perpetuating chronic sinusitis is warranted.

11:33 am

Acute Exacerbations of Chronic Rhinosinusitis (AECS) After Endoscopic Sinus Surgery Are Infectious and Caused by Staphylococcus Aureus and Gram-Negative Agents

Abdulmohsen Hussain, MD

Xavier Rodriguez, MSc

Martin Desrosiers, MD

Montreal, Canada

Introduction: Despite having undergone endoscopic sinus surgery (ESS) for chronic rhinosinusitis (CRS), a percentage of patients will have acute recurrences of symptoms of CRS.

Treatment of these patients represents a challenge, as there are no guidelines for management. As reports have suggested a shift to Staphylococcus Aureus (S Aureus) and Gram-negative bacteria after ESS, current treatment strategies derived from management guidelines for acute bacterial maxillary sinusitis (ABMS) may be inappropriate for this population.

Objectives: We propose to evaluate incidence of infection and type of bacterial flora responsible for acute exacerbations of chronic rhinosinusitis (AECS) following ESS.

Methods: Between October 2002 and March 2003, patients presenting with AECS (at least 12 weeks post-ESS with less than 30 day aggravation of baseline symptoms with evidence of purulent secretions on nasal endoscopy) underwent endoscopically-guided cultures of the involved sinuses.

Results: 41 consecutive patients meeting criteria were cultured. 36 patients (81%) were infected with at least one species. 56 organisms were identified, for an average of 1.4 organisms/patient. Of the 41 patients, 19 grew S Aureus (46%), 10 coagulase – staphylococci (24%), 8 gram- negative agents (19%), and 3 Pseudomonas Aeruginosa (7%). While 6 patients grew either Streptococcus Pneumoniae or Haemophilus Influenzae (14%), only 2 patients (5%) grew them as sole agents.

Conclusion: AECS after ESS is associated with infection in 81% of patients. In contrast to ABMS, S Aureus and Gram- agents predominate. Therapy for post-ESS AECS should include coverage of these agents. Culture directed antibiotic therapy is recommended, particularly in resistant cases.

11:40 am

Discussion

25

11:45 am

Poster Moderators Review and Comments

12:00 pm

American Rhinologic Society Business all ARS Members invited to attend Issues confronting the practicing rhinologist

Moderators

Donald C. Lanza, MD

James A. Hadley, MD

12:30 pm

**Luncheon Symposium
(sponsored by Abbott Labs)
Antimicrobial Update in Rhinology:
Perspectives from the Sinus & Allergy
Health Partnership**

Michael S. Benninger, MD

**Discussion and Audience
Response Questions**

26

Adjunctive Medical and Surgical Techniques

Moderators

Martin Desrosiers, MD

Brad Marple, MD

1:30 pm

Effect of Saline Irrigation on Symptoms After Endoscopic Sinus Surgery: A Randomized, Controlled Clinical Trial

Jayant M. Pinto, MD

Samy Elwany, MD

Fuad M. Barody, MD

Robert M. Naclerio, MD

Chicago, IL

Objective: Saline irrigations are commonly recommended after endoscopic sinus surgery. These irrigations include normal saline, a purported treatment of chronic sinusitis which can improve sinonasal symptoms, and hypertonic saline, which can promote mucociliary clearance, a theoretical beneficial effect in the postoperative setting. Unfortunately, few studies have examined the role of these agents in routine endoscopic postoperative care.

Methods: We performed a randomized, controlled clinical trial to determine the effect of saline irrigation on symptoms in adults undergoing endoscopic sinus surgery. Patients were randomized to receive normal (0.9%) saline irrigations (n=20), hypertonic (3%) saline (n=20), or no irrigation (n=20) in the postoperative period. Subjects were blinded with regard to the sprays. Remaining postoperative instructions and care, including antibiotics and pain medication were per routine of the attending surgeon. A modification of the Chronic Sinusitis Survey was used to measure symptoms of headache, congestion, pain, insomnia, and drainage, and pain medication usage was recorded daily until the first postoperative visit.

Results: The groups were matched with regards to age, gender, atopic status, smoking, revision case, septoplasties or use of post-operative steroids (P>0.05). Symptoms were mild and pain medication use low. Symptoms of pain and nasal discharge were higher in the hypertonic saline irrigation groups as compared to the group with no irrigation during the second and third postoperative days (P<0.05). Additionally, pain symptoms were

higher in the normal saline group as compared to the no irrigation group on the second postoperative day (P<0.05). In all groups these symptoms were similar by postoperative day five. This correlated with pain medication usage, which was highest in the hypertonic saline group. There was no difference in symptom scores for headache, insomnia, or congestion between the groups (P>0.05).

Conclusions: Our results suggest that both forms of saline irrigations do not improve overall patient comfort after sinus surgery. The use of saline irrigation after sinus surgery is not useful for patient symptomatic comfort and may interfere with compliance to other aspects of the postoperative care

1:37 pm

Treatment of Allergic Fungal Sinusitis with Reduction of Environmental Air Fungal Load and Anti-microbial Nasal Sprays

*Donald P. Dennis, MD
Atlanta, GA*

Introduction: Mayo Clinic study of 9-99 found 93% of all chronic rhinosinusitis (CRS) was due to Allergic fungal sinusitis (AFS). AFS is caused by an immune response to the fungal antigen on the nasal mucosa. The purpose of the study was to determine if antigen (fungus) removal in the air and nasal mucosa would reverse the disease and normalize the mucosa.

Methods: 639 patients with AFS were studied. One-hour gravity SDA agar plate exposures and Endoscopic nasal photographs were accomplished in the patient's environment before and after environmental remediation. Nasal fungal cultures were accomplished initially with nasal swabs directly on SDA agar. A protocol was developed to reduce mold in the environmental air and to reduce mold in the nasal mucosa.

Results: 639 patients were studied over 14 years. 365 of 639 were able to achieve a mold count of less than 4 per one hour plate exposure. 343 of 365 or 94% showed normal nasal mucosa without infection. Of the 22 who failed to normalize the nasal mucosa, 3 had lymphoma and 19 had positive nasal fungal cultures. 219 did not reduce the mold count below 4 colonies and had various degrees of mucosal disease remaining.

Conclusion: AFS is caused by an immune response to fungal antigen. When the antigen is removed from the nose and air, the immune reaction stops and the mucosa normalizes. Exceptions to this are other underlying diseases or failure to find the location of mold exposure.

1:44 pm

The Role of Mitomycin-C in Preventing Synechia and Stenosis after Endoscopic Sinus Surgery—A Long Term Follow-Up

*Abtin Tabaee, MD
Clark Huang, MD
Ashutosh Kacker, MD
Vijay Anand, MD
New York, NY*

Hypothesis: Topical application of mitomycin-C reduces the incidence of stenosis and synechia formation following endoscopic sinus surgery. **Study Design:** Randomized, controlled, single blinded study based in a tertiary care teaching hospital

Material and Methods: After routine endoscopic sinus surgery, a pledget soaked in mitomycin C (0.5%) was randomly placed into the middle meatus of one nasal cavity for 5 minutes and a pledget soaked in saline was placed in the contralateral side in each patient. A blinded observer followed the patients for any evidence of stenosis or synechia formation. The medical records of enrolled patients were reviewed for demographics, diagnosis, prior surgery, type of sinus surgery, complications, incidence of stenosis / synechia and need for further procedures.

Results: 29 patients were included in the final analysis. The mean follow up period was 15 months (range 3-32 months). There were no complications in this series. 8 patients experienced 10 episodes of synechia formation and 1 patient experienced 1 episode of synechia formation and 1 episode of stenosis of the maxillary sinus ostium. 7 of the 12 episodes of synechia/stenosis occurred on the side of the mitomycin C application and the remaining 5 occurred on the side opposite to the mitomycin C application. This was not a statistically significant difference.

Conclusion: The topical application of mitomycin-C did not decrease the incidence of stenosis and synechia formation following endoscopic sinus surgery.

1:51 pm

Effect of Estrogen on Olfactory Neuron Connections to the Olfactory Bulb

*Samuel G. Shiley, MD
Karen J. Fong, MD
Dennis R. Trune, MD
Portland, OR*

Background: Clinical evidence suggests a possible influence of estrogen on the olfactory system. Estrogen receptor protein and mRNA have been identified in olfactory receptor neurons, but the impact of estrogen on olfactory neuron physiology is unknown.

Objective: To determine whether varying serum estrogen levels affects the number of olfactory neurons that make a connection to the olfactory bulb.

Methods: Olfactory neurons in the olfactory epithelium were labeled using a retrograde tracer (biotinylated dextran amine) injected into the olfactory bulb. Labeled neurons were then quantified in coronal sections of the olfactory epithelium of normal adult female rats (n = 5) and ovariectomized rats receiving either vehicle (OVX, n = 5), 4 mg E2/kg/day (OVX + E4, n = 5) or 40 mg E2/kg/day (OVX + E40, n = 5) for 2 weeks.

Results: Average olfactory neuron counts were increased in normal animals (79.9 neurons/section) and animals receiving low estrogen replacement (E4: 96.0) as compared to animals receiving vehicle alone (OVX: 67.2) or high estrogen replacement (OVX + E40: 65.2). However, one-way ANOVA did not demonstrate any significant differences between groups with respect to neuron counts.

Conclusion: Physiologic estrogen levels may have a positive effect on the number of olfactory neurons reaching their target organ, the olfactory bulb. High estrogen levels may have an inhibitory effect. However, due to small sample size and high variance, statistically significant differences were not identified in this pilot study.

1:56 pm

Discussion and Audience Response Questions

Moderators

*Don Leopold, MD
John DelGaudio, MD*

2:01 pm

The Use of Acoustic Rhinometry in Evaluation of the Obstructive Sleep Apnea Patient

*Luc G. Morris, MD
Kelvin C. Lee, MD
Richard Lebowitz, MD
Joseph Jacobs, MD
New York, NY*

Introduction: The relationship between nasal airway function and obstructive sleep apnea (OSA) remains unclear. Several investigators have demonstrated that correction of nasal obstruction can significantly improve nighttime breathing and nasal CPAP tolerance. However, nasal obstruction may not play a role in all cases of OSA; an effective method of stratifying these patients is needed. The patient's subjective perception of nasal obstruction may not be the most effective means of evaluating the nasal airway.

Methodology: In this study of thirty patients with OSA, we prospectively review the clinical history of nasal symptoms, sleep symptoms, and physical findings, and perform acoustic rhinometry measurements of nasal airway shape and volume, followed by hospital-based polysomnography and nasal CPAP titration. We compare subjective perception with objective measurement of nasal obstruction, and also describe the relationship of nasal airway caliber to severity of OSA, nasal CPAP titration level, and the relative success of nasal CPAP.

Results: The patient's reported nasal symptoms often did not reflect the level of nasal obstruction as found on physical exam or as measured by acoustic rhinometry. While acoustic rhinometry measurements were not directly related to OSA severity in all patients, in many patients acoustic rhinometry appeared to be related to nasal CPAP titration. These relationships are discussed.

Conclusions: Nasal airway function may be a significant component of OSA in some patients. The use of acoustic rhinometry along with physical examination to describe nasal airway obstruction may be helpful in the evaluation and treatment of the OSA patient.

2:08 pm

Effects of the Nasal Muscles on the Nasal Airway

Matthew A. Kienstra, MD
Holger G. Gassner, MD
David Sherris, MD
Eugene B. Kern, MD
Tampa, FL

Abstract: Introduction: The nasal muscles and their function are not clearly defined. The nasal muscles are generally thought to act synergistically to produce mimetic motion and affect the nasal airway. We proposed to examine directly the effects of the nasal muscles on the nasal airway. Methods: Rhinomanometry was performed on volunteers. Following paralysis of the nasal muscles with lidocaine, rhinomanometry was performed again to measure nasal airway function both with the patient at rest, and attempting to flare his/her nostrils. Each patient's rhinomanometric results (at rest, and attempting to flare the nostrils) taken prior to injection of lidocaine served as the control for comparison of his/her results post injection. The structural tension of the ala at rest and with active flaring of the nostril was also measured, and the results pre- and post paralysis with lidocaine were compared. Results/Conclusions: The data from both the stiffness (structural tension) and airflow portions, taken together, support the following conclusions. Firstly, the paralysis was significant, although not complete. Clinical and stiffness data supported complete paralysis. Airflow data, which we think most sensitive, supports a statistically significant affect of the injection, although incomplete paralysis. All of the evidence supports an important role for the nasal muscles when actively used to increase nasal airflow. Secondly, the majority of the evidence supports an important resting nasal muscle tension that opens the nasal airway.

2:15 pm

Analysis of Possible Cross-Contamination with the Venturi Atomizer System

Joseph M. Scianna, MD
James Chow, MD
Andrew J. Hotaling, MD
Maywood, IL

Purpose: The physics implemented by the Venturi atomizer system suggest a possibility of bacterial colonization and the potential for cross-contamination. A protocol for use of the atomizer and a clinically appropriate demonstration of cross-contamination has not been established.

Methods/Measures: One control and two test atomizers filled with 1% pontocaine and 2% ephedrine were used during a five-day study period. Clinic staff were instructed to use a nozzle tip, a nasal speculum, avoid contact between the atomizer and the patient, and apply a continuous, less than one second spray to the nasal cavity. Samples were obtained from each of the atomizers three times per day, and plated on chocolate agar plates. The number and type of bacterial colony were registered.

Results: No respiratory pathogens grew from any of the plated samples. Twelve bacterial colonies were plated from 9 of 30 possible culture plates. Of the twelve bacterial colonies formed, 6 colonies of coagulase negative staphylococcus, 5 colonies of *Bacillus* sp. and 1 colony of corynebacterium were identified. There was no evidence of an increasing number of colonies per plate over time to suggest contamination, nor was there persistence of any particular bacteria cultured over time to suggest contamination.

Conclusions: There is no risk of contamination of patients with the use of the Venturi atomizer system as performed in this study. Culture results from this study were consistent with random culture contamination during the plating and culturing period. There was no evidence to support the idea of bacterial colonization of the atomizers.

2:22 pm

Discussion and Audience Response Questions

Moderators

*Peter Hwang, MD
Robert Kern, MD*

2:27 pm

Utilization and Efficacy of Hyaluronic Acid – Carboxymethylcellulose (HA-CMC) Wafer in Prevention of Synechiae Reformation in the Clinic Setting

*Noam A. Cohen, MD
James N. Palmer, MD
Philadelphia, PA*

Introduction: The primary goal of functional endoscopic sinus surgery is the restoration of adequate ventilation and mucociliary clearance of the nasal sinus cavities. A common cause for continued sinus disease is lateralized adhered middle turbinate to the lateral nasal wall. This immediate postoperative result requires synechia lysis in the clinic setting. Often the lateralized middle turbinate has intrinsic recoil that causes the two newly cut mucosal surfaces to come into opposition resulting in synechiae reformation. Multiple materials have been used in our experience to provide a space between these two surfaces. No material has previously reached the ideal space occupying, inert material. We report our experience with the use of HA-CMC wafer as a spacer following lysis of synchia in the clinic. The intrinsic hygroscopic and inert properties of HA-CMC are ideal for placement as a spacer and result in optimal outcome.

Methods: 15 patients in the immediate post operative period were seen in the clinic for routine debridement and found to have early synechiae formation. Following lysis of these adhesion bands HA-CMC was placed as a spacer between the raw mucosal surfaces. Patients were followed on a weekly basis for evidence of synichiae reformation.

Results: In the fifteen patients that HA-CMC were used as spacer there was no evidence of synichiae reformation at 6 months followup. There were no complications associated with the use of HA-CMC.

Conclusions: This study demonstrates the use of HA-CMC as an ideal biomaterial for use in the clinic setting to reduce synechiae reformation following lysis in the post operative period.

2:34 pm

Platelet Gel in lieu of Packing for Endoscopic Sinus Surgery

*Jay M. Dutton, MD
Kris Larsen, PA-C
Chicago, IL*

Background: The use of packing following endoscopic sinus surgery involves significant discomfort for patients and entails the risks of infection or even aspiration. Platelet gel is a blood product with excellent hemostatic and wound healing properties that make it theoretically ideal for use in endoscopic sinus surgery. While this product has been successfully utilized in a number of medical fields including head and neck applications in facial plastic surgery and oral surgery, its use has not been described in endoscopic sinus surgery until now.

Methods: This study describes the preliminary use of platelet gel in a small cohort of patients undergoing endoscopic sinus surgery. The basic science of platelet-rich plasma is described, and the operative technique (including a video demonstration), risks, drawbacks and advantages of this procedure are further discussed.

Results: All patients in this study were successfully managed without the use of endonasal packing, with no bleeding complications reported. Initial concerns about postoperative patency of the ethmoid sinus cavity and middle turbinate lateralization were unfounded. The patients and authors both subjectively felt that the recovery time was reduced both in terms of symptoms and endoscopic evaluation of the sinus cavities, although long-term that difference was negated.

Conclusions: Platelet gel appears to be a very promising way to promote wound healing and hemostasis while avoiding packing in the postoperative period following endoscopic sinus surgery. These preliminary results support a long-term, prospective controlled study on the use of platelet gel compared to traditional packing techniques.

2:41 pm

Discussion and Audience
Response Questions

2:45 pm

Break with Exhibitors

3:15 pm

Panel Discussion: Patient Advocacy Issues

Michael Sillers, MD

4:10 pm

Discussion and Audience
Response Questions

Radiographic Evaluation

Moderators

Roy Casiano, MD
Eugenia Vining, MD

4:10 pm

Radiographic Variation of Nasofrontal Recess Anatomy

Alec Beningfield, MD
Giridhar Venkatraman, MD
Patricia Hudgins MD
John DelGaudio, MD
Atlanta, GA

Introduction: Recent application of image-guided surgery and multiplanar reconstruction allows more precise understanding of nasofrontal recess anatomy. CT scans of the nasofrontal recess from primary and revision cases were reviewed to determine the relationships between nasofrontal recess anatomy and frontal sinusitis.

Methods: A retrospective review of CT scans from primary and revision frontal sinus cases was performed by generating multiplanar reconstructions of the images. Images were analyzed for agger nasi cells, frontal cells, size of the nasofrontal recess and presence of frontal sinusitis. Both sides were recorded and analyzed independently.

Results: Frontal sinus cells were present in 31% of primary and 25% of revision cases. Agger nasi cells were identified in 91% of primary and 43% of revision nasofrontal recesses. With frontal sinus cells present frontal sinusitis was found in 20% of primary and 22% of revision sinuses. Without frontal sinus cells present sinusitis was present in 37% of primary and 43% of revision sinuses. Frontal sinusitis was seen in 30% of sinuses with a residual agger nasi and 36% of sinuses with no residual agger nasi. The mean A-P diameter of the frontal sinus isthmus is 7.2 mm with no frontal cell present and 8.6 mm with a frontal cell present. The A-P diameter of the isthmus is 7.7 mm in the presence of frontal sinusitis and 6.9 mm when sinusitis is not present.

Conclusions: In a group of surgical patients with sinusitis, agger nasi cells and frontal cells are found at similar rates before and after surgery, indicating that they are not being completely addressed at surgery. These residual cells do not appear to impact development of recurrent frontal sinusitis after frontal sinus surgery. The size of the frontal sinus isthmus is not related to the presence of these cells and the likelihood of developing sinusitis is not dependent upon the size of the isthmus in either primary or revision sinuses.

4:18 pm

Regions of the Sinus CT Scan that Predict Symptoms

Eric H. Holbrook, MD
Christopher L. Brown, MD
Elizabeth R. Lyden, MS
Donald A. Leopold, MD

Omaha, NB

Background: Patients with symptoms associated with rhinosinusitis frequently present to their physicians for care. One commonly used diagnostic tool is the sinonasal computer tomography (CT) scan, however, little data exists to correlate symptoms with CT findings.

Methods: Immediately preceding CT of the sinuses, sixty-three subjects with no evidence of trauma or previous sinus surgery completed the RSOM-31 symptom questionnaire and were asked to locate areas of pain. Scans were graded according to the Lund-Mackay system, and agger nasi and ethmoid bulla cells were measured. Data from CT scans and symptom/pain questionnaire responses were analyzed for correlations.

Results: The unilateral Lund-Mackay score did not predict areas of pain or any symptom scores from the seven RSOM-31 subsets. Opacification of individual sinuses including agger nasi or ethmoid bulla cells did not correlate with site or number of areas of pressure/pain, but did correlate with the RSOM-31 nasal subset scores for the right posterior ethmoid sinus, sphenoid sinus, osteomeatal unit, and agger nasi cell. There was no statistically significant correlation between size of the agger nasi or ethmoid bulla cells and symptoms measured by RSOM-31. However correlations between the right agger nasi cell size and pain behind the right eye as well as the left ethmoid bulla size and pain medial to the left eye were identified.

Conclusions: Summed measures of unilateral sinus opacification do not correlate with symptoms, however opacification of several specific regions do. The size of the agger nasi and ethmoid bulla cells may predict areas of facial pain.

4:26 pm

Three-Slice Computerized Tomography for Diagnosis

Can Alper Cagici, MD
Ozcan Cakmak, MD
Cem Hurcan, MD
Fahri Tercan, MD
Adana, ???

Introduction: Plain sinus radiography is the imaging technique most frequently used to investigate suspected sinusitis, but it has low diagnostic sensitivity. Contiguous paranasal computerized tomography (CT) gives detailed information about pathology, anatomy and anatomical variations of paranasal sinuses, but this method also has limitations. The cost of using this technique for all cases of suspected sinusitis is prohibitive, and complete CT scans involve considerable radiation exposure. In comparison, a model such as three-slice CT for diagnosing and following sinusitis cases would be more economical and would greatly reduce radiation exposure.

Methods: In this retrospective study, three physicians independently reviewed the contiguous coronal paranasal CT studies of 136 patients. The same three slices were selected for each case to form the "three-slide CT" exam, and the same physicians independently evaluated this set. Using the results from the contiguous set as the gold standard, we calculated the sensitivity and specificity of three-slice CT for identifying sinusitis.

Results: The sensitivity and specificity of three-slice CT for identifying inflammatory sinus disease were 92,6% and 95,1%, respectively.

Conclusion: Three-slice CT is a valuable method for diagnosing and following sinusitis cases, and would be cheaper and require less radiation exposure than contiguous coronal CT. However, despite the high cost and greater radiation exposure, contiguous CT remains the gold standard for evaluating detailed sinus anatomy and progression of disease.

4:34 pm

**Analysis of Methods to Assess Frontal Sinus
Extent in Osteoplastic Flap Surgery:
Transillumination vs. Six Foot Caldwell vs.
Image Guidance**

Christopher T. Melroy, MD
Marc G. Dubin, MD
Brent A. Senior, MD, FACS
Chapel Hill, NC

Objective: To compare three common methods (transillumination, plain radiographs, and CT image guidance) for estimating the position and extent of pneumatization of the frontal sinus in osteoplastic flap surgery.

Methods: Axial computerized tomographic (CT) scans and six foot Caldwell plain radiographs were performed on 10 cadaver heads. For each head, the soft tissue overlying the frontal bone was raised and the anticipated position and extent of the frontal sinus at four points was marked using three common methods. The silhouette of the frontal sinus from the Caldwell plain radiograph was excised and placed in position. Four points at the periphery were also made using information obtained from a passive optically-guided image guided surgery device while transillumination via a frontal trephination was also used to estimate the sinus extent. The true sinus size was measured at each point and compared to experimental values.

Results: There was no difference between Caldwell and CT guided estimation ($p=0.314$). A statistically significant difference between transillumination and both Caldwell (0.001) and image guided ($p=0.003$) methods was seen.

Conclusion: Accurate and precise estimation of the position and extent of pneumatization of the frontal sinus is crucial when performing osteoplastic flap surgery. While no difference exists between image guidance and Caldwell radiographs, both methods are superior to transillumination.

4:42 pm

**Discussion and Audience
Response Questions**

4:50 pm

**Presentation of Awards for
Research and Posters**

Allen Seiden, MD

5:00 pm

Closing Remarks

Donald C. Lanza, MD
James A. Hadley, MD

Poster Presentations

Flow Cytometry: A Powerful Tool to Analyze the Inflammation in Nasal Polyps

Murugappan Ramanathan, Jr., MD
Matthew W. Ryan, MD
Galveston, TX

Introduction: Nasal polyposis is the ultimate manifestation of sinonasal inflammation. As such, nasal polyps are a useful tissue model to study the processes involved in various diseases which cause sinonasal inflammation. Commonly applied techniques like immunohistochemistry or in situ hybridization provide only a qualitative description of the inflammatory infiltrate in nasal polyps. In this study, we introduce a novel flow cytometry-based approach to quantitatively study the lymphocyte populations involved in nasal polyposis.

Methods: Single cell suspensions were created from resected polyp tissue. Cell staining was carried out with FITC/PE/PerCP conjugated monoclonal antibodies for TCR $\alpha\alpha$, TCR $\beta\beta$, CD3, CD8, CD4, CD19, and CD16/56. Cell populations were analyzed by 2 color flow cytometry with a BD FACScan flow cytometer and data analyzed using CellQuest software.

Results: Flow cytometric analysis clearly distinguished discrete populations of lymphocyte subsets using 4 samples from patients with 'allergic' and 'non-allergic' polyps. Average lymphocyte populations consisted of 63% $\alpha\alpha$ T cells, 3.6% $\beta\beta$ T cells, 28% CD4+CD3+T cells, 27% CD8+CD3+T cells, 8% CD19+B cells, 11% Natural Killer Cells, and 7% NK T cells. There was surprising homogeneity of lymphocyte subset populations despite different etiologies of nasal polyposis and different degrees of steroid exposure.

Conclusion: This study describes a novel method to extract the lymphocytic inflammatory infiltrate from nasal polyps, characterize these cells with flow cytometry, and analyze the inflammatory processes of a variety of diseases which cause nasal polyposis. Initial results reveal a consistent lymphocyte subset profile in eosinophilic nasal polyps regardless of etiology or steroid exposure.

Choanal Atresia Mistaken as Antrochoanal Polyp in a 13 Year Old Girl; Retrospective Clues and Surgical Correction

Scott R. Schaffer, MD, FACS
Voorhees, NJ

Introduction: A teenage girl with a long history of nasal obstruction/congestion/sinusitis presented to our office with an apparent antrochoanal polyp by nasal endoscopy and CT scan. Endoscopic surgery was planned. After removal of the polyp, the nasal airway was seen to be abnormally dilated. Unilateral choanal atresia was discovered.

Methods: The patient then underwent a secondary endoscopic procedure. The atretic choanal membrane was resected along with the posterior septum and posterior end of the middle turbinate. Mitomycin 2 mg/ml was applied to the membranes before an intranasal stent was positioned and sutured in place. The patient was maintained on antibiotics, analgesics, and oral and nasal steroids postoperatively and seen frequently in the office.

Results: Two months after stent removal, the patient was breathing well and demonstrated improved resonance of her voice. She could blow her nose and had no signs or symptoms of sinusitis. Nasal endoscopy confirmed patency of the choana and normal mucociliary flow. Retrospective review of the CT scan showed canting of the floor of the nose, lateralization of the lateral nasal wall and tilting of the skull base, all of which increased the volume of the nasal airway on the involved side.

Conclusions: Unilateral nasal obstruction in older children may be the result of unrecognized choanal atresia. Careful endoscopic examination and review of the CT scan may suggest the diagnosis, since findings of abnormal facial growth may be secondary to posterior nasal obstruction. Endoscopic nasal/sinus surgery can be successful at restoring normal function.

Foreign Body of Sphenoid Sinus Following an Explosion: Case Report and Literature Review

Abdulmohsen E. Hussain, MD
B. Al-Sabah, MD
M. Desrosiers, MD
Montreal, Canada

Introduction: Foreign body of the sphenoid sinus is a rare condition but can be severe because of intimate relationship to vital structures. We present successful management of posttraumatic

foreign body of the sphenoid sinus, and summarize the literature to outline management guidelines for this rare condition.

Clinical case: A 41-year-old female was referred to our center with a chronic complaint of persistent bilateral frontal headache and nasal obstruction. In 1983 she had been a bystander victim of a bomb explosion, and over the following twenty years she underwent numerous reconstructive procedures with multiple sinus procedures at different institutions.

Examination revealed facial deformity with loss of both eyes and extensive scarring. Nasal endoscopy demonstrated posttraumatic changes with damage to the lateral nasal wall, absence of the septum, and extensive crusting with no mucopurulent nasal discharge or any evidence of infection. Computed tomography (CT) of the paranasal sinuses demonstrated evidence of the trauma and an unusual opacification of the sphenoid sinus extending into the clivus. Surgical exploration was performed via endoscopic sinus surgery (ESS). A total of 17 fragments of glass were removed from the sphenoid sinus. However, the patient had only partial relief from her headache post operatively.

Eight weeks later repeat CT scan was performed and showed a persistence of one fragment of glass embedded in the body of sphenoid. Revision ESS was performed and successfully removed it.

Outcome: The patient had immediate relief of symptoms. She remains free of headaches and infection six months post-operatively.

Endoscopic Drainage of a Petrous Apex Cholesterol Granuloma

Carl H. Snyderman, MD

Allison C. Ford, MD

Amin B. Kassam, MD

Pittsburgh, PA

Cholesterol granulomas may arise within the petrous apex of the temporal bone. Treatment usually consists of drainage of the cyst into the mastoid cavity when complete excision is not feasible. Surgical access may require a middle fossa approach when pneumatization of the temporal bone is poor. We present a case of cholesterol granuloma of the petrous apex that was effectively drained using endoscopic techniques. A 38 year-old male presented with complaints of unilateral decreased hearing, tinnitus, and facial pain/ pressure. Radiologic studies (CT and MRI) demonstrated an expansile lesion of the petrous apex in close proximity to the petrous carotid artery. Due to poor pneumatization of the temporal bone, a transnasal approach was recommended. An endoscopic sphenoidotomy with drilling of

bone from the floor of the sphenoid sinus and clivus was performed using image guidance. The cyst was entered medial and inferior to the cavernous portion of the carotid artery. A Silastic stent was placed to maintain patency. Postoperatively, his symptoms were markedly improved and radiological imaging demonstrated adequate drainage and placement of the stent.

This represents a unique approach for the drainage of cholesterol granulomas involving the petrous apex. Advantages include avoidance of a craniotomy, faster recovery, minimal postoperative symptoms, and shorter hospitalization.

The Role of Computer Assisted Surgery in Endoscopic Management of Sino-Nasal Cerebrospinal Fluid Rhinorrhea

Abtin Tabaee, MD

Tali Lando, MD

Ashutosh Kacker, MD

Vijay Anand, MD

New York, NY

Introduction: The management of sino-nasal cerebrospinal fluid (CSF) rhinorrhea remains a challenge despite advances in technology. Although craniotomy affords direct access and exposure to the site of the defect, the associated morbidities support minimally invasive extra-cranial approaches.

Materials and Methods: This is a retrospective chart review of patients who presented with CSF rhinorrhea to the New York Presbyterian Hospital and affiliate institutions between 1994 and 2003. Charts were reviewed for indications, location of leak, type of procedure, prior closure attempts, duration of leak prior to procedure, graft materials, adjunct materials, intra-operative and post-operative complications and need for revision.

Results: Data from 27 patients who underwent extracranial repair of a CSF leak was analyzed. There were 10 males and 17 females with a mean age of 48 years (range 28-63 years). The etiology of the leak was previous sinus surgery in 40.7% of the cases, trauma in 22.2% of cases, spontaneous leak in 26%, and skull based surgery causing the leak in 11.1% of patients. The leak occurred on left side in 56% of cases and bilaterally in only 2% of cases. The most common site of leak was the fovea ethmoidalis (48.1%), with cribriform plate and sphenoid sinus comprising a similar percentages of cases (33.3% and 26%, respectively). A concomitant encephalocele or meningocele was present pre-operatively in 37% of patients. All patients underwent an endoscopic sinus approach and repair of the defect using graft material. Image guidance was employed in 59.2% of first attempt repairs. Graft materials used included conchal cartilage, septal cartilage, temporalis fascia, hydroxyapatite and

chondral cartilage. Adjunct materials included floseal, tiseal, fibrin glue and avatene slurry. There were no major intra-operative complications. After initial attempt, >80% success rate was achieved. Six patients required a total of 8 revision procedures (7 endoscopic closures and 1 ventriculo-peritoneal shunt) for recurrent CSF rhinorrhea. Two patients had meningitis which resolved without sequelae. The mean length of follow-up was 1.7 years (ranges 1 month-8.5 years).

Conclusion: Endoscopic closure of CSF rhinorrhea represents a minimally invasive and highly successful procedure. The use of image guidance may allow the surgeon increased safety and improved anatomic orientation, especially in cases of revision sinus surgery.

Isolated Sphenoid Sinusitis After Pituitary Surgery

*Pete S. Batra, MD
Martin J. Citardi, MD, FACS
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Background: Literature addressing the incidence and management of sinusitis after transsphenoidal hypophysectomy is sparse. Methods: Retrospective chart analysis was conducted on 200 consecutive transsphenoidal procedures at our institution from January 1998 through December 2001. The incidence of postoperative sinusitis was determined. Clinical characteristics, management strategy, and outcome were reviewed for patients evaluated by the otolaryngology service.

Results: Fifteen of the 200 patients (7.5%) developed sinusitis after transsphenoidal surgery. Seven of the patients were sent to our department for further management. Two additional patients were sent from outside institutions. Eight of 9 patients (89%) had isolated sphenoid sinusitis by CT and/or endoscopic criteria. Most common symptoms included headaches and nasal discharge present for an average of 1.4 years. Medical management resulted in resolution of symptoms in 5 of 9 cases (56%). The remainder 4 patients required endoscopic sphenoidotomy for recalcitrant symptoms. Intraoperatively, inspissated secretions and/or fungal balls were identified in 3 cases, while an infected fat graft was evident in one case. Sphenoid sinusitis successfully resolved in all 9 cases.

Conclusions: A high index of suspicion must be maintained to avoid an inordinate delay in diagnosis of isolated sphenoid sinusitis after transsphenoidal hypophysectomy, since the presentation is typically nonspecific. Aggressive medical and/or surgical treatment is required for resolution of refractory sinusitis in this patient population.

Choanal Stenosis: An Unusual Late Complication of Radiation Therapy for Nasopharyngeal Carcinoma

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Objectives: To report a unique complication of radiation therapy for nasopharyngeal carcinoma. Methods: We describe the clinical history, preoperative evaluation, surgical management, and postoperative course of a case of acquired choanal stenosis following radiation therapy.

Results: The patient, a 39-year-old female, presented with a history of nasopharyngeal carcinoma 16 years prior to presentation that had been successfully treated with radiation therapy. Upon presentation the patient complained of decreased nasal air flow. Bilateral choanal stenosis was confirmed per rigid nasal endoscopy. Transnasal endoscopic repair with mitomycin application was performed, and nasal stents were left in place for 6 weeks. Postoperative endoscopic examination showed patent choanae and a patent nasopharynx without stenosis. The patient continues to have good air flow 9 months postoperatively. Conclusions: Choanal stenosis is a recently recognized, rare complication of radiation therapy. This is the first report of such a complication in the West and the first report of successful management of acquired choanal stenosis using mitomycin.

Induced Anosmia

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Introduction: Zinc is extensively utilized throughout the body, supporting the activity of approximately 100 enzymes, the immune system, wound healing, the senses of taste and smell, and DNA synthesis. Zinc supports normal growth and development. The deleterious effects of both deficiency and toxicity (acute and chronic) are described. Beneficial zinc absorption takes place via enteral, parenteral, or cutaneous routes. Direct application to the olfactory epithelium, on the other hand, has long been known to be toxic, producing anosmia. This toxicity is thought to be due to the direct effect of the divalent zinc ions on olfactory receptor cells. Apparently overlooking this toxicity, however, intranasal zinc gluconate has recently been recommended as a treatment for the common cold.

Methods: We will present a series of patients with post-zinc anosmia. The mechanism of drug toxicity will be analyzed.

Results: While interindividual variation in drug response and drug toxicity is apparent, anosmia appears to be dose-related and permanent.

Conclusion: Zinc ions remain toxic to human olfactory epithelium, and continued reports of total, probably irreversible, anosmia, can be expected as long as intranasal zinc gluconate gel continues to be used. The recent extension of the use of to the pediatric age group is particularly alarming since this group is less likely to be able to describe the anosmia. Immediate discontinuation of the use of intranasal zinc recommended.

"Those who do not learn from history are doomed to repeat it."
— George Santayana (1863-1952), noted philosopher

Acanthamoeba Rhinosinusitis: A Case Study and Review of the Literature

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Introduction: To date, only six documented cases of Acanthamoeba rhinosinusitis have been reported in the world literature, and all were in HIV-infected patients. Only two cases have been treated successfully. Acanthamoeba is felt to be another opportunistic pathogen in addition to the already long list of opportunistic pathogens of the nose and paranasal sinuses known to cause rhinosinusitis in the immunocompromised patient.

Methods: We present a 31 year old end stage HIV-infected male with a long standing history of chronic rhinosinusitis who presented with a one week history of severe unilateral headaches and peri-orbital pain. Surgical debridement was carried out emergently with removal of an infected lamina papyracea.

Results: Intraoperative cultures were positive for Aspergillus Niger, Penicillium and Acanthamoeba was noted in the necrotic debris.

Conclusion: This report identifies Acanthamoeba as a potentially fatal cause of rhinosinusitis in the immunocompromised patient. Our experience, pathogenesis, diagnosis and potential treatment of this rare entity will be discussed and the literature reviewed.

Endoscopic Septoplasty and Sinus Surgery in an Adult with Unrepaired Cleft Palate Using Transoral Visualization

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Introduction: A 54 year old man with unrepaired cleft palate presented with nasal obstruction and recurrent sinusitis from septal deviation. Numerous medicines were unhelpful. Internal and external nasal deformities are associated with the absence of a nasal floor in patients with cleft palate. Typical anatomic patterns have been described, and chronic sinusitis is common. Septal repair in children with cleft palates is controversial because of possible facial growth retardation. In this adult, endoscopic septoplasty and sinus surgery was planned. The septal technique was modified to compensate for the lack of inferior support of the septum. The endoscopic work was performed through the nostrils, and visualization was aided by the use of a transoral endoscope.

Methods: The procedure was successfully performed without complication. The septum was straightened and thinned while preserving support struts. Quadralateral cartilage was harvested, manipulated, then reimplanted; mucoperichondrial flaps were approximated with quilting sutures. Endoscopic ethmoidectomy and maxillary antrostomy were also performed. Transoral endoscopic photographs demonstrate the surgical technique. The patient had septal splints for one week and routine postoperative sinus care for several weeks.

Results: The patient's symptoms resolved postoperatively. He suffered no bleeding, infection, hematoma, cicatrix or septal perforation. His nasal airway and sinus aeration/drainage improved bilaterally. He no longer required daily nasal medicines for symptom relief.

Conclusions: Endoscopic septoplasty and sinus surgery can be successfully and safely performed on adult patients with unrepaired cleft palate using a conservative endoscopic approach.

Incidence of Complications for Radiofrequency Reduction (SOMNUS) of Base of Tongue Surgery

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Introduction: Radiofrequency reduction (SOMNUS) of the tongue base has been described as an alternate method of

tongue reduction/stiffening procedures. It is typically used in conjunction with other sleep apnea surgeries. Its advantages include simplicity, coupled with a presumed low complication rate. This study was designed to review the complications of this procedure at our institution.

Methods: A two-surgeon retrospective chart review of intraoperative and postoperative complications in patients undergoing sleep apnea surgery, which included SOMNUS to the base of tongue was performed.

Results: 111 charts were examined. No intraoperative complications were noted. The total complication rate was 9.9% (11/111). Not all of these complications were specific to radiofrequency of the tongue base. The total radiofrequency specific complication rate was 7.2% (8/111) with 6.3% (7/111) of these complications being mild, and 0.9% (1/111) being severe. Mild complications included severe tongue ulcers requiring treatment, self-limited floor of mouth edema and self limited hypoglossal nerve injury. Severe complications included significant airway obstruction.

Conclusions: SOMNUS to the base of tongue is a safe procedure, but not without potential risk. Airway type complications all began to occur within 6 hours of completion of the procedure. Recommendations include observation of these patients for at least 6 hours prior to discharge, and the use of steroids perioperatively.

Objective Evaluation of Nasal Aiflow Using Neumotachography

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Objectives: To determine whether pneumotachography is a reliable and sensitive technique to detect changes in nasal airflow.

Methods: Patients with no current nasal symptoms or complaints were measured using pneumotachography during quiet and deep breathing. These baseline flow measures were repeated to ensure reproducible results. These patients are then treated with a topical decongestant and re-analyzed. This patient group was also treated with nasal saline spray and re-analyzed once again. This control group was used to ensure that any benefit could be attributed to a true vasoconstricting effect, rather than simple lubrication of irrigation of the nasal mucosa.

Results: Preliminary data suggests that pneumotachography provides reproducinle nasal airflow data. Airflow after using a topical decongestant was significantly greater than at the untreated baseline and with saline spray alone. Airflow after saline spray alone was statistically similar to the pretreatment airflow rate.

Conclusions: Current standards for nasal evaluation rely on rhinometric volume assessment and subjective patient accounts. Pneumotachography was able to detect changes in airflow due to topical decongestant use that were not noted with the use of saline alone. We believe objective airflow can be used as more sensitive outcome measure, and can correlate with subjective patient sensation of nasal breathing quality. Further studies with this promising technique can be applied to objectively assess medical and surgical treatment outcomes.

Postoperative Endonasal Dressing with Polymeric Membrane Material

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A prospective study of 236 patients undergoing 287 nasal surgical procedures was performed. Nasal septal reconstruction (NSR) was performed in 187 and endonasal sinus surgery (ESS) in 85. All patients had polymeric membrane wound dressing material used for their postoperative intranasal dressings. Quantitative study of pain and bleeding during dressing removal was noted on a 0 – 4 scale. Scoring was recorded as follows: 0= no bleeding/ pain, 1 = mild pain/slight bleeding< 1 minute duration, 2 = moderate pain/ hemorrhage lasting >1 minute but not requiring repacking, 3 = severe pain/ bleeding requiring repacking, 4 = excruciating pain/hemorrhage requiring return to surgery. Patients were also monitored for postoperative hemostasis, toxic shock syndrome, synechial formation, dressing migration, support of septal reconstruction, and dressing odor. NSR patients had a composite pain score of 0.38 and bleeding score of 0.27. Anterior dressing migration occurred in 2/187 patients and posterior migration in 1/187. No synechiae were noted in the NSR group. ESS patient's had a composite pain score was 0.66 and bleeding score of 0.35. . No dressing migrations occurred. Non-obstructing synechiae were noted in 2/85 ESS patients. Toxic shock syndrome and hypersensitivity reactions were not noted in either group. Dressing odor was minimal on dressing removal. Immediate postoperative hemostasis was excellent with no patients requiring repacking of the nose. In summary, polymeric membrane dressings are a safe cost effective intranasal dressing with excellent hemostatic and wound healing properties

CT and MRI Characteristics of Allergic Fungal Rhinosinusitis

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Introduction: The characteristic findings of allergic fungal rhinosinusitis (AFS) on non-contrast CT and gadolinium enhanced MRI are clinically important for diagnosis and treatment planning. These classic findings include a unilateral predominance of disease, and a serpiginous, lamellated appearance of the involved sinuses with or without sinus expansion.

Methods: Cases of documented AFS are presented with an examination of their CT and MRI imaging. Intraoperative findings are correlated with these imaging studies. Other diseases with a similar radiologic appearance are also presented.

Conclusions: Certain characteristic findings on CT should alert one to the possible diagnosis of AFS. When these findings are not accompanied by an elevated total IgE, fungal-specific IgE, or polyps, an MRI should be obtained to assist with the differential diagnosis.

Toxic Shock Syndrome and Nasal Surgery

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Post septorhinoplasty Toxic Shock Syndrome (TSS) is a rare but potentially fatal complication. This paper will review a tragic case, which occurred at a large residency training program. In addition, the disease process of TSS and its association with nasal surgery will be reviewed.

A twenty seven year old female died from TSS after routine nasal surgery. A detailed chronology of this case will be presented. The case will emphasize how TSS can be insidious in nature. The classic symptoms of fever, chill, headache, and rash are not always present at the outset of the disease. Proper preoperative counseling is critical in early recognition of TSS. The surgeon and the patient need to have a healthy suspicion that vague constitutional symptoms after nasal surgery can represent TSS. Multiorgan system failure and shock can develop quickly after vague constitutional symptoms.

TSS is associated with colonization of "Staphalococcus aureus" and the production of a toxin. TSS and its association with superabsorbent vaginal tampons was well publicized in the

1980s, however, 11% of TSS cases are unrelated to menstrual cycle products.

TSS following nasal surgery is very rare, occurring in about 1 in 6,000 cases. Overall mortality estimates are about 1%. Illness onset is typically 2-48 hours after nasal surgery, however, delayed presentation of up to 5 weeks has been reported.

In-Office CT Scanning - Enhancement for Diagnosis & Treatment

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The installation of an in-office GE LightSpeed 16 slice CT scanner into an office environment will be discussed. The technical, networking, PACS, personel and reimbursement issues will be discussed. The surgical and medical management of rhino-sinusitis patients has been greatly enhanced by this modality. The changes in our protocols will be discussed. This equipment would be a great addition to any rhinology practice which would greatly advance the art and science of the treatment of this group of patients.

Eustachian Tube Dysfunction in Chronic Rhinosinusitis

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Background: Symptoms of rhinosinusitis have been relegated to "major" and "minor" in the past, to indicate a possible correlation between symptomatology and the likelihood of occurrence of this disease process. The symptom of eustachian tube dysfunction has been categorized as "minor" but there is a paucity of data regarding the presence of this symptom in chronic rhinosinusitis and the likelihood of its resolution with endoscopic sinus surgery. The aim of this study was to determine the frequency of otologic symptoms in patients with confirmed rhinosinusitis and the likelihood of their resolution in those patients undergoing endoscopic sinus surgery.

Methods: Questionnaires were obtained from 168 patients who had undergone prior endoscopic sinus surgery over a five-year period. Patients were asked to evaluate if they suffered from several different potential symptoms of eustachian tube dysfunction prior to endoscopic sinus surgery, and whether or not that symptom changed postoperatively. Their charts were then

retrospectively reviewed for demographic data and to determine the precise diagnosis and extent of surgery.

Results: 168 patients with confirmed chronic rhinosinusitis requiring endoscopic sinus surgery responded to a mailed questionnaire and had charts available for review. The presence of ear congestion was noted in 42% of patients, and this improved or resolved after endoscopic sinus surgery in 84.3 % of patients. Dizziness was a complaint in 26.9% of patients and this improved or resolved postoperatively in 89.3% of patients. 31.3% of patients complained of “cracking or popping” of their ears and this improved or resolved postoperatively in 65.3% of patients. Finally, otalgia was indicated by 15.1% of patients and this improved or resolved postoperatively in 84% of patients.

Conclusions: Eustachian tube dysfunction, as manifested by several different individual otologic symptoms, is relatively common in patients with chronic rhinosinusitis undergoing endoscopic sinus surgery. The classification of this as a “minor” symptom of rhinosinusitis may need to be re-evaluated. These symptoms tend to improve or resolve in the majority of patients undergoing endoscopic sinus surgery.

Diagnostic Imaging of Nasal Dermoids in the Pediatric Patient

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Introduction: Nasal dermoid sinus cysts are rare congenital lesions that result from aberrant embryonal development. These lesions have the potential for intracranial extension and anterior skull base abnormalities. Accurate preoperative radiological investigations, especially in the younger pediatric patient, are necessary to assist in establishing the diagnosis, precisely locate the malformations and to guide surgical planning. Our study will look at two cases that highlight the importance accurate preoperative radiographic assessment of nasal dermoids.

Methods: Two pediatric patients from a tertiary care center used to emphasize the importance of the proper preoperative radiographic evaluation of nasal dermoids, as well as a literature review of radiographic imaging of nasal dermoids.

Conclusions: The first patient was accurately diagnosed with intracranial extension on true coronal CT imaging. The other patient was diagnosed with an anterior skull base anomaly on true coronal CT imaging; which was not appreciated on the originally reconstructed CT coronal image. Detailed imaging of the anterior skull base effectively changed the preoperative surgical management in both patients. The accurate preoperative radiographic evaluation of the dermal cyst or sinuses should exclude

intracranial extension and anterior skull base abnormalities. These often cannot be appreciated with standard CT protocols for pediatric patients. We recommend that pediatric patients diagnosed with a nasal dermoid be evaluated preoperatively by fine-cut CT scan, in the axial and true coronal planes, not reconstructed computer generated images.

Sellar Floor Reconstruction with Nasal Turbinate Tissue after Endoscopic Endonasal Transsphenoidal Surgery

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Background: The emerging endoscopic endonasal transsphenoidal approach for pituitary adenomas is safe and effective. An intraoperative sellar floor reconstructive method after this approach is challenging.

Objective: To describe a simple method of sellar reconstruction after endoscopic endonasal transsphenoidal surgery for pituitary adenomas by nasal turbinate tissue. **Materials and Methods:** thirty patients with defects in the floor of the sella turcica, after endoscopic endonasal transsphenoidal surgery for pituitary adenomas, underwent reconstruction with nasal turbinate tissue. Surgical technique is described.

Results: patients who underwent this sellar reconstruction did not show postoperative cerebrospinal leak or other complications. **Conclusion:** nasal turbinate tissue is an excellent source of donor material for successful reconstruction of the sellar floor. It is costless, safe, soft, malleable and easy to obtain in the same field of surgery with suitable size without inducing side effects or complications.

Key words: nasal turbinate; Pituitary gland; Reconstruction; Sella turcica; Transsphenoidal endoscopic surgery.

An Assessment for the Presence of Bacterial Contamination of Venturi Principle Atomizers in a Clinical Setting

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Introduction: Venturi principle atomizers have been criticized for potential contamination and disease transmission when utilized for the nasal application of medications. A recent laboratory study reported a high rate of contamination of these atomizers after their immersion and spraying into a broth containing *Staphylococcus aureus*. The objective of this study was to determine whether the Venturi type atomizers used regularly at a busy referral center for sinonasal disorders were contaminated with bacteria.

Methods: Fifteen venturi type atomizers separately containing either 2% lidocaine (seven bottles) or 0.05% oxymetazoline (eight bottles) were sprayed onto blood agar plates using standard technique for their use. The contents within each bottle's reservoir were also cultured onto plates yielding a total sample size of thirty specimens. All atomizers assessed in this study were in use in an active ENT office for one month prior to analysis. The plates were then incubated at 35° C for 48 hours and then at room temperature for 72 hours.

Results: Three of our thirty plates grew one colony each of gram positive bacilli, gram positive cocci and staphylococcus species.

Conclusion: No significant microbial growth was reported from the atomizer or bottle medium after five days of incubation. Thus, Venturi type atomizers may not be at as high a risk for contamination as has been suggested by previous reports.

A Targeted Endoscopic Approach to Chronic Isolated Frontal Sinusitis

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Introduction: Frontal sinusitis is common and is usually secondary to inflammatory changes in the anterior ethmoid cells. Consequently, chronic frontal sinusitis is usually treated by

endoscopic anterior ethmoidectomy. Isolated frontal sinusitis is uncommon. In this condition, most of the ethmoid cells are well aerated and the frontal sinus is involved secondary to anatomical obstruction or inflammatory changes confined to the frontal recess.

Objectives: To describe a problem-oriented targeted endoscopic technique where standard anterior ethmoidectomy is unnecessary in the treatment of chronic isolated frontal sinusitis.

Methods: Between 2000 and 2002 seven patients were diagnosed with chronic isolated frontal sinusitis refractory to medical treatment, as confirmed by CT scan. Patients with isolated frontal sinusitis secondary to previous ESS (Endoscopic sinus surgery) were excluded. All patients underwent limited ESS that included uncinectomy and removal of the terminal recess, agger nasi cell or frontal cell. The ethmoid bulla and the maxillary natural ostium were preserved in all patients. The follow-up ranged from 6 – 26 (mean 14.6) months. Patients reported significant improvement, mild improvement, no change or worsening of symptoms. Frontal sinus outflow patency was confirmed by endoscopy, transillumination or a CT scan.

Results: 5 patients reported significant improvement, 1 patient reported mild improvement, 1 patient had no change in his symptoms. Frontal sinus outflow patency was verified in 6 patients. One patient had frontal sinus recurrent disease.

Conclusion: Chronic isolated frontal sinusitis develops secondary to frontal recess inflammatory changes and hence can be surgically treated by a targeted endoscopic procedure that includes merely re-establishment of the frontal sinus outflow.

Management of the Lacrimal System During Maxillectomy

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Background: Oncologic resection of the maxilla requires management of the nasolacrimal sac/duct system (NLS). A variety of techniques may be used: simple transection, transection with transcanalicular stenting, drilling of the entire nasolacrimal bony canal to the inferior meatus with mobilization of an intact NLS, marsupialization of the NLS with or without stenting, and simple transection with routine delayed dacryocystorhinostomy (DCR) for symptomatic epiphora. Rates of prolonged epiphora range from 13 to 63%.

Objectives: We present our approach to NLS management during maxillectomy, and our rates of epiphora.

Study Design: Review of 220 consecutive patients who underwent transection of the NLS during medial maxillectomy, complete maxillectomy with preservation of orbital contents, suprastructure maxillectomy, or maxillectomy as part of anterior craniofacial resection. Patients with primary NLS tumors were excluded. Prolonged epiphora is defined as persistent more than 6 months.

Methods: After exposure of the anterior maxillary wall and inferior and medial orbital rim, high speed drill and Kerrison rongeurs are used to remove the anterior wall of the nasolacrimal canal. The NLS is transected 12-15mm distal to the periorbita and removed from the canal. Two 4-6mm opposing incisions are made at the distal duct. Two semicircular flaps are everted, folded and sutured to the proximal sac or periorbita. Transcanalicular stent is not placed.

Results: Two hundred twenty patients underwent the above-mentioned procedure. Three patients (1.4%) developed prolonged epiphora which required delayed DCR.

Conclusions: Marsupialization of the NLS without stenting provided us with an acceptable low rate of prolonged epiphora.

Endoscopic Excision of a Juvenile Ossifying Fibroma of the Anterior Cranial Base

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Juvenile ossifying fibroma (JOF) is a benign fibro-osseous neoplasm that may involve the paranasal sinuses. It is a variant of ossifying fibroma and is characterized by locally aggressive growth. Treatment consists of complete resection of the mass to minimize the risk of recurrence. We present a case of a 6-year-old girl with JOF of the nasal cavity with anterior cranial base involvement. With the aid of image guidance, the mass was resected using endoscopic techniques. A sublabial incision was used to enhance exposure and provide greater access for instrumentation. With six months follow up, there has been no evidence of recurrence. Although these tumors are typically resected using open surgical approaches, this patient's tumor was resected endoscopically with the avoidance of the morbidity of a craniotomy. Review of the literature documents similar success using endoscopic techniques. Technological advances in instrumentation, navigational systems, and hemostatic and reconstructive materials now allow endoscopic resection of benign and malignant neoplasms involving the anterior cranial base. As additional experience is gained with endoscopic techniques, the role of endoscopic surgery for the management of benign and malignant neoplasms of the anterior cranial base will become better defined.

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 John Campbell, MD, Tulsa, OK
 Winston Campbell, MD, Nassua, Ba
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 Stanley Cannon, MD, Miami, FL
 Harry Cantrell, MD, Camden, NJ
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 Gerard Carvalho, MD, Redwood City, CA
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 Paolo Castelnuovo, MD, Italy
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 Rakesh Chandra, MD, Chicago, IL
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 Wenfu Chen, MD, Chillicothe, OH
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 Sung J Chung, MD, Cincinnati, OH
 Christopher Church, MD, Loma Linda, CA
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 Lanny Close, MD, New York, NY
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 William Cobb, MD, Plano, TX
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 Steven Connelly, MD, Saint Louis Park, MN
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Richard Dawson, MD, Oklahoma City, OK
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Steven Handler, MD, Philadelphia, PA
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Scott Edwin Harrison, MD, Jackson, MS
Francis Hart, MD, Grand Rapids, MI
Hathaway E Harvey, MD, Chattanooga, TN
Makoto Hasegawa, MD, Tokyo, Japan
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H. Hearnberger, III, MD, Little Rock, AR
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Brian Herr, MD, Maywood, IL
Alfredo Herrera, MD, Columbia
Eugene Hesdorffer, MD, Jackson, MS
Sabine V. Hesse, MD, Ridgeland, MS
Julius Hicks, MD, Birmingham, AL
Hau Hien, MD, Vietnam
Daniel Hinckley, MD, Idaho Falls, ID
Ken-ich Hisamatsu, MD, Tokyo, Japan
Khanh-Gien Hoang, MD, Charleston, SC
Denis Hoasjoe, MD, Baytown, TX

Sanford Hoffman, MD, Buffalo, NY
Eric H. Holbrook, MD, Omaha, NE
J. David Holcomb, MD, Sarasota, FL
William Holmes, MD, Fairmont, MN
Norman Holzberg, MD, West Orange, NJ
Seok-Chan Hong, MD, South Korea
Richard Hood, MD, Palmyra, VA
Carl T. Hook, MD, FACS, Norman, OK
Hunter Hoover, MD, Charlott, NC
Larry Hoover, MD, Kansas City, KS
Jeremy Hornibrook, MD, New Zealand
John Houck, MD, Oklahoma City, OK
Steven M. Houser, MD, Cleveland, OH
Sean Houston, MD, Wilmington, DE
Raymond Howard, MD, Brooklyn, NY
Mark Howell, MD, Johnson City, TN
Mark J. Hoy, MD, Mt. Pleasant, SC
Bruce Hudkins, MD, Tulsa, OK
Scott Huebsch, MD, Ames, IA
James Huerter, MD, Omaha, NE
Kenneth Hughes, MD, Lexington, KY
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Darrell Hunsaker, MD, San Diego, CA
Shannon Elizabeth Hunter, MD, Durham, NC
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Jerry Huo, MD, Scarsdale, NY
Michael K. Hurst, MD, Morgantown, WV
Keith Hurvitz, MD, Los Angeles, CA
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Sera Jacob, MD, Greensboro, NC
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Joseph Jacobs, MD, New York, NY
Robert Jacobs, MD, Oceanside, CA
Abdullmohsin Jafar, MD, Kuwait
Bruce Jafek, MD, Denver, CO
David Jakobowicz, MD, Bronx, NY
Tarek Jamal, MD, Saudi Arabia

Amin R. Javer, MD, Vancouver, BC
 John A. Jebeles, MD, Birmingham, AL
 Rong-San Jiang, MD, Taiwan (ROC)
 Hong-Ryul Jin, MD, Cheongju, South Korea
 John Jiu, MD, Jonesboro, AR
 Stephanie Joe, MD, Chicago, IL
 Jonas Johnson, MD, Pittsburgh, PA
 Kenneth Johnson, MD, Birmingham, AL
 Perry Johnson, MD, Omaha, NE
 Terence Johnson, MD, San Diego, CA
 Paul Jones, MD, Chicago, IL
 Gerald Joseph, MD, Baton Rouge, LA
 Jordan Josephson, MD, New York, NY
 Charles Juarbe, MD, Bayamon, PR
 Slobodan Jugo, MD, Greenville, KY
 Erik Kaas, MD, Boston, MA
 David Kaba, MD, Williston, ND
 Ashutosh Kacker, MD, New York, NY
 Zoheir J. Kaiser, MD (regular), South Hill, VA
 John Kalafsky, MD, Norfolk, VA
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 Shashi Kaluskar, MD, N. Ireland, UK
 Charles Kaluza, DO, Portland, OR
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 Madan N. Kandula, MD, Oklahoma City, OK
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 Srinivas Kaza, MD, Danville, PA
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 Savuas Kazanas, MD, Athens, Greece
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 Mumtaz Khan, MD, Nashville, TN
 Chandra Khasgiwala, MD, Lowell, MA
 Umang Khetarpal, MD, Bay City, MI
 Assad Houry, MD, Washington, NY
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 Matthew Kienstra, MD, Tampa, FL
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 Eugene Kim, MD, San Francisco, CA
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 Jean Kim, MD, Baltimore, MD
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J. Spencer Mooney, MD, Brookhaven, MS
Eric J Moore, MD, Rochester, MN
H. Christopher Moore, MD, Fullerton, CA
William Moran, MD, Glenview, IL
Alice Morgan, MD, Cullman, AL
Charles Morgan, MD, Birmingham, AL
Warren E. Morgan, MD, Houston, TX
John Richard Morris, Jr., MD, Louisville, KY
Winsor Morrison, MD, Hollister, MO
Todd Morrow, MD, West Orange, NJ
Richard A. Morton, Jr., MD, El Paso, TX
Ron L. Moses, MD, Houston, TX
Mark Mount, MD, Edina, MN
Zan Mra, MD, Scarsdale, NY
Brooks Mullen, MD, Sequin, TX
Christopher Muller, MD, Galveston, TX
Karsten Munck, MD, San Francisco, CA
Kanit Muntarbhorn, MD, Bangkok, Thailand
Harlan Muntz, MD, Salt Lake City, UT
James Murata, MD, Boca Raton, FL
Michael Murphy, MD, Minneapolis, MN
Andrew Murr, MD, San Francisco, CA
John Murray, MD, West Palm Beach, FL
Nguyen My, MD, Vietnam
Jeffrey Myers, MD, Houston, TX
Larry Myers, MD, Dallas, TX
Nathan Nachlas, MD, Boca Raton, FL
Y. M. Naci, MD, Startford, CT
Robert Naclerio, MD, Chicago, IL
Ravi Nadarajah, MD, Indiana, PA
Matthew Nagorsky, MD, Philadelphia, PA
Srikanth I Naidu, MD, Memphis, TN
Vincent Nalbhone, MD, Las Vegas, NV
Donald Nalebuff, MD, Hackensack, NJ
Isaac Namdar, MD, New York, NY
Ari Namon, MD, Sharon, CT
Mohsen Naraghi, MD, Tehran, Iran

David Nash, MD, Stoneham, MA
 Richard Nass, MD, New York, NY
 Carl Nechtman, MD, Birmingham, AL
 H. Bryan Neel, III, MD, PhD, Rochester, MN
 Brian Neff, MD, Philadelphia, PA
 Leon Neiman, MD, Akron, OH
 Erik G Nelson, MD, Gurnee, IL
 Mark Nelson, MD, Cleveland, Oh
 Michael Neuenschwander, MD, Riverdale, GA
 Alfred Neumann, MD, Mobile, AL
 Leonard Newton, MD, Ithaca, NY
 Anthony Nguyen, MD, Buffalo, NY
 Henry Nguyen, MD, La Habra, CA
 Hoa Van Nguyen, DO, Olympia Fields, IL
 Nghia Nguyen, MD, Detroit, MI
 Quoc Nguyen, MD, Huntington Beach, CA
 Paul Nieberding, MD, Burlingame, CA
 Brad Nitzberg, MD, Boca Raton, FL
 Phillip Noel, MD, Abbeville, LA
 Michael Nordstrom, MD, Milwaukee, WI
 Paul Norman, MD, Manchester, CT
 Joel Norris, MD, West Monroe, LA
 Frederick Nunnally, MD, Dothan, AL
 Thomas O'Donnell, MD, Danville, PA
 John O'Neill, MD, Westfield, MA
 Robert Oberhand, MD, Westfield, NJ
 Neal Obermeyer, MD, Port Huron, MI
 John Odess, MD, Chelsea, AL
 Hiroshi Ogasaware, MD, Kobe, Japan
 John Oghalai, MD, Houston, TX
 T. Metin Onerci, MD, Turkey
 Seth Oringher, MD, Rockville, MD
 Richard Orlandi, MD, Salt Lake City, UT
 Laura Orvidas, MD, Rochester, MN
 John Osguthorpe, MD, Charleston, SC
 Frans Ostyn, MD, Belgium
 Ralph Glen Owen, Jr., MD, Augusta, GA
 Stuart Owens, MD, Mt Pleasant, SC
 Michael Paciorek, MD, Syracuse, NY
 Edwin Page, MD, Columbus, GA
 John Pallanch, MD, Sioux City, IO
 Pietro Palma, MD, Italy
 James Palmer, MD, Philadelphia, PA
 William Panje, MD, Chicago, IL
 Raymond V. Paolini Jr., MD, Buffalo, NY
 Ariadna Papageorge, MD, New York, NY
 Michael Papsidero, MD, Garden Heights, OH
 Albert Park, MD, Salt Lake City, UT
 Stephen Park, MD, Charlottesville, VA

Francis Parnell, MD, Ross, CA
 Todd Parnes, DO, Lake Worth, FL
 Nigel Pashley, MD, Denver, CO
 Thomas Pasic, MD, Madison, WI
 William E Pate, MD, DeLand, FL
 Anit Patel, MD, Bronx, NY
 Ankit M Patel, MD, Chicago, IL
 Kalpesh Patel, MD, London, United Kingdom
 Elizabeth Payne, MD, Robbinsdale, MN
 Paul Pedersen, MD, Oakland, CA
 Michael Peery, MD, Memphis, TN
 Alejandro Perez, MD, Chile
 Donald Perez, MD, Loma Linda, CA
 Byron Perry, MD, Phoenix, AZ
 Curtis J Perry, MD, East Greenwich, RI
 Steven Peskind, MD, Plano, TX
 Bruce Peters, DO, Toms River, NJ
 James Peterzell, DO, Saint Louis, MO
 Charles Petrillo, MD, Clinton, CT
 Gary Petrus, MD, N Little Rock, AR
 George Petti, MD, Redlands, CA
 John Pflug, MD, Kearney, NE
 Perry Phillips, MD, Sheboygan, WI
 Supote Phipatanakul, MD, Saint Louis, MO
 Jay Piccirillo, MD, Saint Louis, MO
 William Pierce, MD, Batavia, NY
 Robert Pincus, MD, New York, NY
 Stephen Pincus, MD, Marina Del Rey, CA
 Timothy Pine, MD, Reno, NV
 Jayant M Pinto, MD, Chicago, IL
 James Pitcock, MD, Mobile, AL
 Steven Pletcher, MD, San Francisco, CA
 Roger Plotkin, MD, New City, NY
 Alan Pokorny, MD, Park City, UT
 Glen T. Porter, MD, Galveston, TX
 Louis Portugal, MD, Chicago, IL
 Edward Porubsky, MD, Augusta, GA
 William Potsic, MD, Philadelphia, PA
 W. Bruce Povah, MD, Canada
 Jeffrey Powell, MD, DDS, FACS, Chesapeake, VA
 Loring W. Pratt, MD, Fairfield, ME
 John C. Price, MD, Lutherville, MD
 Jordan Pritikin, MD, Chicago, IL
 Christine Puig, MD, Auburn, WA
 Pelayo Vilar Puig, MD, Edo, Mexico
 Ronald Pulli, MD, Pittsford, NY
 Liana Puscas, MD, Sacramento, CA
 Joseph Puzzi, MD, Pottsville, PA
 Melissa Pynnonen, MD, Ann Arbor, MI

Timothy Queen, MD, Newport News, VA
 Chris Quilligan, MD, Fulelrton, CA
 Richard Quisling, MD, Hermitage, TN
 Jean-Jacques Rafie, MD, McKinney, TX
 Sherif Ragheb, MD, Moline, IL
 B Manrin Rains, MD, Cordova, TN
 Hassan H Ramadan, MD, Morgantown, WV
 Alexander Ramirez, MD, San Francisco, CA
 Emilio Godoy Ramirez, MD, CHILE
 Elizabeth Ransom, MD, Bloomfield Hills, MI
 Vittal Rao, MD, Wappingers Falls, NY
 Douglas E. Rapisarda, MD, Two Rivers, WI
 Christopher H. Rassekh, MD, FACS, Morgantown, WV
 Adrian Ratinoff, MD, Argentina
 Edward Razim, MD, Oak Brook, IL
 Edward Reardon, MD, Quincy, MA
 Elie Rebeiz, MD, Boston, MA
 Patrick Reidy, MD, Detroit, MI
 Jacquelyn Reilly, MD, Bronx, NY
 Seth Reiner, MD, Littleton, CO
 Mark Reinke, MD, Green Bay, WI
 Anthony Reino, MD, New York, NY
 Bruce Reisman, MD, Oceanside, CA
 William J. Remington, MD, Decorah, IA
 Angelo Reppucci, MD, Memphis, TN
 Todd Reulback, MD, Lewisville, NC
 Dukhee Rhee, MD, Bronx, NY
 Edward Rhee, MD, Pomona, NY
 Theodore B. Rheney, MD, Asheville, NC
 Dale Rice, MD, Los Angeles, CA
 Harry J. Richter, Jr., MD, Belfast, ME
 William Richtsmeier, MD, Phd, Cooperstown, NY
 Seth Riddle, MD, Provo, UT
 Anthony A. Rieder, MD, Milwaukee, WI
 Michael Riley, DO, Largo, FL
 Nabil M. Rizk, MD, Egypt
 Jeffrey Roach, MD, Bronx, NY
 Wade Robinette, MD, Grandview, MO
 C. Robinson, MD, Albuquerque, NM
 Donald Rochen, DO, West Bloomfield, MI
 Bret Rodgers, MD, Cleveland, OH
 Hector Rodriguez, MD, New York, NY
 Jeffrey D. Roffman, MD, Tinton Falls, NJ
 Shawn E. Rogers, MD, Edmonds, WA
 Anthony Rogerson, MD, Monroe, WI
 Hwan-Jung Roh, MD, Korea
 Renato Roithmann, MD, Brazil
 John H Romanow, MD, Burlington, MA
 Alexander A Romashko, MD, Maywood, IL

J. Lewis Romett, MD, Colorado Spring, CO
 Thomas Romo, III, MD, New York, NY
 Walter Rooney, MD, Cincinnati, OH
 Inell C. Rosario, MD, Saint Paul, MN
 Roger Rose, MD, S. Salem, NY
 John Rosedeutscher, MD, Hermitage, TN
 Marc R Rosen, MD, Philadelphia, PA
 Zvi Rosen, MD, Israel
 David Rosenberg, MD, Cranford, NJ
 Seth Rosenberg, MD, Sarasota, FL
 Marc Rosenthal, MD, Sicklerville, NJ
 Deborah Rosin, MD, Martinsville, NJ
 Arthur Rosner, MD, Sterling Hts., MI
 Louis Rosner, MD, Rockville Center, NY
 Adam Ross, MD, Philadelphia, PA
 Douglas Ross, MD, New Haven, CT
 Edwin B. Jr. Ross, MD, Gretna, LA
 Erin J Ross, RN, Cleveland, OH
 Edward Rubin, MD, Denville, NJ
 Ran Rubinstein, MD, Newburgh, NY
 Christopher Rucker, MD, FACS, Spartanburg, SC
 David Rudman, MD, Overland Park, KS
 Charles Ruhl, MD, Providence, RI
 C. Allen Ruleman, Jr., MD, Memphis, TN
 Pedro J Rullan-Marin, MD, San Juan, Pr
 Matthew W. Ryan, MD, Galveston, TX
 Robert Ryan, Jr., MD, Bonita Springs, FL
 Kelly Rydlund, MD, Lafayette, CO
 John Ryzenman, MD, Cincinnati, OH
 Daryoush Saadat, MD, Los Angeles, CA
 Steven Sabin, MD, East Brunswick, NJ
 Michael Sachs, MD, New York, NY
 Raymond Sacks, M.D., Australia
 Bassem M. Said, MD, Cleveland, Oh
 Hamed Sajjadi, MD, San Jose, CA
 Ali Sajjadina, MD, Pittsburgh, PA
 Frank Salamone, MD, Cincinnati, OH
 Salah Salman, MD, Boston, MA
 Sharyar Samadi, MD, Philadelphia, PA
 Mark Samaha, MD, Canada
 Ruwanthi Samaranayake, MD, Oakland, CA
 Sreedhar Samudrala, MD, Jackson, MS
 Reynaldo Sanchez, MD, Garland, TX
 Anthony Sanders, MD, Columbus, IN
 Kenneth Sanders, MD, Shreveport, LA
 Tarik Sapci, MD, Turkey
 Sholomo Sarfaty, MD, Tel AViv, Israel
 J. R. Sarpa, MD, Bloomington, IN
 Adrian Saurajen, MD, Singapore

Phillip R. Say, MD, Omaha, NE
Michael Saylor, MD, Hagerstown, MD
Stanley Schack, MD, Omaha, NE
Steven Schaefer, MD, New York, NY
Dean Schaeffer, MD, Goldens Bridge, NY
Scott Schaffer, MD, Voorhees, NJ
Joseph Scharpf, MD, Cleveland, OH
Barry Schatikin, MD, Pittsburgh, PA
Sara Scheid, MD, Philadelphia, PA
Kenneth Scheinberg, MD, Wichita, KS
Michael Scherl, MD, Westwood, NJ
Michael Scheuller, MD, San Francisco, CA
Rodney J. Schlosser, MD, Charlottesville, VA
Richard Schmidt, MD, Philadelphia, PA
Todd Schneiderman, MD, Bridgewater, NJ
Erik Schoenberg, MD, West Orange, NJ
Kenneth Schoenrock, MD, Toledo, OH
Jerry Schreibstein, MD, Springfield, MA
James Schroeder, MD, Chicago, IL
Stacey L. Schulze, MD, Milwaukee, WI
Susan Schwartz, DO, Farm Hills, MI
Heather Schwartzbauer, MD, Cincinnati, OH
John Schweinfurth, MD, Nashville, TN
Craig Schwimmer, MD, Baltimore, MD
Joseph Scianna, MD, Maywood, IL
Paul Scolieri, MD, Cleveland, OH
McWilliams Sean, MD, Birmingham, AL
Brook M. Seeley, MD, Cleveland, OH
Michael Seicshnaydre, MD, Gulfport, MS
Allen Seiden, MD, Cincinnati, OH
Stuart Selkin, MD FACS, Melville, NY
John Sellers, MD, Norfolk, VA
Peter Selz, MD, Swansea, IL
Brent Senior, MD, FACS, Chapel Hill, NC
Galgano Alejandro Sergio, M, Argentina
Anthony Sertich, Jr., MD, San Antonio, TX
Merritt Seshul, MD, Murfreesboro, TN
Maher Sesii, MD, Redondo Beach, CA
Reuben Setliff, III, MD, Sioux Falls, SD
Guy Settupane, MD, Providence, RI
Gavin Setzen, MD, Albany, NY
Michael Setzen, MD, Manhasset, NY
Howard Shaffer, MD, Fort Worth, TX
Frank Shagets, Jr., MD PC, Joplin, MO
Anand Shah, MD, Detroit, MI
Shefari Shah, MD, Chicago, IL
Udayan K. Shah, MD, Philadelphia, PA
Djakhangir Shamsiev, MD, Uzbekistan
Weiru Shao, MD, Minneapolis, MN

Adam Shapiro, MD, St. Thomas, VI
Barry Shapiro, MD, Briarcliff Manor, NY
Jack Shapiro, MD, Old Westbury, NY
Lawrence Shapiro, MD, Los Alamitos, CA
Nina Shapiro, MD, Los Angeles, CA
Stanley Shapshay, MD, Boston, MA
Daniel Sharkey, MD, Stuart, FL
Pramod Kumar Sharma, MD, Salt Lake City, UT
Michael B. Shaw, MD, Tulsa, OK
Frank Shechtman, MD, Armonk, NY
David Sherris, MD, Rochester, MN
Alan Shikani, MD, Baltimore, MD
David Shoemaker, MD, Greensboro, NC
Michael Shohet, MD, New York, NY
Merrit Shshul, MD, Birmingham, AL
Joseph Siefker, MD, Meridian, MS
Michel Siegel, MD, Houston, TX
Timothy Siglock, MD, Jefferson Valley, NY
Jason B Sigmon, MD, Omaha, NE
Harvey Silberman, MD, Elkins Park, PA
Seth Silberman, MD, Solon, OH
Michael J. Sillers, MD, Birmingham, AL
Steven Silver, MD, Albany, NY
Damon Silverman, MD, Shaker Hts., OH
John Simmons, MD, Jasper, AL
George Simpson, MD, Buffalo, NY
Hugh Sims, III, MD, Bowling Green, KY
John Sinacori, MD, Syracuse, NY
Bhuvanesh Singh, MD, New York, NY
Pradeep Sinha, MD PhD, Atlanta, GA
Abraham Sinnreich, MD, Staten Island, NY
David Slavitt, MD, New York, NY
Beatrice Smith, MD, Anniston, AL
Bruce M. Smith, MD, Fort Collins, CO
Joe Frank Smith, MD, Dothan, AL
Lorraine M. Smith, MD, Los Angeles, CA
Maynard Smith, MD, Richmond, VA
Ronald Smith, MD, Bronx, NY
Timothy L. Smith, MD, MPH, Milwaukee, WI
Gary Snyder, MD, Bayside, NY
Mary C. Snyder, MD, Omaha, NE
Carl Snyderman, MD, Pittsburgh, PA
Alan Sogg, MD, Russell, OH
Raymond Soletic, MD, Manhasset, NY
Ahmed M.S. Soliman, MD, Philadelphia, PA
Doron Sommer, MD, Canada
Michael Spafford, MD, Albuquerque, NM
Robert Spears, MD, San Antonio, TX
Andrew Ryan Specter, MD, Philadelphia, PA

James E. Spier, MD, El Paso, TX
 James Spoden, MD, Cedar Rapids, IA
 Carl Sputh, MD, Indianapolis, IN
 Brendan Stack, Jr., MD, Hershey, PA
 Sarah Stackpole, MD, New York, NY
 Heinz Stammberger, MD, Graz, Austria
 James Stancil, MD, Indian Wells, CA
 James Stankiewicz, MD, Maywood, IL
 Ralph Stanley, MD, Republic of Singapore
 Robert Stanley, MD, Middleton, WI
 Edward Starinchak, MD, Granville, OH
 Gregory Stearns, MD, Chula Vista, CA
 Kirk Steehler, DO, Erie, PA
 Ira Stein, MD, Livonia, MI
 Jeannine Stein, MD, Cleveland, Oh
 Albert Steiner, MD, Owings Mills, MD
 Vernon H. Stensland, MD, Sioux Falls, SD
 Bruce Serman, MD, Akron, OH
 Michael Stevens, MD, Sandy, Ut
 David Steward, MD, Cincinnati, OH
 Michael Stewart, MD, Houston, TX
 Gerald Stinziano, MD, Buffalo, NY
 J. Pablo Stolovitzky, MD, Snellville, GA
 William Stone, MD, Concord, NH
 John Stram, MD, Boston, MA
 Michael Strand, MD, Hauugesund, Norway
 Victor Strelzow, MD, Irvine, CA
 Scott P. Stringer, MD, MS, FACS, Jackson, MS
 Michael Strodes, MD, Cleveland, Oh
 Marshall Strome, MD, Cleveland, OH
 Edward Bradley Strong, MD, Sacramento, CA
 Mariel Stroschein, MD, Scottsdale, AZ
 William Stubbs, MD, Vero Beach, Fl
 Fred J. Stucker, MD, Shreveport, LA
 Howard Stupak, MD, San Francisco, CA
 Das Subinoy, MD, Durham, NC
 Joseph Sugerman, MD, Beverly Hills, CA
 Krishnamurthi Sundaram, MD, Staten Island, NY
 Charles Suntra, MD, Brockline, MA
 Dana Suskind, MD, New Orleans, LA
 Galli Suzanne Kim, MD, New York, NY
 Ronnie Swain, MD, Mobile, AL
 Ronnie Swain, Jr., MD, Atlanta, GA
 Greg Swanson, MD, Detroit, MI
 Lisa Szubin, MD, Englewood, NJ
 Thomas Tami, MD, Cincinnati, OH
 Hasan Tanyeri, MD, Chicago, IL
 M. Eugene Tardy, MD, Chicago, IL
 Robert Tarpy, MD, Lafayette, LA

Jacob Tasher, MD, Slingerlands, NY
 Barry Tatar, MD, Glen Burnie, MD
 Sherard Tatum, MD, Syracuse, NY
 John Taylor, MD, La Mesa, CA
 Robert Taylor, MD, Durham, NC
 Benjamin Teitelbaum, MD, Milwaukee, NY
 Su Teoh, MD, Indianapolis, IN
 Jeffrey Terrell, MD, Ann Arbor, MI
 Erica Thaler, MD, Philadelphia, PA
 Dai Thanh, MD, Vietnam
 Stanley Thawley, MD, Saint Louis, MO
 Hilary Timmis, Jr., MD, Bellvue, OH
 Wyatt To, MD, Weston, FL
 Diana Tobon, MD, Miami, FL
 Paul Toffel, MD, Glendale, CA
 Lawrence Tom, MD, Philadelphia, PA
 Vincent Toma, MD, W Bloomfield, MI
 Stephen Toner, MD, Panama City, Fl
 Robert Toohill, MD, Milwaukee, WI
 Richard Trevino, MD, San Jose, CA
 Matteo Trimarchi, MD, Italy
 William Trimmer, MD, Reno, NV
 Minh Trong, MD, Vietnam
 Ewen Tseng, MD, Plano, TX
 Charles Tucker, MD, West Hartford, CT
 Ralph Tyner, MD, Davenport, IA
 William Updegraff, MD, Poughkeepsie, NY
 Susan Urban, MD, Eugene, OR
 Benito Uy, MD, Quezon City, Ph
 Michael Vaiman, MD, PhD, Israel
 Mahlon VanDelden, MD, Evansville, IN
 Hannah Vargas, MD, Albany, NY
 Samuel Varghese, MD, Cincinnati, OH
 Cheryl Varner, MD, Jackson, MS
 Paul Vastola, MD, Brooklyn, NY
 Winston Vaughan, MD, Stanford, CA
 Leopoldo Velez Rios, MD, Mexico
 T Venkatesan, MD, Chicago, IL
 Giri Venkatraman, MD, Atlanta, GA
 Michael Vietti, MD, Mansfield, OH
 Raul Vila, MD, Puerto Rico
 Pelayo Vilar-Puig, MD, Mexico City, Mexico
 Douglas Villaret, MD, Gainesville, FL
 Daniel Viner, MD, Cleveland, OH
 Thomas Viner, MD, Iowa City, IA
 Eugenia Vining, MD, New Haven, CT
 Yvette Vinson, MD, Rochester, NY
 Richard L. Voegels, MD, Sao Paulo, Brazil
 Erich Voigt, MD, New York, NY

David Volpi, MD, New York, NY
Mark A. Voss, MD, Fairbanks, AK
Daniel D Vukas, MD, Matwood, IL
Bryan G Wachter, MD, Anchorage, AK
Richard Waguespack, MD, Birmingham, AL
Glenn Waldman, MD, Los Angeles, CA
Curtis Walsh, MD, Maywood, IL
Manish Wani, MD, Katy, TX
Robert Ward, MD, New York, NY
Walter Ward, MD, Winston Salem, NC
Steve P. Warman, MD, Glen Head, NY
Kurtis A. Waters, MD, Brainerd, MN
Daniel Watson, MD, San Antonio, TX
Mark Wax, MD, Portland, OR
Edward Weaver, MD, MPH, Seattle, WA
Lyle D. Weeks, MD, El Paso, TX
Richard Wehr, MD, Greer, SC
Julie Wei, MD, Rochester, MN
Dudley Weider, MD, Lebanon, NH
Debra Weinberger, MD, Cody, WY
Samuel Welch, MD, PHD, Little Rock, AR
Hans-J Welkoborsky, MD, DDS, PhD, Germany
Alvin Wenger, MD, Land o Lakes, FL
Barry Wenig, MD, Chicago, IL
Lawrence Weprin, MD, Dallas, TX
Jeffrey Werger, MD, FRCSC, FACS, Canada
John Werning, MD, Toledo, OH
Joseph West, MD, Kirkwood, MO
Ralph F Wetmore, MD, Philadelphia, PA
Ernest A. Weymuller, Jr., MD, Seattle, WA
Mark Whitaker, MD, Danville, PA
James White, MD, Dubuque, IA
Ronald Whitmire, MD, Gainesville, GA
Bryan Wilcox, MD, Syracuse, NY
Andrea Williams, MD, Buffalo, NY
Jack Williams, MD, Sugar Land, TX
Robert Williams, MD, East Aurora, NY
Lorraine Williams-Smith, MD, Los Angeles, CA
Hobson L. Wilson, MD, Rockledge, FL
Keith Wilson, MD, Cincinnati, OH
Mark Wilson, MD, Madison Heights, MI
Charles Wine, MD, Oklahoma City, OK
Catherine Winslow, MD, Denver, CO
Welby Winstead, MD, Louisville, KY
Birgit Winther, MD, Charlottesville, VA
Daniel Wohl, MD, Richmond, VA
Gregory Wolf, MD, Ann Arbor, MI
Gabriel Wong, MD, Bronx, NY
Arthur Wood, MD, Boardman, OH

B Tucker Woodson, MD, Menomonee Falls, WI
Peter Wormald, MD, Woodville South, SA
Erin Daniel Wright, MD, Canada
J Robert Wyatt, MD, Mesquite, TX
John Wyllie, MD, Saudi Arabia
Michelle Yagoda, MD, New York, NY
Eiji Yanagisawa, MD, New Haven, CT
Ken Yanagisawa, MD, New Haven, CT
Dorise Yang, MD, Chicago, IL
Kathleen Yaremchuk, MD, Dearborn, MI
James Yee, MD, Folsom, CA
James Yeh, MD, Rockville, MD
David Yen, MD, Philadelphia, PA
Thomas Yen, MD, San Francisco, CA
Matthew Yetter, MD, Colorado Springs, CO
Altan Yildirim, MD, Turkey
Anthony Yonkers, MD, Omaha, NE
Dayton L. Young, MD, Omaha, NE
M. Young, PhD, Hines, IL
Philip Young, MD, Los Angeles, CA
Kathy Yu, MD, Carraboro, NC
Taskin Yucel, MD, Turkey
Richard Yules, MD, Boca Raton, FL
David Yun, MD, Bronx, NY
Bilal Zaatari, MD, Lebanon
Mark Zacharek, MD, Detroit, MI
Warren Zager, MD, Philadelphia, PA
Gerald Zahtz, MD, Jamaica, NY
Lloyd Zbar, MD, Glen Ridge, NJ
Jill F. Zeitlin, MD, Pleasantville, NY
Warren Zelman, MD, Garden City, NY
Shane Zim, MD, Los Angeles, CA
Jeffrey M Zimmerman, MD, Philadelphia, PA

Dr. Maurice H. Cottle Honor Award

*For Outstanding Clinical and Laboratory
Investigation in Rhinology
First Place Gold Medal Winners*

1978

The Nasal Cycle in the Laboratory Animal

Winston M. Campbell, MD, Mayo Clinic, Rochester, MN
Eugene B. Kern, MD, Mayo Clinic, Rochester, MN

1979

*The Physiologic Regulation of Nasal Airway Resistance
During Hypoxia and Hypercapnia*

T.V. McCaffrey, MD, Mayo Clinic, Rochester, MN
Eugene B. Kern, MD, Mayo Clinic, Rochester, MN

1980 Two Awards Given

*Growth Pattern of the Rabbit Nasal Bone Region
A Combined Serial Gross Radiographic Study
with Metallic Implants*

Bernard G. Sarnat, MD, Los Angeles, CA
Abbee Selman, DDS, Los Angeles, CA

Sleep Disturbances Secondary to Nasal Obstruction

Kerry D. Olsen, MD, Mayo Clinic, Rochester, MN
Eugene B. Kern, MD, Mayo Clinic, Rochester, MN
Phillip R. Westbrook, MD, Mayo Clinic, Rochester, MN

1984

*Nasal Problems in Wood Furniture Workers –
A Study of Symptoms and Physiological Variables*

Borje Drettner, MD, Sweden
Bo Wihlelmsson, MD, Sweden

1987

*Eustachian Tube and Nasal Function During Pregnancy
A Prospective Study*

Craig S. Derkay, MD, Pittsburgh, PA

1988

*The Effect of Kiebsiella Ozenae on Ciliary Activity
in Vitro: Implications for Atrophic Rhinitis*

Jonathan Ferguson, MD, Mayo Clinic, Rochester, MN

1990

*The in Vivo and in Vitro Effect in Phenylephrine
(Neo Synephrine) on Nasal Ciliary Beat Frequency
and Mucoilliary Transport*

P. Perry Phillips, MD, Mayo Clinic, Rochester, MN

1991

*Ultrastructural Changes in the Olfactory Epithelium
in Alzheimer's Disease*

Bruce Jafek, MD, University of Colorado, Denver, CO

1992

*A Scanning Electron Microscopic Study of Smoking and
Age Related Changes in Human Nasal Epithelium*

Steven Kushnick, MD, New York, NY

1993

Mucociliary Function in Endothelins 1, 2 & 3

Finn Ambie, MD, Mayo Clinic, Rochester, MN

1996

*Capsacin's Effect on Rat Nasal Mucosa
Substance P Release*

Frederick A. Kuhn, MD, Savannah, GA

1999

*Subacute Effects of Ozone-Exposure on
Cultivated Human Respiratory Mucosa*

Joseph Gosepath, D. Schaefer, C. Broomer, L. Klimek,
R. G. Amedee, W. J. Mann, Mainz, Germany

2000

*Capsacin's Effect on Trigeminal Nucleus
Substance P Release*

Frederick A. Kuhn, MD, Savannah, Georgia

2002

*Bioengineering of Cartilage Using Human Nasal
Chondrocytes Propagated in Microcarrier Spinner Culture*

Alan H. Shikani, MD, David J. Fink, PhD, Afshin Sohrabi,
M.H.S., Phong Phan, BS, Anna Polotsky, MD, David S. Hunger-
ford, MD, Carmelita G. Frondoza, PhD, San Diego, CA

International Research Award

2003

Nitric Oxide and Collagen Expression in Allergic Upper Airway Disease

Marc A. Tewfik, MD, Julio F. Bernardes, MD, Jichuan Shan, MD,
Michelle Robinson, MD, Saul Frankiel, MD,
David H. Eidelman, MD

2002

Recording of the Electro-Olfactogram (EOG) Using Externally Placed Electrodes

Churunal K. Hari, F.R.C.S., Liwei Wang, PhD,
Tim J.C. Jacob, PhD, San Diego, CA

American Rhinologic Society Resident Research Grant Award

2003

Nasal Mucosal Sensitivity in Young and Old

Alex G. Bien, MD
University of Nebraska Medical Center
Omaha, Nebraska

2003

Evaluation of Biofilms in Chronic Sinusitis

Joel R. Perloff, MD
University of Pennsylvania Medical Center
Philadelphia, PA

Golden Head Mirror Honor Award For Meritorious Teaching in Rhinology

The Golden Head Mirror Honor Award was first given by Dr. Cottle to colleagues who were chosen because of "Meritorious Teaching in Rhinology." The first pair of Golden Head Mirror cuff links were given by Dr. Cottle to Dr. George Fisher in 1948.

A

Vijay Anand, US
Pierre Arbour, US
Harold Arlen, US
Walter J. Agesen, US
Tomas L. Aguara, Mexico

B

Pat A. Barelli, US
Fred W. Beck, US*
Carlos G. Benavidee, US
Michael Benninger, US
Bernard Blomfield, US*
Max Bornstein, US*

C

Jamie Carillo, Mexico*
James Chesson, US*
Maurice H. Cottle, US*

D

Efrain Davalos, Mexico
H.A.E. van Dishoeck, The Netherlands*
George H. Drumheller, US*
Glen W. Drumheller, US
Larry E. Duberstein, US

F

George W. Facer, US
Anthony Fails, US*
George G. Fishcer, US*
Douglas W. Frericha, US
Amos D. Friend, US*

G

Irwin E. Ganor, US
Norman E. Ginsberg, US*
Vernon D. Gray, US*
Charles Gross, US
Harvey C. Gunderson, US

H

Richard B. Hadley, US*

Robert M. Hansen, US*
Edward W. Harris, US*
Raymond L. Hilsinger, US*
Kenneth H. Hinderer, US*
Leland R. House, US
Sandy Hoffman, US
Egbert Huizing, The Netherlands

J

Gerald F. Joseph, US

K

Alvin Katz, US
David Kennedy, US
Eugene Kern, US
John A. Kirchner, US
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