

AMERICAN RHINOLOGIC SOCIETY

49th Annual Spring Scientific Meeting May 2 – 6, 2003 Nashville, Tennessee

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.

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 policies on disclosure of the Accreditation Council for Continuing Medical Education and the Program/Education Advisory Committee of the American Rhinologic Society, presenters for this program have identified no personal relationships which, in the context of their topics could be perceived as a real or apparent conflict of interest. Those presenters who have identified any relationships with a commercial concern will announce the nature of that relationship at the meeting prior to their presentation.

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Upcoming Dates

August 1, 2003

Deadline for Cottle Award Submission

September 20, 2003

ARS Fall Meeting, The Peabody Hotel, Orlando, FL

October 3, 2003

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

April 30 – May 4, 2004

COSM 2004, Desert Ridge, AZ

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COSM 2005, Boca Raton, FL

Conference Schedule

May 2, 2002

1:00 pm

Welcome and Introductions

Donald Lanza, MD

James A. Hadley, MD

Pathophysiology of Disease

Moderators

Thomas Tami, MD

Scott Graham, MD

1:05 pm

Expression of Cell Surface Immune Molecule Genes by Human Middle Meatal Epithelial Cells in Culture

*Andrew P. Lane, MD
Bahman Saatian, M.D
Xiao-Ying Yu, MD
Ernst Wm. Spannhake, PhD
Baltimore, MD*

Introduction: Although the mechanisms underlying the initiation and maintenance of inflammation in chronic rhinosinusitis are poorly understood, the activation of memory T-cells within the nasal mucosa is thought to play an important role. T-cell activation requires the presentation of antigen by immunocompetent cells in the context of cell surface immune molecules. The purpose of this study was to investigate the expression of such molecules by human sinonasal epithelial cells grown in culture at the air-liquid interface (ALI).

Methods: Middle meatal epithelium was obtained from six patients undergoing endoscopic sinus surgery. Dissociated epithelial cells were grown to confluence in serum-free, defined medium and transferred to filter inserts for culture at the ALI. Cells were harvested at 2 and 21 days of growth at the ALI and processed for real-time PCR. The presence and relative abundance of constitutively expressed mRNA for HLA-B, B7H3, HLA-DR, B7H2, B7.2, and B7.1 were assessed.

Results: After 2 days at the ALI, middle meatal epithelial cells were demonstrated to express genes for each of the cell surface immune molecules tested. The expression of HLA-DR and B7.1 increased significantly with longer growth at the ALI.

Conclusions: Primary human epithelial cells obtained from the middle meatus express genes for cell surface immune molecules. The pattern of gene expression changes as the cells differentiate at the ALI. This finding suggests that mature middle meatal epithelial cells have the cellular machinery to interact with T-cells and therefore may be direct participants in the activation of T-cells in chronic rhinosinusitis.

1:13 pm

Glycodelin — A Novel Immunomodulatory and Proangiogenic Molecule in Chronic Sinusitis

*Ian Murton MD
Sam Parthasarathy PhD
John DelGaudio MD
Giri Venkatraman MD
Atlanta, GA*

Exposure to environmental allergens or a viral upper respiratory infection leads to inflammation and tissue edema in the mucosa of the nasal cavity and sinuses. This process in turn leads to obstruction of mucosal outflow, and bacterial superinfections or acute bacterial sinusitis (ABS). Although the acute process is often self-limiting, a subset of patients develops chronic inflammation (CRS), and in extreme cases, forms benign inflammatory polyps. Many previous studies have demonstrated increased expression of pro-inflammatory cytokines in the nasal mucosa and in the nasal polyps in patients with CRS as well as allergic rhinitis. However, the cascade of upstream cellular and molecular events inducing this aberrant cytokine production in CRS is not well understood. In addition, we can also presume that angiogenesis and neo-vascularization are required for nasal polyp formation although no direct evidence exists for this hypothesis. Here we describe the differential expression of glycodelin, a novel protein, in both normal and CRS nasal mucosa. We also show that nude mice injected with glycodelin form new blood vessels, and, in addition, allergen challenge leads to glycodelin production by lymphocyte precursor cells. Based on this data, we propose that glycodelin plays a key role in both the immune dysfunction and the angiogenesis that are the hallmarks of CRS and nasal polyps.

1:20 pm

Human Defensins in Patients with Chronic Rhinosinusitis with/without Cystic Fibrosis

Jivianne T. Lee, MD
Thomas C. Calcaterra, MD
Sunita Bhuta, MD
Thomas Ganz, MD
Los Angeles, CA

Introduction: Human alpha defensins 1-3 and beta defensin 2 are members of a family of antimicrobial polypeptides that have been found to play a role in the host defense of the respiratory tract. The purpose of this study was to compare the expression of human beta defensin 2 (HBD-2) and human neutrophil peptide (HNP) in patients with chronic rhinosinusitis (CRS) with/without cystic fibrosis (CF) to explore the hypothesis that patients with CF have increased inflammatory response compared to non-CF patients.

Methods: Specimens of sinus mucosa were collected from 11 patients with CF who underwent endoscopic sinus surgery (ESS) for CRS. Similar specimens were obtained from 8 patients without CF who also underwent ESS for CRS. After tissue processing, immunohistochemical stains were performed to search for HBD-2 and HNP.

Results: Global staining for HBD-2 was positive in 9/11 CF patients as opposed to 0/8 non-CF patients. Intraepithelial staining for HBD-2 was also evident in 5/11 CF patients in comparison to 0/8 non-CF patients. With respect to HNP, global staining was seen in 9/11 CF patients versus 0/8 non-CF patients. Intraepithelial staining for HNP was positive in 6/11 CF patients but only 1/8 non-CF patients. However, in the non-CF patients (8/8), scattered foci of HNP staining were seen within the subepithelial stroma.

Conclusions: Patients with CRS and underlying CF express HBD-2 and HNP to a greater degree than non-CF patients. This finding supports the theory that CF patients with CRS have a more intense inflammatory response than non-CF patients with CRS and may contribute to the poorer clinical course often seen in the CF group.

1:28 pm

Discussion

1:35 pm

The Role Interleukins and TGF-Beta in Chronic Rhinosinusitis and Nasal Polyposis

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

Objectives: To determine the role of, IL-4, IL-4 receptor (IL-4R), IL-6, IL-8, IL-11 and TGF-Beta in chronic rhinosinusitis (CRS) and chronic rhinosinusitis with nasal polyposis (CRS/NP).

Methods: Sinus tissue from patients undergoing endoscopic sinus surgery for CRS and CRS/NP was collected. Sinus tissue was then analyzed using reverse transcription polymerase chain reaction (RT-PCR) to detect transcription of IL-4R, IL-6, IL-8, IL-11. Sinus tissue samples were also cultured in-vitro, treated with IL-4 for 24 hrs and real time PCR used to quantitate the transcription of TGF-Beta.

Results: Twenty patients were evaluated, 9 with CRS/NP and 11 with CRS alone. The mean age was 43 (20-74) with 13 females and 7 males. IL-4R, IL-6, IL-8, IL-11 were identified by RT-PCR in all 20 patients. The transcription of TGF-Beta was found to be 3.2 times greater in patients with CRS/NP than in patients with CRS alone, P=0.047.

Conclusions: IL-6, IL-8, and IL-11 are nonspecific markers of sinus inflammation being transcribed in patients with CRS and patients with CRS/NP. However, patients with CRS/NP demonstrate increased transcription of TGF-Beta in response to IL-4 treatment, suggesting a IL-4 mediated mechanism for stromal proliferation in the formation of nasal polyposis.

Conflicts details: Stilianos Kountakis, MD, PhD — Speaker for Schering, GSK, Bayer, BMS, Merck; Research grants from Baxter Medical, Schering

1:42 pm

Nitric Oxide Regulates Collagen Expression in Allergic Upper Airway Disease

*Marc A. Tewfik, MD
Saul Frenkiel, MD
David H. Eidelman, MD
Jichuan Shan, MD
Montreal, Canada*

Background: The presence of nitric oxide (NO) in high concentrations has been described in the nasal mucosa of patients with untreated allergic rhinitis. We sought to examine the role of exogenous, as well as endogenous, NO in the production of collagen type I and type III by human nasal fibroblasts.

Methods: Primary cultured fibroblasts derived from nasal polyps were exposed to NO-donors (SNAP 500 micromolar and DETA-NONOate 1000 micromolar), and various other compounds, over 24-hour incubation periods. Collagen production was evaluated qualitatively by immunocytochemistry, and quantitatively by western blot analysis.

Results: Maximally stimulated fibroblasts demonstrated a 2.5-fold increase in the production of type III collagen relative to type I, as compared to baseline. Oxyhemoglobin, a NO scavenger, abolished this effect. Five-hundred micromolar SNAP caused a 14% increase in collagen type I synthesis as compared to unstimulated controls. Incubation with SNAP also caused an increase in collagen type III production by a factor of 35%.

Conclusions: Nitric oxide stimulates collagen expression in human nasal polyp-derived fibroblasts; this upregulation is preferential to collagen type III, causing a shift in the ratio of collagen type I to type III production.

1:50 pm

Discussion

Outcomes Management

Moderators

*Joseph Jacobs, MD
Stilianos Kountakis, MD, PhD*

2:00 pm

Objective Testing and Quality of Life Evaluation in Chronic Rhinosinusitis

*Timothy L. Smith, MD, MPH
Todd A. Loehrl, MD
John S. Rhee, MD
Ann B. Nattinger, MD, MPH
Milwaukee, WI*

Objectives: Discordance has been reported between patient symptoms and objective measures of disease in chronic sinusitis, such as radiographic evaluation. The objective of this study was to evaluate the association between presurgical objective studies and presurgical quality of life (QOL).

Study Design: Cross-sectional study of 90 consecutive patients presenting to a tertiary rhinology practice for surgical management of sinonasal disease.

Methods: Quality of life assessment was performed utilizing disease-specific instruments (Chronic Sinusitis Survey and Rhinosinusitis Disability Index). Computed tomography scans were scored according to the Lund-Mackay CT scoring system and endoscopy evaluation scored by the system proposed by Lund and Kennedy.

Results: Ninety surgical candidates were enrolled and included in the analysis. Correlation between the QOL total scores and subscale scores was excellent ($r=0.39$, $p=0.0001$) as was the correlation between CT and endoscopy scores ($r=0.59$, $p=0.0001$). In contrast, correlation between QOL and objective measures was not significant ($r=0.17$, $p=0.096$). These results were not significantly influenced by subgroup analysis by diagnosis, comorbidity, and other patient factors.

Conclusions: Preoperative objective measures of CRS disease do not correlate with disease specific QOL measures in surgical candidates. It is likely that CT and endoscopy are measuring a different aspect of CRS disease than the QOL measures. It is also possible that preoperative QOL, either alone or in combination with CT and endoscopy, may prove important in selecting patients most likely to benefit from surgery.

2:08 pm

Outcomes of Endoscopic Rhinologic Surgical Procedures Performed in the Office Setting

*Joseph K Han, MD
Dan Bishop, BS
Karen J Fong, MD
Peter H Hwang, MD
Portland, OR*

Introduction: Endoscopic techniques have allowed a variety of sinonasal surgical procedures to be performed in a minimally invasive manner. Many procedures that have traditionally been performed in the operating room may be well-suited to the office setting. We review our experience in performing endoscopic surgical procedures in an ambulatory clinic setting.

Methods: Retrospective chart review was performed on patients who underwent endoscopic surgical procedures at the Oregon Sinus Center clinic between 1997 to 2002. Basic procedures such as diagnostic nasal endoscopy, debridement, and control of epistaxis were excluded. Anesthetic agents and complications were recorded, and a patient satisfaction telephone interview was conducted.

Results: 51 procedures were identified in 42 patients, with a mean age of 50 years. Six patients had multiple procedures. The procedures consisted of 22 microdebrider polypectomies, 9 revision maxillary antrostomies, 8 ethmoidectomies, 3 sphenoidotomies, 3 frontal sinusotomies, 3 inferior turbinate reductions with outfracture, 2 marsupializations of a mucocele and nasopharyngeal cyst, and 1 revision dacrocystorhinostomy. Eighty four percent of the patients were treated with a combination of topical and injectable anesthetic. Estimated blood loss was 15 cc in all cases. There were no immediate or delayed complications at a mean follow up of 17 months. There was a high degree of patient satisfaction, with over 90% of patients stating that they would prefer the office setting over the operating room.

Conclusions: Selected endoscopic surgical procedures can be performed in an ambulatory setting under local anesthesia with minimal morbidity and a high rate of patient satisfaction.

2:18 pm

Discussion

2:25 pm

Long-Term Asthma Outcomes Following Endoscopic Sinus Surgery

*Todd A. Loehrl, MD
Timothy L. Smith, MD, MPH
Robinson M. Ferre BS
Robert J. Toohill, MD
Milwaukee, WI*

Objectives: Aspirin triad disease (ATD) is a well known clinical entity characterized by asthma, polyposis, and aspirin intolerance. Using subjective and objective clinical data, this study examines the short and long-term outcomes of asthma following sinus surgery in patients with ATD.

Study Design: A retrospective review and standardized survey in the setting of an academic tertiary referral center.

Methods: Sixty-five patients with ATD who had endoscopic sinus surgery between 1986 and 1998 were identified from an internal database. Surveys were utilized to assess objective and subjective improvement of their asthma.

Results: Thirty-six of sixty-five patients with ATD who underwent endoscopic sinus surgery responded to the survey. Respondents had a mean follow-up of 10.0 years. Overall, 29 of 31 patients (94%) who reported asthma symptoms preoperatively noted postoperative improvement. Furthermore, 21 of these 31 patients (68%) reported further improvement of their asthma beyond the first postoperative year. Emergency department visits for asthma exacerbations decreased in 17 of 18 (94%). Inpatient hospitalizations for asthma exacerbations also decreased in the first postoperative year in 10 of 11 (91%) patients. Asthma attacks declined in 12 of 29 (41%) patients the first year while continued improvement was noted by 13 of 29 patients (45%) beyond the first year. Peak flow rates improved from an average of 60% of the predicted value pre-operatively to 86% at the time of follow-up.

Conclusions: The asthma component of ATD continues to improve with time following endoscopic sinus surgery. While the most dramatic decrease occurs in the first year following sinus surgery, the majority of patients noted further improvement in subsequent years.

2:35 pm

How Subjective Is Nasal Endoscopy? A Study of Inter-Rater Agreement Using the Lund & Mackay Scoring System

Haytham Kubba (*author for correspondence*), MD
Sivakumar Annamalai (*presenting author*), MD
Jeremy Davis, MD
Glasgow, Scotland

Background: Scoring systems standardise the recording of nasal endoscopy findings. The extent to which two surgeons agree on the findings of nasal endoscopy in adults is unknown, although a study in children showed good agreement between two observers 1. We wish to determine the inter-observer agreement of adult nasal endoscopy scored with the Lund & Mackay system 2.

Methods: A consecutive series of rhinology clinic patients was recruited. All were examined with a zero degree 4mm endoscope by two surgeons on the same clinic visit. Each independently recorded their findings using the Lund & Mackay system, which rates polyp, oedema, discharge, crusting and adhesions each on a scale of 0, 1 or 2. Neither surgeon was aware of the other's findings.

Results: 30 patients were studied, 16 female, 14 male. Since the endoscopic findings were recorded separately for each side of the nose, each surgeon made 60 observations. Inter-rater agreement was calculated as Cohen's kappa (1=perfect agreement, 0=agreement expected by chance). The number of observations with exact agreement was 59/60 for polyp (kappa=0.93), 43/60 for oedema (kappa=0.45), 55/60 for discharge (kappa=0.84), and 53/60 for crusting (kappa=0.62). Adhesions were only present in one patient.

Conclusions: Two independent observers agree on the findings of nasal endoscopy in a high proportion of cases. Nasal endoscopy is reliable, especially when the Lund & Mackay system is used.

References:

1. Kubba H, Bingham BJG. Endoscopy in the assessment of children with nasal obstruction. *Journal of Laryngology and Otology* 2001; 115: 380-384.
2. Lund V, MacKay I. Staging in rhinosinusitis. *Rhinology* 1993; 31: 183-184.

2:42 pm

Discussion

2:48 pm

Transnasal Endoscopic Surgery for Resection of Angiofibroma with and without Arterial Embolization

Mohammad Hossein Baradaranfar, MD
Farhad Fatehi, MD
Yazd, Iran

Background: Juvenile nasopharyngeal angiofibroma (JNA) is a rare benign but aggressive tumor of head and neck.

Many surgical procedures have been described for resection of this tumor but endoscopic surgery in recent years has revolutionized its treatment. This method is usually used after arterial embolization.

Materials and Methods: 16 patients with mean age of 16.5 years were treated with endoscopic approach between March 1997 to June 2000. Patients were in stages IA to IIB based on Session classification.

In 3 patients preoperative embolization were not performed. Of cases, 14 patients were treated for the first time and 2 cases for recurrence after external approaches.

All cases were investigated with CT and/or MR1 and carotid angiography preoperatively and with CT or MR1 and periodic endoscopy after operation.

Operation Technique: Under general anesthesia with controlled hypotension, the tumor was slowly pulled down with application of a retractor to expose sphenopalatine foramen. Then the tumor pulled out of foramen by a seeker. After detachment of tumor from nasal mucosa and sphenoid sinus, it pushed medially and inferiorly. If there was extension to lower part of pterygo-maxillary fossa or to infratemporal fossa, inferior part of inferior turbinate was resected or it pushed inferoposteriorly. Tumor is then grasped and pushed medially to expose its origin. After removal of posterior wall of maxillary sinus and elevation of retromaxillary periosteum, the infratemporal fossa will be accessible. After clipping the maxillary artery; the tumor will be pulled out of nostril.

Results: Mean follow-up time was 44-1 months. No case of recurrent disease or major complication were seen. The amount of blood loss or need for transfusion were comparable with other series.

Conclusions: Endoscopic surgery is a safe and reliable method for JNA treatment with results that are comparable with open approaches. Preoperative embolization is not an obligatory component of endoscopic approach. In conclusion the endoscopic approach is an acceptable alternative in small to middle sized JNA.

2:55 pm

Discussion

3:00 pm – 3:30 pm

Break with Exhibitors

Surgical Techniques

Moderators

Steven Marks, MD

James Stankiewicz, MD

3:30 pm

Management of Late Sequelae of the
Caldwell Luc Procedures

Joseph K Han, MD

Timothy L Smith, MD, MPH

Todd A Loehrl, MD

Peter H Hwang, MD

Portland, OR

Introduction: Prior to the introduction of endoscopic sinus surgery, the Caldwell Luc (CL) procedure was the traditional surgical management for medically refractory maxillary sinusitis. As endoscopic surgeons, we are commonly faced with the management of patients who have persistent maxillary sinusitis in the face of previous Caldwell Luc surgery. The objective of this paper was to review long-term outcomes and management of patients who have undergone a CL for chronic maxillary sinusitis.

Methods: Retrospective chart review was performed on patients who underwent a CL procedure for chronic sinusitis at the Oregon Health & Science University and Medical College of Wisconsin between 1965 and 2002.

Results: One hundred and seven patients were identified with a mean follow up period of 85 months. A total of 174 CL procedures were performed and fifty percent of the maxillary sinuses required revision surgery. Of the patients who underwent additional procedures, 61% were managed endoscopically with an average of 1.7 additional procedures and 39% were managed with another CL procedure with an average of 1.3 additional procedures. Six percent of patients developed a maxillary mucocele at a mean follow up period of 90 months from the first CL procedure.

Conclusions: Patients who have undergone a Caldwell Luc procedure are likely to require surgical revision. Despite a history of mucosal stripping of the maxillary sinus, many patients may be successfully revised through endoscopic approaches. Patients who have a history of CL surgery should be followed carefully for late complications of maxillary sinus mucoceles.

3:38 pm

Endoscopic Modified Lothrop Procedure: Indications and Results of Short-term Stenting

*William O. Collins, MD
Sarita Kaza, MD
Roy R. Casiano, MD
Miami, FL*

Introduction: Despite significant improvement in symptoms, restenosis (2% intraoperative size) of the common frontal ostium, after an endoscopic modified Lothrop Procedure, still occurs in a significant number of patients. Historical or clinical factors contributing to the rate of restenosis, and recurrence of symptoms, are not clearly defined. Also, the efficacy of stenting, with silastic sheeting, in reducing the incidence of restenosis is not well reported.

Methods: A retrospective review of 41 patients who underwent an endoscopic modified Lothrop Procedure was conducted. Patients were divided into three groups based on their main indication for surgery: neoplasm exposure and resection, chronic rhinosinusitis with nasal polyps, and chronic rhinosinusitis without polyps. A variety of preoperative, intraoperative, and postoperative factors (i.e., ostium size, presence of osteoneogenesis or fibrosis, and use of stenting) were correlated with the incidence of restenosis and improvement of symptoms.

Results: The patency rate for patients undergoing surgery for neoplasm versus chronic rhinosinusitis was 86% versus 57%. Patency rates did not differ between polyp and non-polyp formers. Few patients had complete closure of the ostium (7%). Despite restenosis, a significant number of patients had improvement in symptoms. A direct correlation between improvement in headaches, infections, and nasal obstruction, and frontal ostium patency was observed. Stented patients with chronic rhinosinusitis showed an overall improvement in ostium patency (67%), with more dramatic improvements in headache relief (75% vs. 60%), decreased infections (100% vs. 67%), and nasal obstruction (100% vs. 100%), as compared to non-stented patients.

Conclusions: The endoscopic Lothrop procedure provides a reasonable alternative to historically more extensive frontal sinus surgeries, and provides good symptomatic relief. In select patients, with more extensive inflammatory disease necessitating more extensive bony resection or exenteration of mucosa, short-term stenting, may improve ostium patency.

3:46 pm

Endoscopic Management of Failed Frontal Sinus Obliteration

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

Background: Frontal sinus obliteration (FSO) has traditionally represented the final stage in the algorithm for difficult to manage frontal sinus disease. FSO has also been employed in selected cases of frontal sinus trauma. This procedure, however, has been associated with failure in approximately 5% of cases. Advances in surgical instrumentation and stereotactic navigational technology have permitted endoscopic management of these failures.

Methods: Ten patients presenting with failure of a previously performed FSO were managed endoscopically with the assistance of stereotactic imaging.

Results: Initial frontal sinus pathology included chronic inflammatory disease in 6 patients and frontal sinus trauma in 2 patients. Two patients underwent obliteration following neurosurgical frontal craniotomy. Frontal sinuses were obliterated with fat in 7 cases, bone chips in 2 cases, and bone cement in 1 case. The mean time interval to FSO failure was 10.5 years (range 4 months - 35 years). The etiology of failure included mucocele in 7 patients, chronic frontal sinusitis in 2 patients, and Pott's puffy tumor in 1 patient. All patients underwent endoscopic frontal sinusotomy, of which 2 were by a trans-septal approach. A drill was utilized for frontal sinusotomy in 3 cases. In one additional patient, trephination was performed in conjunction with the endoscopic sinusotomy. Two patients required revision endoscopic surgery, but all sinusotomies are patent in the early follow-up period (mean = 11.3 months).

Conclusions: Endoscopic management of failed FSO may be performed safely. These approaches are viable alternatives to open revision procedures in the management of failed FSO.

3:54 pm

Discussion

4:00 pm

Endoscopic Management of Extensive Sinonasal Inverted Papilloma

*Mark Jameson, MD, PhD
Stilianos Kountakis, MD, PhD
Charlottesville, VA*

Introduction: Given the malignant potential and propensity for recurrence of inverted papilloma (IP) of the nasal cavity, complete excision is warranted. However, the morbidity of open surgical procedures is high and control of recurrence is difficult. The more conservative endoscopic approach provides excellent visualization, permits removal of diseased mucosa while preserving vital anatomic structures, and allows for excellent post-operative surveillance. Recurrences are identified early and endoscopic re-resection is repeated as necessary until there is no evidence of disease.

Methods: Data was prospectively collected and subsequently reviewed on 13 patients who underwent endoscopic management of extensive IP (present at more than one anatomic site) between 1999 and 2002.

Results: Ten males and 3 females ages 36-74 (average 51) were followed for an average of 17 months (range 6-36 months) after initial endoscopic resection. Patients all complained of nasal airway obstruction for 6 months to 1 year and had undergone an average of 1.2 procedures (range 0-3) prior to referral. The most common sites affected were maxillary sinus, orbital floor, lamina papyracea, and ethmoid roof/cribiform plate. Patients required an average of 1.8 endoscopic surgeries (range 1-4) to achieve local control; 6 patients (46%) required only one. All patients were symptomatically improved and complications were limited to one CSF leak, which was repaired intraoperatively. **Conclusion:** Extensive IP can be well-controlled using minimally invasive endoscopic procedures as long as close follow-up is maintained. Operative risk and post-operative morbidity are significantly less than observed with open procedures.

Conflicts details: Stilianos Kountakis, MD, PhD — Speaker for Schering, GSK, Bayer, BMS, Merck; Research grants from Baxter Medical, Schering

4:08 pm

Endoscopic Closure of the Eustachian Tube

*Richard R. Orlandi, MD, FACS
Clough Shelton, MD, FACS
Salt Lake City, UT*

Introduction: Eustachian tube closure is occasionally indicated for conditions ranging from patulous Eustachian tube to cerebrospinal fluid leak. The authors demonstrate an endoscopic minimally invasive technique for successful closure of the Eustachian tube.

Methods: This is a description of a new technique that has been employed successfully in three patients. Two patients had cerebrospinal fluid leakage down the Eustachian tube and meningitis following middle fossa skull base surgery. One patient had autophony due to a patulous Eustachian tube accompanying weight loss.

Results: Follow up data demonstrate successful resolution of the cerebrospinal fluid rhinorrhea in both patients and improvement in the autophony in the remaining patient.

Summary: The demonstrated technique is a minimally invasive method of treating Eustachian tube patency problems in selected patients.

4:16 pm

Management of the "Lateral Frontal Sinus Lesion:" The Supraorbital Mucocele

*Alexander G Chiu, MD
Winston C Vaughan, MD
Stanford, CA*

Introduction: Masses that appear in the lateral aspect of the frontal sinus can be difficult to access and are often approached through external approaches. Supraorbital ethmoid cells pneumatize the orbital plate of the ethmoid bone to lie posterior and lateral to the frontal sinus. Obstruction may result in a supraorbital cell mucocele, which radiographically gives the appearance of a laterally based frontal sinus lesion. Knowledge of this anatomy allows surgical drainage to be achieved through endoscopic techniques, and may obviate the need for an external approach.

Methods: Retrospective review of patients treated for a supraorbital cell mucocele at a tertiary sinus center was performed. Radiology, endoscopic findings and symptom outcome measures were reviewed.

Results: Ten patients were identified with supraorbital cell mucoceles based on 1 mm cut CT scans of the paranasal sinuses. Each patient underwent surgical drainage using computer-aided endoscopic techniques. Drainage of the mucocele was successful in each patient and without the need for an external incision. Each patient remains clear of disease at follow-up (range 8 - 38 months) by nasal endoscopy and post-operative CT scans.

Conclusions: Knowledge of the anatomy of the supraorbital cell and its relation to the frontal sinus recess, are important in achieving success through endoscopic means. Given the nature of mucoceles, long-term follow-up is needed before endoscopic drainage of supraorbital mucoceles is validated. However, this preliminary data suggests that an endoscopic approach to these laterally based mucoceles provides adequate drainage and avoids an external incision.

4:22 pm

Discussion

Review of Data

Moderators

*Allen Seiden, MD
Eugenia Vining, MD*

4:25 pm

A 15-Year Review of Invasive Fungal Sinusitis

*John M. DelGaudio, MD
Shatul Parikh
Giridhar Venkatraman, MD
Atlanta, GA*

Objectives: Invasive fungal sinusitis (IFS) affects immunocompromised patients with reported mortality rates of 50% to 80%. We reviewed our experience with patients with IFS to determine outcomes and identify factors that may affect patient survival.

Methods: A retrospective review was performed between 1987 and 2002. 39 patients were identified accounting for 41 cases of IFS. Patients were included if they had a definitive diagnosis of IFS based on pathology report confirming tissue invasion by fungus and/ or positive fungal cultures.

Results: The underlying reasons for immunosuppression were hematologic malignancy (HM) (26), diabetes mellitus (9), solid organ transplant (3), chronic steroid use (2), and Acquired Immunodeficiency Syndrome (1). Six of 41 cases (14.6%) died of IFS and 4 of 41 (9.8%) died of other underlying disease related complications with persistent IFS. Thirty-eight (93%) had one or more surgical procedures for IFS (average 1.8 per patient). All but one patient received systemic antifungal therapy.

Of the twenty-six cases associated with HM, 3 died of IFS (11.5%), and 4 (15.4%) died of other causes with persistent IFS. 25 (96%) had absolute neutrophil counts (ANC) of less than 500 when symptoms began, and in the 3 deaths the ANC remained at 0. 3 of 9 (33%) patients with DM died of IFS. Permanent morbidity related to IFS was also more common in DM patients.

Conclusions: In this series we have found the overall mortality rate directly related to IFS to be 14.6%. The rate is higher for diabetic patients than for patients with hematologic causes for their immunosuppression. This is likely due to the high suspicion and early diagnosis and treatment of patients with neutropenia. While surgical debridement, antifungal therapy, and granulocyte replenishment are important, these mainly serve to reduce fungal load and augment neutrophil counts until the patient has a chance to regain natural immune function.

4:33 pm

Role of Nasal Endoscopy in Patients Undergoing Endoscopic Sinus Surgery

Brian A. Kaplan, MD
Stilianos E. Kountakis, MD, PhD
Charlottesville, VA

Introduction: Determine the role of nasal endoscopy in patients undergoing endoscopic sinus surgery. Examine the correlation between nasal endoscopy and pre and postoperative CT grade, symptom scores, and asthma status.

Methods: A prospective analysis was performed of patients presenting to a tertiary care rhinology practice for endoscopic sinus surgery from 1999-2002. Two hundred fifty-four consecutive patients were analyzed, 131 males and 123 females, with a mean age of 48 years. All patients had a minimum of one year follow up. All patients received preoperative CT scans and completed symptom scoring, SNOT-20 questionnaires, and endoscopic examination at both the preoperative and one year postoperative visits. Correlation between the endoscopic grade and CT, symptom, and SNOT-20 findings was calculated. The role of asthma was also calculated for the correlation between endoscopy and symptom scores.

Results: Nasal endoscopy demonstrated a statistically significant correlation with preoperative CT grade in this patient population. There was no correlation between endoscopic findings and symptom scores. Patients with asthma (n=47) showed no significant correlation between endoscopic grade and either CT or symptom scores. Non-asthmatics (n=207) also correlated nasal endoscopy with CT grade, but not with symptom scores.

Conclusions: Nasal endoscopic scoring does correlate with CT grade in a non-asthmatic population. No correlation was found between endoscopy and CT or symptom scores in patients with asthma.

Conflicts details: Stilianos Kountakis, MD, PhD — Speaker for Schering, GSK, Bayer, BMS, Merck; Research grants from Baxter Medical, Schering

4:41 pm

The Incidence of Sphenoid Sinus Mucocele Following Transsphenoidal Surgery: A Ten Year Experience

Tarika Bhuta, MD
Christopher R. Rassekh, MD
Jeffery P. Hogg, MD
Hassan R. Ramadan, MD
Morgantown, WV

Objectives: Scattered case reports of sphenoid sinus mucocele following transsphenoidal surgery exist in the current literature, but the incidence is unknown. The purpose of this study is to determine the incidence of mucocele formation in a large series of patients having undergone transsphenoidal surgery.

Methods: A retrospective review of charts of all patients undergoing transsphenoidal surgery at our institution since 1992 was conducted. Fifty patients were identified, with sixteen patients lost to follow up. Thirty-four patients' charts and post-operative magnetic resonance imaging (MRI) studies were reviewed to identify the incidence of sphenoid mucocele formation. Surgical procedure was uniform in all cases with the sphenoid sinus packed with fat. For the purpose of this study, all follow-up MRI's were reviewed again by a neuroradiologist with attention given to the sphenoid sinus.

Results: Thirty four patients were included in the study. Follow up range was 3 to 107 months, with a mean follow up time of 46 months. Three of thirty-four patients (9%) developed a post-operative sphenoid sinus mucocele based on imaging findings. None have required surgical intervention thus far.

Conclusions: The transsphenoidal approach for treatment of intrasellar tumors has been widely used since the 1980's because of its associated low morbidity and mortality. Our review shows that sphenoid sinus mucocele development is a rare but typical complication of sinonasal surgery often occurring several years after the primary surgery. Therefore, it is necessary to be aware of the incidence of mucocele formation as a long term complication of transsphenoidal surgery.

4:50 pm

Discussion

5:00 pm

**Business Meeting of
the American Rhinologic Society
Remarks By The President
and Committee Reports**

5:30 pm

Adjourn

Saturday, May 3, 2003

8:00 am

Opening Remarks

Introduction of Audience Response System

Medical Management of Chronic Rhinosinusitis

Moderators

Peter Hwang, MD
Richard Orlandi, MD

8:05 am

Medical Management and Diagnosis of Chronic Sinusitis: US Treatment Patterns

Scott M. Kaszuba, MD
Michael G. Stewart, MD, MPH, FACS
Houston, Texas

Introduction: This study was performed to identify current patterns of diagnostic criteria and medical treatment for chronic sinusitis by otolaryngologists in the United States.

Methods: A 15-item survey was mailed to a random sample of 200 members of the American Academy of Otolaryngology-Head and Neck Surgery; statistical analysis was performed.

Results: The overall response rate was 40.0%. Of respondents, 73% defined chronic sinusitis (CS) as sinusitis lasting greater than 12 weeks. 73% also believed radiological imaging was necessary for definitive diagnosis, but only 30% believed nasal endoscopy was necessary. Regarding treatment, respondents reported use of oral antibiotics (94%) and nasal corticosteroids (94%) as part of maximum medical management; oral decongestants, oral mucosolvents and allergy testing were only used by about half of respondents, and used less frequently were topical decongestants (38%), oral corticosteroids (36%) and oral antihistamines (27%). Oral corticosteroids were more likely to be used by specialists that self-classified as rhinologists than by other otolaryngologists ($p=0.005$), but rhinologists were less likely use to radiological imaging ($p=0.04$) as a diagnostic criteria. Pediatric otolaryngologists used allergy testing in medical management more frequently than other otolaryngologists ($p=0.001$). Overall, the basis for choice of maximal medical management was personal clinical experience (74%), rather than clinical research results, or expert recommendations.

Conclusions: US otolaryngologists agree on the use of oral antibiotics and nasal corticosteroids as part of maximal medical management for chronic sinusitis, but do not agree on other adjuvant therapies, or on the use of endoscopy as a diagnostic criteria.

8:12 am

Community Surveillance of Acute and Chronic Rhinosinusitis

Farhan Taghizadeh, MD
James A. Hadley, MD, FACS
Rochester, NY

We initiated a prospective study of 174 patients presenting with rhinosinusitis to continue community surveillance of the most common disease pathogens. 146 patients were evaluated for acute rhinosinusitis, with 36 patients under age 18. 28 adult patients presented with chronic rhinosinusitis. All patients greater than age 15 had endoscopic directed cultures, all children were swabbed nasally. All patients were evaluated at a single outpatient facility. For the adult acute bacterial rhinosinusitis group, *H. Influenzae* (24%), *Strep. Pneumoniae* (21%), *Staph Aureus* (18%), and *M. Cattarrhalis* (17%) were primarily cultured. For the pediatric acute bacterial rhinosinusitis group, *H. Influenzae* (25%), *Strep. Pneumoniae* (31%), *Staph Aureus* (17%), and *M. Cattarrhalis* (19%) were primarily cultured. Only 10 samples grew more than one dominant primary organism. Chi Square analysis showed no difference in the frequency of these major organisms between the pediatric and adult acute rhinosinusitis groups. This data was compared to previously published community surveillance data, showing similar results except for the much higher frequency of *Staph. Aureus* culture frequency. For the chronic rhinosinusitis group, *H. Influenzae* (11%), *Strep. Pneumoniae* (4%), *Staph Aureus* (43%), and *M. Cattarrhalis* (4%), *Pseudomonas* (25%) were primarily cultured. Again, we note the increasing frequency of *Staph Aureus* in this population compared to our previously published data. Our findings emphasize the rapidly changing patterns of bacterial prevalence for acute and chronic rhinosinusitis.

8:20 am

Discussion/Audience Response Questions

8:28 am

Correlations Between SPECT Bone Scanning and Histopathology of the Ethmoid Bulla-Part I

*Peter J. Catalano, MD
Robert W. Dolan, MD
John H. Romanow, MD
Mark L. Silverman, MD
Burlington, MA*

Introduction: Recent reports in the rhinology literature suggest that osteitis of the ethmoid bone may be responsible for refractory and/or recurrent sinusitis. Although this theory remains controversial, it suggests new treatment paradigms may be necessary for patients with chronic sinusitis and bone scanning technologies may be useful in diagnosing this condition and its response to treatment.

Methods: 38 patients diagnosed with chronic sinusitis and scheduled to undergo sinus surgery underwent a pre-surgical SPECT bone scan using technetium 99M-MDP. All bone scans were done within 5 days of surgery. During the procedure, bone samples from the face of the ethmoidal bulla were obtained bilaterally and examined by a pathologist blinded to the bone scan result. Surgeons were also blinded to the bone scan and pathology results. In this study, histopathology consistent with osteitis was defined as a change from lamellar to woven bone. A bone scan was defined as positive if increased radiotracer uptake was present in the ethmoid sinuses.

Results: 32 patients had a positive bone scan on SPECT imaging. Of these 32 patients, histopathologic bone changes consistent with osteitis were found in 31 specimens and absent in one. An additional 6 patients had a negative bone scan on SPECT imaging. Histopathology was unremarkable in 5/6; osteitis was identified in 1/6.

Conclusions: SPECT bone scanning with technetium 99M-MDP may be a reliable means to identify those patients with chronic sinusitis more likely to benefit from surgical intervention.

8:36 am

MR Findings of Inverted Papilloma: Differential Diagnosis with Malignant Sinonasal Tumors

*Roberto Maroldi, MD
Laura Palvarini, MD
Davide Lombardi, MD
Piero Nicolai, MD
Brescia, Italy*

Purpose: To evaluate the MR pattern of inverted papilloma (IP) and differentiate it from sinonasal malignant tumors (MT).

Patients and Methods: MR examinations of 23 patients affected by IP (16 primary, 7 recurrent) and 23 patients affected by MT (12 adenocarcinomas, 9 squamous cell carcinomas, 2 neuroendocrine carcinomas) were evaluated. The IPs arose from the lateral nasal wall in 17 cases, from the maxillary sinus in 5 cases, and from the nasal septum in one patient. The signal intensity of IP and MT was compared to muscles on SET2 and SET1 images; contrast enhancement was compared to nasal septum mucosa. Bone involvement was graduated as remodeling or erosion (focal mm; intermediate; extended 30mm). Correlation between bone changes and size or histology of the lesions was studied by Pearson's test.

Results: The average size of the IPs was significantly less than that of MT (33.9 mm vs. 59 mm, $P=0.0003$). IP showed a columnar pattern in all 23 cases by enhanced SET1 images and in 16 of 23 lesions (20mm diameter) by SET2. This pattern was observed in only 1 of the 23 MT: pathologic examination of that specimen demonstrated multiple foci of IP associated with SCC. Bone remodeling was observed in 19 of 23 IP, which in 4 cases was associated with focal (2) or intermediate (2) erosion. Bone changes did not correlate with size of IP. In all MT remodeling was present, combined with focal (2/23) or extended (21/23) erosion. A strong correlation was found between pattern of bone changes and histology ($r=0.89$).

Conclusions: Columnar pattern is a reliable MR sign of IP and reflects its histological architecture (positive predictive value 95.8%). The combination of this finding with the absence of extended bone erosion allows for the confident discrimination of IP from MT.

8:42 am

Quantitative Computer-Aided CT Analysis of Sphenoid Sinus Anatomical Relationships

Ryan P. Gallivan, MD
Donald C. Lanza, MD
Calvin R. Maurer, Jr., PhD
Martin J. Citardi, MD
Bend, OR

Introduction: A central tenet of safe sphenoid surgery is the avoidance of lateral manipulations within the sphenoid sinus. This CT-based study utilizes a novel computer-generated anatomical symmetry plane as a framework for the quantitative description of the anatomy of the sphenoid sinus and adjacent structures.

Objectives: To determine relationships and distances between a midline reference point within the sphenoid sinus and lateral sphenoid wall landmarks and structures.

Materials and Methods: Axial CT scans (1 mm slice thickness) were obtained on a VolumeZoom CT scanner (Siemens Medical, Erlangen, Germany). Mathematically derived anatomical symmetry planes were created using custom post-processing software. CT image data sets were transferred to the CBYON Doctor Station version 2.6R3FC4 (CBYON, Inc., Mountain View, CA). Standardized review of each CT scan using various surgical planning tools was performed. The central sphenoid point (CSP) was defined as the reference point in the midline sagittal plane at the intersection of the vertical sellar face and the horizontal sellar floor.

Results: A total of 128 sides in 64 cadaveric specimens were available for review. The incidences of anterior clinoid process (ACP) pneumatization and lateral pterygoid recess (LPR) pneumatization were 23.4% and 37.5%. The mean distance between the CSP and the maxillary spine (MS) was 76.4 mm. The mean distances from the CSP to the left optic canal midpoint (OCMP), the left anterior clinoid process entrance point (ACPEP) and the left lateral pterygoid recess lateral wall (LPRLW) were 17.2, 15.6, and 27.6 mm, respectively. The corresponding distances from the CSP on the right side were 17.3, 15.8, and 28.0 mm, respectively. The distances from MS to OCMP, ACPEP and LPRLW were 71.9, 75.3, and 72.0 mm on the left side. The corresponding distances from MS on the right side were 72.0, 75.0, and 72.0 mm, respectively.

Conclusions: This approach provides both quantitative understanding of sphenoid osteology, and may be coupled with intraoperative surgical navigation to reduce the risks of sphenoid surgery. LPR pneumatization is surprisingly common, and may provide a route for transnasal endoscopic procedures

of the middle cranial fossa skull base. ACP pneumatization exposes the optic nerve to the risk of inadvertent injury and creates a path for surgical decompression of the optic nerve. Because the CSP-derived relationships may be referenced during endoscopic surgical navigation from within the operative site, it may provide greater clinical utility than traditional references from the maxillary spine. This paradigm may facilitate greater understanding of sphenoid anatomy and enhance surgical safety and precision.

Conflict Details: Calvin R. Maurer, Jr., PhD — Grant/Research Support from CBYON, Inc.; Consultant for CBYON, Inc.; Member of the Scientific Advisory Board of Advanced Imaging Technologies, Inc. (AIT).

8:50 am

Discussion/Audience Response Questions

Moderator

William Bolger, MD

Rhinosinusitis and the Laboratory

9:00 am

Is Bone Infection a Reason for Chronic Suppurative Rhinosinusitis?

*Sara L. Retsema, MD
Joseph P. Allegretti, MD
Neal M. Lofchy, MD
William R. Panje, MD
Chicago, IL*

Introduction: Experimental data from previous histomorphometric studies of chronic suppurative rhinosinusitis (CRS) have reported changes in underlying bone suggestive of osteomyelitis. This inflammatory and infectious process in the bone may be a significant factor in the persistence of CRS and necessitate biopsy for culture directed antibiotic treatment. The purpose of this study is to evaluate ethmoid and maxillary bone in CRS for osteomyelitis based on bone culture and pathology.

Methods: A prospective study of 10 adult patients treated with functional endoscopic sinus surgery for CRS was completed. Tissue and underlying bone samples from diseased sinuses were obtained and sent separately for aerobic, anaerobic, and fungal culture. An additional sample of diseased sinus was stained by hematoxylin and eosin and analyzed for pathology.

Results: Bacteria was positively cultured from 90% of bone isolates. Bacteria in the sinus mucosa was generally representative of the organisms in the underlying bone. Pathological examination revealed chronic inflammation in all cases with a predominance of membranous inflammation.

Conclusions: The positive bacterial bone cultures support infection in bone as a major contributor to the pathogenesis of CRS. The similarity of CRS to osteomyelitis may account for disease chronicity and have further implications for the medical management of CRS.

9:08 am

Allergic Fungal Sinusitis: Developing an Animal Model

*Felicia Johnson, MD
John Houck, MD
Elizabeth Gilles, MD
Blaine Smith, PhD.
Nashville, TN*

Introduction: Allergic fungal sinusitis (AFS) is a chronic noninvasive form of fungal sinusitis with an unclear pathogenesis and a high rate of recidivism. There has been significant controversy as to whether AFS represents a hypersensitivity to the fungi in a predisposed patient or an actual infectious process. The histopathology of AFS has been shown to be identical to that of allergic bronchopulmonary aspergillosis (ABPA), which led to the idea that the pathogenesis in the two diseases is the same. It has long been known that both IgG and IgE antibodies specific to the causative fungal antigens are present in ABPA. However, the question of immunologic pathogenesis has not been clearly answered in AFS and there is no established animal model.

Objectives: The main objective of this study was to develop an animal model for AFS. In addition, we hoped to gain information regarding the possible immunologic pathogenesis behind the disease and the roles of IgG and IgE fungal-specific antibodies.

Methods: A pilot study was first performed to determine the optimal dose of *Aspergillus fumigatus* antigen for immunosensitization of New Zealand white rabbits. Once this was determined, the rabbits (n=8) were then actively immunized using fungal antigen combined with complete Freund's adjuvant and then given a booster 3 weeks later. Control rabbits (n=4) were not actively immunized and baseline IgG and IgE titers were obtained. Post-immunization fungal-specific IgG titers were measured with indirect ELISA testing. Fungal-specific IgE titers were measured by the homologous passive cutaneous anaphylaxis (PCA). The rabbits were then challenged with *Aspergillus fumigatus* spores by a percutaneous injection into each maxillary sinus. The rabbits were then observed over weeks to months, euthanized and tissue from the maxillary sinuses harvested and stained with hematoxylin/eosin and GMS stains and evaluated by our staff pathologist.

Results: The optimal dose of *Aspergillus fumigatus* antigen for immunization was determined to be 1 mg. We determined that the rabbit could indeed be sensitized to *Aspergillus* antigen and that there was variability in antibody response between the various rabbits. Some of the rabbits mounted both an IgG and IgE response while others produced only IgG or were complete nonresponders. Histopathology results showed focal areas of

acute and chronic sinusitis with allergic mucin present in several of the specimens. This type of histologic response was not seen in the control group. GMS staining did not show any evidence of fungal hyphae.

Conclusions: This study demonstrates that the rabbit can be sensitized to the *Aspergillus fumigatus* antigen to produce both IgG and IgE antibodies. Second, the control rabbits demonstrated no histologic evidence of sinusitis or any reaction to the fungal challenge which may suggest a possible immunologic pathogenesis behind AFS. The histologic results showed focal areas of acute and chronic sinusitis with allergic mucin which may represent AFS. With a few modifications of this model in regards to fungal inoculation methods as well as immunization techniques, this study may serve as a reliable animal model for AFS in the future.

9:16 am

Discussion/Audience Response Questions

New Etiologies??

Moderators

Andrew Lane, MD

B.J. Ferguson, MD

9:20 am

A Superantigen Hypothesis for the Pathogenesis of Chronic Hypertrophic Rhino-Sinusitis

Joel M. Bernstein, MD, PhD

Getzville, NY

Objective: To propose a theory and supporting data that may account for the chronic inflammatory infiltrate in massive nasal polyposis

Methods: 9 Patients with Chronic Hypertrophic Rhino-sinusitis with massive nasal polyposis were studied. Nasal Washings were submitted for bacteriological and fungal identification. The histopathology of the nasal polyps were studied in a semi-quantitative fashion. Only nasal mucus isolates with *S. aureus*, Coag. neg. Staph. and B-hem. Strep. were analyzed for enterotoxins (superantigen). The Beta Variable region of the T Cell Receptor (TCR) was studied in those patients in which enterotoxins were isolated.

Results: 5 of 9 patients grew out *Staph. aureus* that produced enterotoxins. Enterotoxin A in 2 Patients and TSS-1 (Toxic Shock Syndrome-1 toxin)

in 3 patients. The T cells receptors included those that can bind microbial superantigens. No fungal elements were seen in the nasal washings. The histopathology of the nasal polyps consisted primarily of lymphocytes, eosinophiles and plasma cells.

Conclusions: The pathogenesis of the chronic inflammation in nasal polyposis consisting of heavy infiltration of lymphocytes/eosinophiles may be the result of superantigen disease in which *Staph. aureus* releases enterotoxins (superantigens) which stimulate the appropriate TCR V beta regions on lymphocytes. This interaction may result in a massive upregulation of lymphocytes accounting for the chronic inflammatory disease seen in nasal polyposis.

9:35 am

Chronic Sinusitis with Polyps: Presence of IgE to Staphylococcal Enterotoxins

*David B. Conley, MD
Anju Tripathi, MD
Megan M. Lowery, MD
Kristin A. Seiberling, MD
Chicago, IL*

Rationale: Chronic sinusitis with polyps is a multifactorial disorder often associated with the presence of bacteria, notably *Staphylococcus aureus*, within the inflamed paranasal sinuses. IgE mediated hypersensitivity to *Staphylococcal* enterotoxins may be responsible for contributing to this chronic inflammation in certain patients. IgE to *Staphylococcus* enterotoxins has been demonstrated in several studies of atopic dermatitis, where there is a similar colonization by *Staphylococcus* of the affected skin. In addition, enterotoxins may act as superantigens, stimulating lymphokine release from T-cells.

Methods: Serum was drawn from 11 patients with sinonasal polyps undergoing endoscopic sinus surgery as well as 13 atopic and non-atopic control subjects without sinusitis. IgE to *Staph aureus* enterotoxin B (SEB) and toxic shock syndrome toxin -1 (TSST-1) was measured by ELISA. We compared degree of tissue inflammation in patients with IgE against staph enterotoxins to those without IgE against Staph enterotoxins. Numbers of tissue eosinophils and lymphocytes on H&E stained sections of polyps were scored by a blinded pathologist.

Results: Serum levels of IgE to SEB or TSST-1 were positive in 6/11 (55%) of patients with sinonasal polyps and 0/13 (0%) of control subjects. Patients with IgE against Staph enterotoxins tended to have a greater intensity of eosinophils and lymphocytes in their tissue specimens as compared patients without the antibodies.

Conclusion: *Staph aureus* enterotoxins may elicit an immune mediated response in certain individuals with chronic sinusitis and polyps. This response may act through type I IgE allergy and/or a T-cell mediated superantigen response, contributing to the inflammation that drives chronic sinusitis with polyps.

9:42 am

Discussion/Audience Response Questions

9:45 am

Break with Exhibitors

Antimicrobials and RS

Moderator

Michael Siller, MD

10:15 am

Penetration of Telithromycin (HMR 3647), a New Ketolide, into Sinus Tissue in Patients Undergoing Sinusectomy

*J.M. Klossek, MD
E. Serrano, MD
R. Peynegre, MD
Poitiers, France*

Background: A 5-day course of telithromycin 800 mg once daily has demonstrated efficacy and safety in acute sinusitis. The aim of this open, multicenter, randomized, parallel-group study was to assess telithromycin diffusion in maxillary sinus tissue.

Methods: 25 adult patients undergoing endoscopic endonasal surgery for nasal polyposis received telithromycin 800 mg orally once daily for 3 days before surgery. Sinus tissue samples were collected 2, 3, 4, 5, 12, 24 hours (H) and blood samples 2, 4, 12, 24 H after the last intake respectively. Tissue and plasma concentrations were determined by microbiological assay.

Results: 21/25 patients were eligible for pharmacokinetic analysis.

Mean (\pm SD, [95% CI]) sinus tissue concentrations of telithromycin (mg/kg) were as follows: 6.60 ± 3.48 [2.28;10.93] at 2 H (n=5), 5.54 ± 1.68 [2.86;8.22] at 3 H (n=4), 6.96 ± 1.58 [5.00;8.92] at 4 H (n=5), 5.44 ± 0.97 [3.90;6.98] at 5 H (n=4), 3.98 ± 1.93 [1.59;6.38] at 12 H (n=5), 1.58 ± 1.68 [-0.18;3.34] at 24 H (n=6). Mean (\pm SD, [95% CI]) plasma concentrations of telithromycin (mg/L) were as follows: 1.05 ± 0.22 [0.51;1.58] at 2 H (n=3), 1.27 ± 0.50 [0.47;2.06] at 4 H (n=4), 0.29 ± 0.11 [0.16;0.42] at 12 H (n=5), 0.04 ± 0.01 [0.02;0.05] at 24 H (n=5). Sinus/plasma concentrations ratios ranged from 4 to 6 at 2 H and 4 H.

Conclusions: A 3-day course of telithromycin 800 mg orally once daily achieves high sinus tissue concentrations, higher than MIC values for the key bacterial pathogens responsible for acute sinusitis.

10:22 am

Middle Meatus/Sinus Culture — Does It Change Therapy?

*Berrylin J. Ferguson MD
Shalini Kansal, MD
Pittsburgh, PA*

Background: Infectious rhinosinusitis can be viral or bacterial. The recent increase in antimicrobial resistance makes empiric selection of an appropriate antibiotic problematic. The senior author's current practice is to endoscopically culture all patients with possible infectious rhinosinusitis. This retrospective study assesses the impact this practice has on patient management.

Design: Retrospective chart review

Intervention: Examination of culture results obtained endoscopically from the middle meatus or a specific sinus and assessment of whether antibiotic treatment was altered based on culture results.

Results: 22 charts were retrospectively reviewed. In 5 patients, no pathogenic bacteria were isolated and no antibiotic treatment was initiated. In 4 patients, pathogenic bacteria were isolated, and the appropriate antibiotic, which was implemented prior to culture, was continued. In 4 patients, pathogenic bacteria were isolated, and the patient's initial antibiotic was switched based on sensitivities. In 6 persistently symptomatic patients, an antibiotic was instituted based on specific bacterial sensitivities after culture results were available. In 3 cases, patients improved following sinus irrigation and topical antibiotics and despite isolation of pathogenic bacteria, no antibiotic was initiated.

Conclusions: In 10 of 22 patients (45%) antibiotics were changed or initiated based on endoscopically obtained culture results.

Conflict details: Berrylin J. Ferguson MD — Consultant for Glaxosmith Kline, Aventis, Pfizer; Research Support from Aventis; Speaker's Bureau of Glaxosmith Kline, Aventis.

10:30 am

Discussion/Audience Response Questions

10:35 am

Patient Advocacy Committee/Membership/
Education Committee Presentations

Moderators

Committee Chairs

Discussion/Audience Response Questions

Image Guidance and Imaging

Moderators

Martin Citardi, MD

Brent Senior, MD

11:05 am

Evaluation of the Endoscopic Sinus Surgery Simulator (ES3) as a training device

Marvin P. Fried, MD

Walter Ralph, MD, PhD

Jose I. Uribe, MD

Bronx, NY

As an initial step in evaluating the efficacy of training otolaryngology residents on the endoscopic sinus surgery simulator (ES3), we have assessed the ability of the ES3 to train persons inexperienced in sinus surgery (medical students) to perform simulated procedural tasks of endoscopic sinus surgery. In the novice mode (a training mode of the ES3 in which 3D abstract images are used to teach the use of endoscopic surgical equipment) 11 randomly selected medical students displayed a steep learning curve within 3-5 trials on the simulator and, after an additional 4-5 trials, reached a plateau in their learning curves to within 90% of that of experienced sinus surgeons. In the intermediate mode (a training mode of the ES3 in which endoscopic sinus surgery is performed on a simulated patient with realistic sinus anatomy) a similar trend existed where 5 students were able to plateau their learning curve to within 80% of that of experienced surgeons after 3 to 5 trials within a 2 to 6 week training period. Of note was the observation that medical students, who had 3-4 continuous weeks of novice or intermediate mode training interrupted with an interval of 1-2 months, were able to resume their training without deviation from their prior learning curves. Students who were on the steep slope of their curve prior to the interruption returned to that part of the curve in a manner similar to those who never had an interruption. These results support the conclusion that (1) intensive, proctored training on the ES3 can train inexperienced persons to perform simulated endoscopic sinus surgery within a reasonable approximation of the performance of experienced sinus surgeons on the ES3 and (2) the training that an inexperienced person receives on the simulator is not short-term, but is retained over a period of at least 1-2 months.

11:12 am

CT Generated Templates — A New Approach to Frontal Sinus Osteoplastic Flap Surgery

John L. Fewins, MD

Randal A. Otto, MD

San Antonio, TX

Objectives: To present a new technique for frontal sinus template creation used in osteoplastic flap surgery which obviates the need for the traditional 6 foot Caldwell radiograph.

Study Design: A prospective study was conducted using templates created from human cadaver skulls.

Methods: Seventeen human cadaver skulls were studied. Using digital addition algorithms of sequential coronal CT images of the frontal sinus to create a composite image, an image is printed to 1cm=1cm scale. A frontal sinus template was created using this processed image and compared to a control 6-foot Caldwell plain film.

Results: Seventeen human cadaver skulls were studied. One was excluded secondary to an agenetic frontal sinus. Three were excluded due to the inability to clearly visualize landmarks on the Caldwell projections. The mean variance between corresponding vertical points on the templates was .7mm with a standard deviation of .7mm. The mean variance between horizontal points was 1.2mm with a standard deviation of 1.4mm. The mean difference in width was 2.5mm. The plain film templates were always wider than the CT generated templates.

Conclusions: The CT generated frontal sinus templates were easily created, practical, and precise. They obviate the need for additional imaging and minimize the potential errors commonly associated with six-foot Caldwell templates. Additionally, they are more easily obtained in severely injured patients who may be unable to stand for standard 6 foot Caldwell radiographs. Our results indicate that there is negligible variation in size between CT and plain film generated templates.

Key Words: frontal sinus, osteoplastic flap, Caldwell

11:20 am

Discussion/Audience Response Questions

11:30 am

Economic Analysis of the Use of Limited Coronal CT Scans in the Management of Sinusitis

*Christine B. Franzese, MD
Scott Stringer, MD
Jackson, MS*

Objectives: As medical costs increase, less expensive alternatives to standard diagnostic tests are sought to reduce the economic burden placed on society. One alternative is using limited, non-consecutive cut computed tomography (CT) scans for the evaluation of sinonasal disease. This study evaluates the cost-effectiveness of utilizing limited CT scans instead of full sequence CT scans in the diagnosis and management of rhinosinusitis.

Methods: A Medline search was performed to obtain data for the sensitivity and specificity of limited CT scans, the prevalence of abnormal CT scans, and recommendations on using limited CT scans for operative management. A standard cost-effectiveness analysis including a sensitivity analysis was performed using a hypothetical population of patients with sinus complaints who failed prior appropriate medical therapy.

Results: At baseline, the limited CT scan was found to be less cost-effective than the full CT scan, costing \$217.13 more per correct diagnosis. The sensitivity analysis demonstrated that changes in the prevalence of abnormal CT scans and the percentage of surgeons who would operate using a limited scan had the greatest impact on cost, while changes in the price of the full CT or limited CT scan had the least effect.

Conclusions: This study finds the use of limited CT scans to be economically unsound as a method to reduce costs in the defined population. Published literature recommends obtaining a full CT scan prior to operative management. Basing intervention on limited CT scans increases the possibility of erroneous diagnoses leading to either excessive or inadequate treatment of patients.

11:38 am

An Endoscopic Study of the Neural Anatomy of the Pterygomaxillary Fossa

*Jonathan Mellema, MD
Thomas A. Tami, MD
Cincinnati, OH*

Introduction: Utilizing an endoscopic approach, lateral sphenoid air cells and terminal branches of the internal maxillary artery can often be accessed through the pterygomaxillary fossa, however injury to the infraorbital nerve (V2) and greater palatine nerve (GPN) can occur if the anatomy of this region is not clearly understood. This study was undertaken to define the pathway of V2 and the GPN and to identify landmarks useful in preventing their injury.

Methods: Six cadaveric heads were used to endoscopically dissect and examine eleven pterygomaxillary fossae. An additional latex injected cadaveric head was sectioned coronally and dissected bilaterally. The relationships between the vascular, neurologic and bony structures and foramina were noted and described.

Results: All specimens studied maintained consistent relationships. The sphenopalatine and posterior nasal arteries cross nearly perpendicular and just superficial to the GPN. The GPN traveled anteriorly and inferiorly to reach the greater palatine foramen. The lateral wall of the canal ranged from a thin bony covering to complete dehiscence and was thinnest as it crossed the inferior turbinate and approached the foramen. The foramen rotundum was consistently located lateral and superior to the sphenopalatine foramen near the roof of the maxillary sinus.

Conclusions: When surgically approaching the pterygomaxillary fossa, injury to V2 and the GPN can be avoided if specific anatomical relationships are understood. The foramen rotundum, V2, GPN and internal maxillary artery all have specific anatomical relationships which can be used to successfully and safely navigate through this complex anatomic region.

Conflict details: Medtronic/Xomed provided surgical and video equipment to perform the anatomic dissections.

11:46 am

Discussion/Audience Response Questions

11:54 am

Closing Remarks

Donald Lanza, MD
James A. Hadley, MD

12:00 pm

Adjourn

POSTER PRESENTATIONS

Aeroallergen Hypersensitivity: Comparing patients with Nasal Polyps (NP) to those with Allergic Rhinitis (AR)

Janine VanLancker, MD
Anne Ditto, MD
Paul Yarnold, PhD
Kristen Seiberling, MD
Chicago, IL

Background: IgE mediated allergy has not generally been considered to be important in the pathogenesis of nasal polyps, in spite of elevated IgE in polyp exudates, tissue eosinophilia and degranulated mast cells. In previous reports, patients with nasal polyps were more likely to have positive skin tests to perennial than to seasonal allergens. It is postulated that nasal polyps result from the constant nature of perennial allergen exposure.

Objectives: To compare the prevalence of sensitization to 6 aeroallergens in a group of nasal polyp(NP) patients, a group allergic rhinitis(AR) patients, and those subjects with positive skin tests in the National Health and Nutrition Evaluation Survey (NHANESII).

Methods: Twenty-five consecutive nasal polyp patients evaluated over a 3 month period of time at Northwestern Sinus and Allergy Center, in addition to 50 of the allergic rhinitis patients evaluated over the same time were randomly chosen. All were skin tested with the following antigens: dog, cat, dust mite, grass, tree, and ragweed. (ALO; Columbus Ohio). Published skin test data from the NHANESII study of 14,367 individuals was also obtained.

Results: The percent of NP patients, AR patients, and NHANESII subjects with sensitization to perennial allergens was 72%, 96%, and 7.6% respectively. The difference between the AR and NP patients was statistically significant. (p=0.006)

The percent of NP, AR, and NHANESII subjects sensitized to seasonal allergens was 84%, 82%, and 17.7%. There was no statistical difference between the AR and NP patients.

Conclusions: While the AR and NP patients had similar levels of reactivity to perennial and seasonal allergens, the NHANESII group was more than twice as likely to be sensitized to a seasonal allergen. The NP and AR groups were similar in prevalence of reactivity to seasonal allergens, but the NP patients in our population were actually less likely to be sensitized to perennial allergens than individuals with AR.

Change in Olfaction After Sinus Surgery

*Prajoy Kadkade, MD
Hector Rodriguez, MD
Jeffrey Ahn, MD
Lanny G. Close, MD
New York, NY*

Background: Functional endoscopic sinus surgery (FESS) is now the surgical procedure of choice for treating medically-refractory chronic sinusitis in patients of all ages. In FESS, it is common practice to medialize the middle turbinates by suturing the middle turbinates to the septum. There is anecdotal evidence that suture-medializing the middle turbinates adversely affects olfaction.

Objectives: To objectively evaluate olfaction post FESS/septoplasty with suture-medialization of the middle turbinates.

Methods: University of Pennsylvania Smell Identification Tests (UPSIT) were administered preoperatively and postoperatively to 20 patients undergoing FESS/septoplasty for medically-refractory chronic sinusitis. All patients had reported subjective olfactory dysfunction preoperatively. Half of these patients underwent suture-medialization of the middle turbinates as part of the procedure. The average age was 40 years with approximately 3:2 male: female ratio in both groups.

Results: There was an average increase in sense of smell postoperatively in both groups based on UPSIT. No significant difference in sense of smell was detected in patients who underwent suture-medialization of the middle turbinates compared with patients who did not have suture-medialization.

Conclusions: There is no detriment to olfaction with suture-medialization of the middle turbinates.

Patient Preference for Outcomes Measures of Rhinitis

*Ilknur Haberal, MD
Jacquelynne P. Corey, MD
Chicago, IL*

Objectives: Our aim was to determine patient preference for validated allergic rhinitis questionnaires. Two questionnaires were evaluated: the FNQ (Fairley Nasal Questionnaire), and the SNOT-20 (20 Item Sino Nasal Outcome Test).

Study design and Setting: A prospective study was performed on 25 patients with rhinitis symptoms. They were given the

SNOT-20 and FNQ concurrently and asked to complete the questionnaires. They were asked which questionnaire they felt most accurately depicted their symptoms.

Results: 48% of the patients were females whereas 52% were males. 22 (88%) of them had allergic rhinitis, 2 (8%) had chronic sinusitis, 1 (4%) had acute sinusitis, 8 (32%) had allergic conjunctivitis, 2 (8%) had obstructive sleep apnea (OSA), 1 (4%) septal perforation, 2 (4%) septal deviation and 2 (8%) had asthma. Among these patients with proved and suspected allergic rhinitis, 17 (68%) preferred SNOT-20, saying that it was more detailed and it reflected their symptoms much better.

Conclusions: The SNOT-20 is a preferred testing method for patients with symptoms of allergic rhinitis, a chronic disorder. The FNQ seemed better for acute symptoms.

Discussion and Significance: The recent trend has been to shorten questionnaires as it was assumed that patients prefer shorter questionnaires. In this study, the longer questionnaire was preferred because it was felt to be more complete and more closely approximated their symptoms.

Results of Endoscopic Surgery of Choanal Atresia Through Transnasal Approach

*Mohammad Hossein Baradaranfar, MD.
Farhad Fatehi, MD.
Yazd, Iran*

Choanal atresia is a complete blockage of communication between nasal cavity and nasopharynx. Clinical presentation depends on the type of anomaly. In unilateral atresia, there may be no symptoms until puberty but unilateral rhinorea in a child should raise suspicion of choanal atresia.

Clinical signs are usually present at birth in bilateral atresia, including recurrent cyanosis that is relieved by crying. Between 1997 and 2000, in the Amiralam hospital (Tehran) and Shahid Rahnemoun hospital (Yazd), 18 Patients with choanal atresia underwent transnasal Endoscopic surgery.

Mean age was 7.3 years with a range of one month to 16 years. 14% of patients had bilateral atresia and the remaining 86% had single sided atresia. Of those with single sided atresia, 70% were on the right side and 30% on the left side. 43% had membranous atresia and 59% were bony atresia.

In bony atresia it was opened by micro-drilling and in membranous ones, it was opened by curette and circular punch. Stent tube was placed for all of them.

Mean follow up time was 38 months. 12 patients had complete success with both choanae open but in 4 patients nasal obstruct-

tion recurred, two of them underwent revision and the other 2 patients refused revision surgery.

No complications occurred in patients. Considering these results it seems that endoscopic surgery of choanal atresia through transnasal approach is a good method, which due to excellent visualization of the field, yields successful results.

Transnasal Endoscopic Repair of Orbital Blow out Fracture

Mohammad Hossein Baradaranfar, MD.

Farhad Fatehi, MD.

Yazd, Iran

Orbital blow out fracture is defined as fracture of one of orbital walls without orbital rim involvement. It is more common in orbital floor. Prolapse of orbital contents into maxillary sinus can cause ophthalmic complaints.

Clinical signs of orbital blow out fracture include: eyelid echymosis, diplopia, restriction of eye movements, enophthalmia, and occasionally sensory deficits in infraorbital nerve territory.

Here we describe a case of orbital blow out fracture with involvement of orbital floor after trauma who presents with eyelid echymosis, diplopia, exophthalmos and impairment of upward gaze. In coronal high resolution CTscan there was fracture of orbital floor with prolapse of orbital contents into maxillary sinus, but without fracture of lamina papyracea.

Under general anesthesia with transnasal endoscopic approach, a wide middle meatal antrostomy was created and after removal of bony fragments, orbital contents were released from periphery and returned into orbit. A Foley catheter was introduced into maxillary sinus and inflated to support the repaired area. It remained in place for 2 weeks. After operation, all signs of fracture improved and post-op CTscan approved clinical improvement. It seems that transnasal endoscopic approach with better visualization, less bleedings and no need for foreign material such as silastic is a choice for repair of orbital blow out fracture than trans-orbital or trans-antral methods.

Endoscopic Resection of a Maxillary Sinus Ameloblastoma

Lance A. Manning, MD

Eric J. Moore, MD

Rochester, MN

Ameloblastoma is an uncommon, benign, locally invasive tumor representing 1% of all jaw tumors. It has a predilection for the mandible and is typically slow-growing in nature. Twenty percent of these tumors occur in the maxilla, and when this happens, the standard therapy is wide local resection. We present a case of an elderly patient that presented with symptoms of nasal congestion and rhinorrhea. CT scan confirmed the presence of an expansile mass with bone deformation. Endoscopic biopsy confirmed the presence of ameloblastoma and a partial medial maxillectomy was performed endoscopically instead of the traditional open surgical treatment. Surgical approach and technical issues are discussed. As endoscopic technologies, experience, and techniques continue to evolve, endoscopic treatments augment the breadth of treatment options available to the skull base surgeon.

Saddle Nose Repair with "Modified Crossed Flying Wing" Method (A New Approach)

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The hallmark of saddle deformity is an abnormally concave nasal dorsum in profile. The fundamental defect is a lack of architecture in the nasal dorsum, which may involve the bony or cartilaginous nasal vault.

Depending on the degree of architectural loss several associated nasal defect may be seen commonly with the saddle nose deformity such as tip-lip complex abnormalities, projection defects and so on.

Numerous etiologies of the saddle nose are described most commonly trauma or previous rhinoplastic surgery but congenital defect, infectious diseases, syphilis and soon are other probable etiologies.

The treatment plan first must insure that the underlying etiology is addressed. Correction of the saddle defect almost universally involves augmentation of the nasal dorsum with a filler material to replace the lost framework. Augmentation materials maybe broadly categorized as autografts, homografts and alloplasts. An ideal augmentation material would approximate closely the

shape, consistency and strength of the deficient nasal framework. It would be easily obtainable capable of being shaped and cost-effective. Finally it would provoke minimal tissue reactivity and resist tissue extrusion, or resorption.

None of augmentation materials is correct for all circumstances and a myriad of materials have been used over the years. Overall autograft cartilages (Septal, auricle or lower lateral) if available are preferred over other materials.

Modified crossed flying wing is a new method that uses autogenous lower lateral cartilage for repair of mild to moderate cases of saddle nose deformity. We used this method in some patients with traumatic or post-rhinoplasty saddle nose. Under G/A and with open approach the cephalic portion of lower lateral cartilage was separated, crossed and sutured to nasal bone periosteum. The mean follow up of patients was 3 years without any complication of recurrence.

It seems that this method is a suitable mean for mild to moderate saddle nose without any sequel, further deformity or donor site morbidity.

Malignant Solitary Fibrous Tumor of The Ethmoid Sinuses: A Case Report

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Introduction: Solitary fibrous tumor (SFT) is a rare spindle cell neoplasm, originally described as a tumor of the pleura. Extrapleural SFT, including those arising in the head and neck are exceedingly uncommon. To date, only 13 cases of sinonasal SFTs have been reported. We believe this to be the first example of a malignant solitary fibrous tumor of the head and neck and paranasal sinuses.

Methods: Case report.

Results: A 71 year old male presented with 5 month history of nasal obstruction and snoring. He has no history of sinusitis or allergic rhinitis, yet is found to have bilateral nasal polyposis. After failure of medical therapy, nasal endoscopy is performed. An unusual mass is found in the left ethmoid sinus. Histopathological evaluation reveals a patternless cellular arrangement with poorly defined eosinophilic cytoplasm. Focal areas of prominent branching vessels resemble hemangiopericytoma. Immunostaining is positive for CD34 and Vimentin, and negative for S100, LCA, CK, HHP-35, EMA, and Factor 13A. The diagnosis of malignant SFT is made with the finding of 8 mitotic figures per 10 high-powered fields counted.

Review of the literature reveals this to be the first documented case of malignant solitary fibrous tumor of the head and neck and paranasal sinuses. Management including natural history is reviewed and histologic and radiographic examples are provided.

Conclusions: This case report serves to document the first case of malignant solitary fibrous tumor of the head and neck. These exceedingly rare tumors must be included in the differential diagnosis of nasal neoplasms. We also emphasize the importance of specimen collection on routine endoscopic sinus surgery.

Endoscopic Repair of CSF Rhinorrhea and Encephalocele: A Case for Intrathecal Fluorescein Localization

*Derek Kofi O. Boahene, MD
David A. Sherris, MD
Rochester, MN*

Introduction: Endoscopic repair of CSF rhinorrhea has gained increased acceptance. Successful outcomes depend on the precise intraoperative localization of the leakage site. We present a complex case where the use of intrathecal fluorescein allowed the precise intraoperative localization of CSF leakage site to the anterior ethmoid whereas a preoperative indium -111 DTPA scintiscisternogram falsely suggested the sphenoid sinus.

Methods: A 47 years-old female presented with left-sided clear rhinorrhea 3 years following primary radiation treatment of an optic sheath meningioma in the region of the left sphenoid sinus. Follow-up MRI showed no recurrence of the meningioma. The nasal discharge was positive for beta-2 transferrin. Preoperative indium -111 DTPA cisternogram revealed a high count in the left sphenoid sinus consistent with the patient's previous history. An endoscopic repair of a potential sphenoid sinus defect was planned. Intrathecal fluorescein was used to facilitate intraoperative identification of the leakage site. The left sphenoid was however negative for any dye leak or dehiscence.

Results: The CSF leakage site was localized to the anterior ethmoidal roof with intrathecally injected, CSF diluted 5% fluorescein. An associated encephalocele was identified and removed without sequelae. The leak was successfully repaired using tissue glue and a composite graft of uncinata mucosa and bone.

Conclusions: Although preoperative identification of CSF fistulas with cisternograms is useful, the addition of intrathecal fluorescein allows a precise live-time intraoperative localization of the defect, which may prevent the performance of the wrong repair procedure.

Treatment of Velopharyngeal Incompetence with Injectable Hydroxylapatite

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A variety of surgical techniques have been used for the treatment of velopharyngeal incompetence (VPI), including palatal flaps and tissue implants. Calcium hydroxylapatite ceramic (HAC) is a synthetic material that is biocompatible and does not elicit a foreign body reaction. It has been used to augment soft tissues and maintains its volume. The first reported case of injectable HAC for the treatment of VPI is presented here. A 53-year-old female developed VPI following a transoral/transpalatal decompression of the cervical spine. Symptoms of nasal reflux and hypernasal speech resolved following endoscopic injection of the nasopharyngeal tissues with HAC 13 and 18 months following her initial surgery. Long term persistence of the injected implant has been demonstrated radiographically. Injectable HAC provides a simple and effective technique for the treatment of VPI in selected patients.

MRI Findings in the Evaluation of Traumatic Anosmia

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Introduction: Head trauma is a common etiology of anosmia, but diagnosis is typically late, owing to the more life-threatening situation of an acute head injury. We present a case report involving a patient who sustained a closed head injury with the isolated neurological sequella of permanent anosmia, diagnosed early with brain imaging and an olfactory evaluation. MRI findings in the setting of acute olfactory region trauma are discussed in this report.

Methods: Case report. CT was a 34 year old woman who presented to a local emergency room with head trauma secondary to being struck by an automobile while riding a bicycle. Her only symptom was a change in sense of smell noticed after about 3-4 days.

Results: MRI of the brain obtained immediately post trauma demonstrated hemorrhage with surrounding edema in the gyrus rectus and the region of the olfactory bulbs and tract bilaterally compatible with hemorrhagic contusion. A follow-up MRI performed after one year demonstrated malacia in the above mentioned areas with associated volume loss, in an appearance

suggestive of chronic contusion. Formal olfactory testing demonstrated bilateral total anosmia.

Conclusions: Anosmia is a potential complication of head trauma. Conventional MRI, which is readily available at most medical centers, serves as a valuable tool for predicting olfactory trauma, and may serve to correlate clinical progression. Such testing may enable early consultation of an Otolaryngologist, formal olfactory testing, and early patient counseling regarding anosmia.

Lipoma of the Nasal Dorsum, A Unique Presentation of Common Neoplasm

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Introduction: Lipomas are the most common neoplasm of mesenchymal origin and more than 10% arise in the head and neck. We present the first known case of a lipoma arising from the nasal dorsum.

Methods: Case report and literature review

Results: The lipoma was completely excised via an external septorhinoplasty approach providing an excellent cosmetic result.

Conclusions: This is the first known presentation of a lipoma of the nasal dorsum. We describe the presentation of this unusual lesion, describe the radiographic characteristics which differentiate it from other neoplasms in this area, and recommend a minimally invasive method of treatment.

Bacteriology of the Patients with Chronic Sinusitis of Whom Had Been Medically and Surgically Treated Due to Chronic Sinusitis

*Altan Yildirim, MD
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Chronic sinusitis is a disease that afflicts a significant percentage of the population and causes considerable long-term morbidity. The common use of multiple broad spectrum oral antibiotics and performing endoscopic sinus surgery to treat this condition might cause an alteration in the pathogens that promote persistence of chronic sinusitis. Fortyeight culture positive patients with chronic sinusitis of whom had been medically and surgically treated due to chronic sinusitis were bacteriologically evaluated. Swab speci-

mens of middle meatus and sphenoetmoid recess were aseptically obtained endoscopically and cultured for aerobes. Coagulase-negative staphylococci were the most common isolates 45.8% followed by streptococcus pneumonia 16.7%, enterobacteriaceae 16.7%, staphylococcus aureus 10.4%, pseudomonas aeruginosa 10.4%. Coagulase-negative staphylococcus is the most frequently isolated organism in our study as in many other studies of nonoperated patients. Despite the significant predominance of this organism has always been assumed to be a contaminant and its presence in culture has been discounted. Coagulase-negative staphylococcus may be a pathogen in chronic sinusitis process and sensitivities should be obtained of this isolate for evaluation and possible treatment of the disease.

An Initial Report of a Cranial Pin System for Frameless Image Guidance

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Introduction: The use of an intraoperative navigation device improves surgical accuracy, helps identify anatomic landmarks and can minimize the risk of complications during surgery of the paranasal sinuses and skull base. Despite these benefits of image guidance, its use is limited by the headset, which precludes external surgical access. We report the successful utilization of a cranial pin (AXCESS(tm) System) that is placed into the outer table of the calvarium during surgery. This eliminates the need for a headset, permitting unencumbered external surgical access.

Methods: Following the induction of general anesthesia, the patient's temporal scalp is prepped and draped. A 2-3 cm incision is made, and the calvarium is exposed. A drill hole is made using a special guarded bit and the cranial pin is placed, using a custom driver, included with the AXCESS TM system. A transmitter is then attached to the pin, and calibration is performed. Following a fast fiducial registration and verification, the headset is removed, and intraoperative tracking can then be accomplished.

Results: Accuracy of intraoperative localization was noted to be similar to published reports using the InstaTrak(r) System with a headset. There were no complications associated with placement of the cranial pin. Patients reported only minimal postoperative discomfort related to the 2-3 cm. temporal scalp incision.

Conclusions: The cranial pin adaptation for the InstaTrak(r) System combines the benefits of surgical navigation with external surgical access to the paranasal sinuses and base of skull.

Pyogenic Granuloma

*Han-Soo Bae
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Introduction: Nasal pyogenic granuloma is an uncommon lesion which presents as a vascular nasal mass. There are reports of both anterior and posterior location. The etiology is believed to be traumatic or related to pregnancy.

We report two cases—one pregnancy related and the other traumatic.

Study Design: Case report and review of literature

Results: 33 year old pregnant woman presented with right sided epistaxis and controlled by cauterization by the Emergency Department. Since the cauterization, she developed right sided nasal obstruction with a friable tissue. After her delivery, the lesion was biopsied in the clinic which revealed a pyogenic granuloma. She was then taken to the OR for total endoscopic resection.

Our second patient is a 50 year old presented with a two year history of right nasal obstruction and multiple episodes of intermittent epistaxis. Physical exam revealed a verrucous-looking mass occupying the entire anterior nasal cavity attached to the septum by a narrow stalk. CT scan demonstrated anterior nasal mass 3 by 2 cm. Biopsy was performed in the office which showed features consistent with pyogenic granuloma. The patient subsequently was taken to OR for total endoscopic resection

Conclusions: The etiology of pyogenic granuloma is unclear; however, trauma and hormonal changes seem to be contributing factors. Management consists of total resection and observation.

Subperiosteal Orbital Abscess: Medical or Surgical Treatment?

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Introduction: Controversy exists about the optimal management of subperiosteal orbital abscesses (SPOAs). Some advocate immediate surgical drainage. Others recommend medical management with surgery reserved for non responders. We hypothesized that patients who could be managed without surgery had identifiable features on presentation.

Methods: A retrospective chart review was performed. All patients were 18 years and younger. Findings consistent with a SPOA were present on CT imaging. Patients were divided into two groups; Group 1 had medical treatment alone while group 2 had either open or endoscopic abscess decompression surgery within 24 hours of admission.

Results: 39 patients were identified. 17 (group 1) received entirely medical treatment while 22 (group 2) had surgery. All patients had resolution of their SPOA. The following variables attained significance: group 1 presented younger (5 vs. 13 years, $p = 0.0003$), had less ophthalmoplegia (1.0 vs. 2.3, $p = 0.017$) and spent less time in hospital (6.5 vs. 13 days, $p = 0.011$). The following variables did not obtain clinical significance; gender, side of abscess, temperature, total white cell count, neutrophil count, chemosis, visual acuity and proptosis. Culture reports were predominantly no growth (10/25) and streptococci (7/25). There were no surgical complications.

Conclusions: A subset of patients with SPOAs can be managed medically, particularly if younger and with minimal ophthalmoplegia. Close observation of these patients for possible deterioration and need for surgical management is required.

Recovery of Olfaction After Endoscopic Sinus Surgery for Chronic Sinusitis

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Background: Smell recovery in patients with chronic sinusitis who have undergone functional endoscopic sinus surgery (FESS) appears to be quite variable. Few studies have assessed the effect of this treatment on the sense of smell.

Objectives: We hypothesized that restoration of smell may depend on pre-existing factors such as the extent of disease, the severity of nasal polyps, and the presence of Samter's triad. The purpose of this study was to analyze these factors prospectively, with respect to smell recovery after FESS.

Methods: 82 patients who underwent FESS participated in this study. Patients were evaluated pre-operatively with a nasal and sinus survey, physical examination, allergy testing, and computer tomography. Visual analogue scoring was performed pre-operatively, and repeated at 5 post-operative intervals over 2 years.

Results: At 4-12 weeks post-operatively, significant improvement was noted in the majority of patients' subjective olfactory ability (mean relative improvement 58%). However, patients with polyps, more severe sinusitis, and asthmatics all showed

less relative improvement than their counterparts. Over two years, all patient subgroups showed evidence of some deterioration from their first post-operative visit, but patients with Samter's triad showed the most impressive deterioration, with an initial mean relative improvement of 64% at the first post-operative visit to only a 25% mean relative improvement from pre-operative baseline at 12 months.

Conclusions: FESS with post-operative nasal steroid spray, performed in patients with chronic rhinosinusitis, significantly improves subjective olfactory ability. However, variability is present and appears to be correlated with certain pre-operative risk factors.

Embolization for the Treatment of Idiopathic Posterior Epistaxis

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Objectives/Introduction: Posterior packing, ligation and cautery are long-standing methods for treatment of idiopathic posterior epistaxis. In the last decade, embolization has become more frequently employed for management. This study presents our experience with embolization for treatment of idiopathic epistaxis from 1988 to present.

Methods: We present a retrospective chart review of all patients undergoing embolization for posterior epistaxis treated by otolaryngology - head and neck surgery, neurology and/or interventional neuroradiology services at a tertiary care facility. The charts of patients who presented with idiopathic posterior epistaxis were reviewed in detail.

Results: Seventy-four patients were treated with embolization for posterior epistaxis. The majority were idiopathic presentations of posterior epistaxis (30, 41%). In decreasing frequency, the following underlying conditions were found: juvenile nasopharyngeal angiofibroma (15, 20%), malignancy (6, 8%), post-surgery (5, 7%), arteriovenous malformation (4, 5%), Osler-Weber-Rendu syndrome (4, 5%), trauma (4, 5%) and idiopathic thrombocytopenic purpura (1, 1%). Seventeen men (57%) and 13 (43%) women presented with idiopathic epistaxis. The mean age of presentation was 67 years with a range from 44 to 87 years. The majority had failed packing and many were referred from other institutions for refractory epistaxis. Four (13%) had recurrent epistaxis within one month requiring either repeat embolization (3) or treatment by other modalities (1). Hypertension, diabetes mellitus and intake of anticoagulant medications were associated risk factors for idiopathic epistaxis.

Conclusions: Embolization is an effective modality for treatment of idiopathic posterior epistaxis. Occasional recurrences may necessitate repeat embolization or treatment by other means.

Endoscopic Sinus Surgery in Patients with Chronic Hepatic Failure Waiting Liver Transplant

*John M. DelGaudio, MD
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Introduction: Because of the need for postoperative immunosuppression, patients with chronic liver failure requiring transplantation must be free of infection to maintain active status on the transplant list. These patients present significant surgical risks due to coagulopathy. Here we present our experience with endoscopic sinus surgery for medically refractory sinusitis in this patient population.

Methods: A prospective case series of 7 patients undergoing 10 surgeries from May 2001 to October 2002. Patients were evaluated for operative blood loss, perioperative blood product use, complications, and the need for revision surgery.

Results: All patients were given preoperative blood product infusions. 7 of 10 cases (5 patients) had elevated prothrombin times. Fresh frozen plasma (FFP) was given in all cases (average 2.44 U/case). 5 cases received preoperative platelets for thrombocytopenia (42-78,000/ul). Two patients each required preoperative transfusions of 2 units of packed red blood cells (PRBCs) for anemia of chronic disease. Operative blood loss ranged from 200-1500cc with an average of 533cc. One case had to be stopped before completion because of bleeding obscuring visualization. The 2 cases with the greatest blood loss were in patients with the most severe liver and sinus disease. These 2 patients (4 cases) required the only postoperative transfusions, use of packing, and hospital stays longer than 1 night, and required revision surgery within 2 months of the initial procedure due to persistent disease. All patients were returned to active status on the liver transplant. No major complications occurred in this group of patients.

Conclusions: Patients with chronic hepatic disease awaiting liver transplant can be successfully treated with endoscopic sinus surgery. Preoperative use of FFP and platelets is always necessary and postoperative blood products may be required with worse disease. Significant perioperative bleeding may not be avoidable. Patients should be counseled on the possible need for additional procedures to adequately clear disease.

Suggestions From the Senior Surgeon to Perform an Intranasal Endoscopic Duraplasty

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Introduction: endoscopic intranasal repair of cerebrospinal fluid rhinorrhea is becoming a common procedure. Methods: the purpose of the authors is to perform a critical analysis of their personal experience on 90 cases of cerebrospinal fluid leaks: 79 treated with the intranasal endoscopic approach, while 11 cases treated with the intranasal endoscopic approach combined to the transcranial one. Their diagnostic algorithm is discussed. The surgical technique is described in details and suggestions from the senior surgeon are emphasized. Personal failures are also analyzed. Results: the success rate at the first attempt is 92% and it raises to 98.9% after the second attempt. Follow up in all the cases reported is limited (range: 1-6 years). Conclusion: whether the endoscopic repair is effective in the long term remain to be seen. It is well validated that intranasal endoscopic technique in the repair of CSF-leaks leaves the patient with no external scars. The nasal mucosa and anatomy are respected and great care is taken to ensure the least possible alteration to nasal physiology. The olfactory function is preserved in the nasal cavity opposed to the lesion side. The use of autologous grafts, preferably from the nasal cavity, allows a highly compatible duraplasty. Then autologous graft can be readily prepared from the donation area. The hospital admission period is reduced to just several days and the postoperative care consists of only few nasal medications.

The Role of Three Dimensional (3D) Reconstruction Imaging in the Assessment of Posterior Ethmoid Sinus (PES)

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Introduction: A complete understanding of the anatomy of sinuses is essential in safely performing the sinus surgery. Although there are many reports on the anatomy of the anterior ethmoid sinus, the anatomy of PES was minimally described. Therefore, the authors tried to establish the value of 3D reconstruction imaging in the understanding of the PES anatomy.

Methods: One mm thickness axial computed tomograms of 10 patients were used as source images. Onemilimeter thickness axial CT images of 10 patients were reconstructed with PC-based software (Vworks 4.0, Seoul, Korea) from DICOM files. The middle turbinate, superior turbinate and lamellae in the PES were reconstructed separately and analyzed as a whole. The pneumatizing pattern of the PES as well as the specific structures, such as middle, superior & supreme turbinate, lamellae etc. were analyzed.

Results: The anatomic structures and the pneumatization of the PES were visualized three dimensionally in many combinations of the anatomic structures. Combining 3D anatomic structures, several patterns of pneumatization were noticed and such patterns were characterized by the direction of pneumatization and completeness of lamella structures.

Conclusions: These 3D reconstruction images were useful to understand the anatomy of PES and to avoid surgical complications.

Software-enabled CT Analysis of the Carotid Artery Position and Sphenoid Sinus Pneumatization Patterns

*Pete S. Batra, MD
Ryan Gallivan, MD
Donald C. Lanza, MD, FACS
Martin J. Citardi, MD, FACS
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Introduction: The critical relationship of the internal carotid artery (ICA) with the sphenoid sinus is well recognized. High-resolution CT (HRCT) imaging in conjunction with sophisticated imaging software now allows for detailed analysis of these anatomic relationships.

Objectives: To precisely delineate the anatomic relationship between the ICA and the sphenoid sinus.

Methods: Axial CT scans (1 mm slice thickness) were obtained on a VolumeZoom CT scanner (Siemens Medical, Erlangen, Germany) and transferred to the CBYON Doctor Station version 2.6R3FC4 (CBYON, Inc., Mountain View, CA) for review. Standardized review of each CT scan using various surgical planning tools was performed.

Results: A total of 128 sides in 64 cadaveric specimens were available for review. Pneumatization of the sphenoid sinus was classified into 4 categories: conchal, presellar, sellar, and postsellar. The incidence of these 4 types was 4.7%, 4.7%, 25%, and 65%, respectively. The extent of sphenoid pneumatization around the postsellar ICA was categorized as follows: no expo-

sure, 90 degrees, 90 to ∞ degrees, and 180 degrees. The incidence of the postsellar ICA exposure was 12.5%, 32.8%, 50%, and 1.6%, respectively. Septal insertions onto the carotid artery were noted in 37.5% of sides and sphenoid wall dehiscences in 19.5% of sides.

Conclusions: Software-enabled CT review allows for detailed study of the critical relationships between sphenoid pneumatization and ICA position. Such technology can be invaluable in surgical planning and navigation during endoscopic sinus surgery. In lieu of these findings, sinus surgeons must exercise extreme caution when operating in this region to prevent unintentional injury to the ICA.

Conflict details: Dr. Citardi — Member of the Cbyon scientific advisory board.

A Comparison of Image Guidance Registration Methods for Endoscopic Sinus Surgery

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Introduction: Stereotactic image guided technologies have provided the surgeon with a means to more safely navigate through diseased or surgically altered sinus anatomy. Accurate registration is vital to successful image guided surgery, and numerous methods of registration have been developed in an attempt to improve accuracy, reproducibility, and efficiency. Controversy exists as to which registration technique is best. The current study used a single image guided surgery system (BrainLAB) to test the accuracy and performance of three common registration methods: fiducials (5 markers), anatomic landmarks (5 points), and surface registration (Z-touch(r)).

Methods: 10 cadaveric heads were scanned and underwent endoscopic middle meatal antrostomy and sphenoidotomy. Five anatomic landmarks (anterior tip of the middle turbinate, posterior wall of the maxillary sinus, junction of the sella turcica with the intrasinus septum, carotid artery, and optic nerve) were identified and marked with methylene blue dye so that the exact location could be accurately identified. Registration was performed using the above techniques, and the time required and mean registration error were recorded. Using each registration method, the previously inked sites were identified and compared to the BrainLab CT images. The true distances between the known anatomic sites and the crosshair locations on the images were measured.

Results: Statistically significant differences were noted for mean registration error and time for registration. The mean time for registration for the fiducial, landmark, and surface methods were 86, 136, and 31 seconds, respectively. The mean registration error for the fiducial, landmark, and surface methods were 0.4 mm, 2.7 mm, and 1.1 mm, respectively. When the true accuracy of the three registration methods were compared, it was found that fiducial registration was significantly more accurate than both landmark and surface registrations. Furthermore, surface registration was statistically more accurate than landmark registration at all anatomic sites except for the optic nerve.

Conclusions: Although all three registration methods are highly accurate, the fiducial method was found to be the most accurate. However, when time of registration, accuracy, and reproducibility were considered, surface registration was found to be superior.

Conflict details: Brent Senior, one of the authors listed above, serves as a clinical consultant to the BrainLAB corporation and aids in the research and development of improved technologies.

Endoscopic Frontal Sinus Obliteration

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Introduction: Frontal sinus obliteration has traditionally utilized an osteoplastic flap approach. The purpose of this study was to report on our experience with a minimally-invasive technique of frontal sinus obliteration performed with endoscopic instrumentation.

Methods: Three patients underwent endoscopic frontal sinus obliteration. Selection criteria included those with unilateral frontal sinus disease and a small frontal sinus. After intranasal enlargement of the frontal sinus ostium, sinus mucosa was meticulously removed under direct endoscopic visualization through both the nose and an external trephination site. The sinus cavity was then obliterated with abdominal fat. Results were compared to a control group of 13 patients who underwent frontal sinus obliteration with an osteoplastic flap approach during the same time period.

Results: No patients in either the study population or control group required additional surgery for frontal sinus disease. There were no intraoperative complications. The endoscopic group had significantly less intraoperative blood loss than the control group (75.0cc vs. 278.8cc, respectively, $p=0.002$) and a shorter operating time (2.2 hours vs. 2.9 hours, respectively, $p=0.023$). Mean hospital stay was also shorter in the endoscopic

cohort (2.0 days vs. 2.8 days, $p=0.002$). Follow-up averaged 2.17 years for the endoscopic group and 3.18 years for controls.

Conclusions: Endoscopic obliteration should be considered in patients with a small, unilaterally diseased frontal sinus, which has failed previous attempts at surgical drainage. This approach appears to have reduced morbidity compared to conventional osteoplastic flap techniques.

The Role of Nasal Airflow Testing in Nasal Surgery

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Introduction: Nasal obstruction is one of the most common complaints otolaryngologists deal with in clinical practice. Obstruction is usually diagnosed by either the patient's complaint or by the otolaryngologist's clinical assessment. Although objective nasal testing for patency was introduced over 100 years ago technical problems have limited its use. More recently, with standardizations of techniques and continuous calibration of the apparatus evidence supporting its use in identifying the site, and quantifying the degree of nasal obstruction and this helps prevent unnecessary surgery.

Objectives: To determine the efficacy and feasibility of rhinomanometry in determining the need for surgical intervention in patients with nasal obstruction.

Methods: Retrospective review of results of patients who had nasal airflow testing at the Mount Sinai Hospital nasal air-flow lab in the period between January 2001 and June 30th 2002.

Results: The total number of patients who studied was 476. Forty percent were female and 60% male. Age range is (12-78) average 40.5 years. 19 had mucosal obstruction and the rest had structural causes. 220 patients had unremarkable results and the rest had some interference with breathing. Of those with structural abnormality 111 had mild obstruction, 92 had moderate obstruction and 40 had severe nasal obstruction. Based on the nasal airflow results, 57 underwent surgery. Of these, 31 had septoplasty alone 21 had cryotherapy and 5 underwent septorhinoplasty.

Conclusions: The nasal airflow testing is a valuable tool in the management of nasal obstruction. This study showed that only 11% of patients who present with nasal obstruction required some form of surgical intervention. By helping identify those patients without significant structural disease unnecessary or inappropriate surgery can be avoided.

Endoscopic Sinus Surgery in Geriatric Population

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Introduction: With the baby boomer generation getting older, endoscopic sinus surgery (ESS) is being performed more on elderly than before. We reviewed the demographics and immediate complications of patients having ESS older than 65 years of age with those of adults less than 65 years.

Methods: Review of our data base of cases who had ESS between 1992 -2002 showed 568 cases who had 623 procedures. Demographics and patient characteristics of both groups was reviewed as well as complications encountered intraoperatively and immediately postoperatively.

Results: Forty-six (8.1%) patients were older than 65 years of age compared to 522 patients who were 18-64 years old. 59% were males in older group compared to 45% in younger one. 24% of cases were revisions in older group compared to 34% in younger one. Complication rates were 21.7% for elderly compared to 12.8% for younger group. Of interest was that the complication rate was the highest in patients older than 65 years who were having revision ESS. Complication rate was the same in those having primary ESS and older than 65 and those 18-64 years old having primary or revision procedure.

Conclusions: With ESS being performed more on the elderly population, our results showed that those elderly who are having revision surgery are at a higher risk of complications compared to those having primary surgery or those younger than 65 years old.

Replantation of a Near Complete Amputated Nose: Outcomes and Controversies

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Objectives: Injuries to the nose may be simple or complex, with injury involving the nasal mucosa, cartilage, bone, and skin. The injury may lead to subtotal or complete loss of the nose. Several methods have been used in reconstructing the amputated nose. We report the effectiveness of using amputated segment as a composite graft, while reviewing the literature to discuss controversies in this field.

Materials and Methods: We encountered an avulsed nose segment, that was composed of upper and lower lateral cartilages,

dorsum, vestibule and skin of the nose and triangle skin segments of upper lip and cheek, which was transported to our center in a plastic bag. The patient, a 27-year-old man, who was traumatized after a blow with a broken glass, was immediately taken to the operating room. The skin and the mucosa were meticulously sutured in place. Heparin was immediately administered to the patient and medicinal leeches were applied postoperatively over the surface of the nose.

Results: During two weeks postoperatively, a superficial dark discoloration of skin progressed to form a necrotic superficial layer over the replanted nose. On postoperative day 14, this layer fell off and beneath the live tissue was apparently visible. At the third postoperative week, post-auricular skin was used as a full thickness skin graft to cover the bare tissue. The amputated segment survived except of a small area be over the left ala.

Conclusions: Simple careful suturing of the amputated segment or micro-vascular techniques has been used to treat these patients. We discuss limitations and advantages of each method. It seems that the former has acceptable results especially when it saves the invaluable time. After surgery, "wait and see" policy is the preferred measure. The darkened skin usually indicates only partial thickness loss and the majority of the graft would survive.

Semi-Automated Digital Model of Ciliary Beat Analysis

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Background: Ciliary dysfunction is one of the main causes for mucus stasis and subsequent sinusitis. Ciliary dysfunction can be congenital or acquired. Acquired dysfunction can be due upper respiratory infections, allergies, environmental causes or iatrogenic causes (post-surgical or drug induced). The ability of diagnose Ciliary dysfunction can help tailor the treatment of these patients. Quantitative measurement of ciliary beat is time consuming and difficult task. This is an attempt to simplify the measurement of ciliary beat.

Material and Methods: A phase contrast microscope was coupled with a high resolution 3-chip color camera. Images obtained of beating cilia at a magnification of 100X were digitized using Image-pro software and ciliary beat was measured using image analysis using a custom macro program.

Results: This technique produced a reproducible quantitative measurement of ciliary beat both in human volunteers as well as chicken trachea model. The digital image analysis is easier to use than older technique of using a pin-hole photometer.

Conclusions: The semi-automated digital model of ciliary beat analysis provides an accurate qualitative and quantitative measure of ciliary beat and can be used to evaluate effect of chemicals on the nasal mucosa.

Venturi Atomizer Contamination in Rhinologic Practice

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Introduction: Cross contamination of venturi atomizers has been reported. However, the clinical significance of these findings is unclear. This study quantifies the bacterial contamination of venturi atomizers in an academic rhinology practice.

Methods: In the first study phase, atomizers were sterilized and refilled per clinic practice with either 1% lidocaine or 0.25% tizine (Day 0). In the second, the atomizers were wiped with 70% ethanol between usage. In both phases, on days 7, 14, 21, 28, the contents of the atomizer were sprayed onto two culture media. If the cultures were found to be positive, a culture from the nozzle, lumen and solution was taken and quantified.

Results: At fourteen days 34% of bottles in Phase I were culture positive while 6% were positive in Phase II. By week four, 47% of the atomizers in Phase I, while 37% of atomizers in Phase II were culture positive. Furthermore, 42% of the nozzles from the atomizers with lidocaine were culture positive in Phase I, while only 7% were culture positive in Phase II. However, 11% of bottles in Phase I had a culture that grew 100 colony forming units while none of the atomizers in Phase II had a significant culture quantity.

Conclusions: Over a four-week period it is equivocal whether or not atomizers become contaminated with a clinically significant amount of bacteria as low levels can be commonly cultured. Regardless, the use of 70% ethanol wipes appears to decrease contamination and eliminates the growth of a significant quantity of bacteria.

Endoscopic Image Guided Transnasal Biopsy of the Clivus: A Case Report

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Introduction: Lesions of the clivus are uncommon, and present diagnostic and therapeutic challenges when they occur. While prompt diagnosis with a tissue biopsy is a critical step in the management of these patients, access to the clivus is technically difficult and not without significant potential risks. We present a case of an endoscopic transnasal biopsy of a lesion of the clivus using stereotactic image guidance.

Methods: A 56 year old female presented with a several month history of multiple cranial nerve palsies, and a lesion of the clivus detected by computed tomography. The patient underwent a transnasal endoscopic biopsy of the lesion with image guidance. A posterior ethmoidectomy and wide sphenoidotomy were performed to provide adequate exposure of the planum sphenoidale. A drill system with a cutting burr was used to biopsy bone marrow back to the posterior cortex of the clivus.

Results: Satisfactory exposure of the lesion was achieved. Diagnostic biopsy specimens were obtained. There were no intraoperative complications.

Conclusions: The endoscopic transnasal approach to the clivus is a relatively noninvasive technique that allows adequate exposure of the clivus for biopsy while image guidance confirms proper sampling of the radiographically abnormal tissue and helps prevent inadvertent injury to surrounding structures.

Prevalence of Pneumatization of the Superior Turbinate on Computerized Tomographic Scans of the Paranasal Sinuses

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With the availability of high resolution computerized tomographic (CT) scanning, and the acceptance of the functional theory of chronic rhinosinusitis, a great deal of attention has been paid to the bony and mucosal anatomy of the paranasal sinuses. It has been well documented that structural anatomic ab-

normalities, such as pneumatization of the middle turbinate, can contribute to the development of sinusitis through blockage of the normal sinus drainage pathways. Much of the literature has been focused on the ostiomeatal complex and its relation to chronic rhinosinusitis (CRS), with little discussion of the superior turbinate and its possible relation to sinus and nasal disease. The role of mucosal contact points, due to pneumatization of the superior turbinate, in the pathophysiology of headaches has been reported. However, the incidence of the radiographic finding of pneumatization of the superior turbinate has not been described in the literature. We reviewed the coronal paranasal sinus CT scans of 50 consecutive patients (100 sides) referred to our Rhinology division with symptoms of CRS, to determine the incidence of pneumatization of the superior turbinates. The total incidence was determined to be 20%, with bilateral pneumatization approximately equal to unilateral pneumatization. Potential implications of this finding in patients with sinus and nasal symptoms are discussed.

NOTES

NOTES

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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

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 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 Ses, 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
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 Harvey Silberman, MD, Elkins Park, PA
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 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
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 Carl Snyderman, MD, Pittsburgh, PA
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 Ahmed M.S. Soliman, MD, Philadelphia, PA
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 Michael Spafford, MD, Albuquerque, NM
 Robert Spears, MD, San Antonio, TX
 Andrew Ryan Specter, MD, Philadelphia, PA

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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 Urben, 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,
LOCATION??

International Research Award

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

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
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 Faills, 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
Daniel D. Klaff, US*
Zvonimir Krajina, Croatia

L
Clifford F. Lake, US*
Donald Lanza, US
Don Leopold, US
Walter E. E. Loch, US*
W. Kaye Locklin, US
Fausto Lopez-Infante, Mexico
Roland M. Loring, US*
Frank Lucente, US

M
Henry Merriman, US*
Lewis E. Morrison, US

N
William J. Neidlinger, US*
Roberto Neveus-Pinto, Brazil
Leon Neiman, US

O
Joseph H. Ogura, US*
Harold Owens, US

P
Charles J. Patrillo, US*
Ivan W. Philpott, US*
Loring W. Pratt, US

R
Federico Reyes, Mexico
Ralph H. Riggs, US
Zvi Henry Rosen, Israel

S
Pieter H. Schmidt, The Netherlands
Thomas C. Smersh, US
Maynard P. Smith, US
Pinckney W. Snelling, US*
Carl B. Spath, US
Heinz Stammberger, Austria

Albert Steiner, US*
Sydney L. Stevens, US*
Fred Stucke, US
Giorgio Sulsenti, Italy
Edward A. Swartz, US

T
William H. Tenny, US
H. Ashton Thomas, US*
Richard Trevino, US
Charles A. Tucker, US

W
Richard C. Webster, US*
Alvin P. Wenger, US
Joseph W. West, US*
Manuel R. Wexler, US*
Henry L. Williams, US*
Russell I. Williams, US

* Deceased

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Chicago, IL

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Baltimore, MD

Guy L. Boyden, MD
Portland, OR

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Mexico, DF, Mexico

Bernard Butterworth, PhD
Kansas City, MS

D. Thane R. Cody, MD, PhD
Ponte Verde Beach, FL

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Leiden, Holland

H.A.E. van Dishoeck*
Leiden, Holland

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Salt Lake City, UT

Matthew S. Ersner, MD*
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New Orleans, LA

Branimir Gusic, MD
Zagreb, Yugoslavia

Tu Guy-Yi, MD
Beijing, China

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James Herbertson, MS, DDS*
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Ryo Tschiasny, MD*
Cincinnati, OH

Richard C. Webster, MD*
Brookline, MA

Jim Zinreich, MD
Baltimore, MD

* Deceased