



2011 **cosm**

PROGRAM & ABSTRACTS

April 27-28, 2011

Sheraton Chicago Hotel & Towers, Chicago

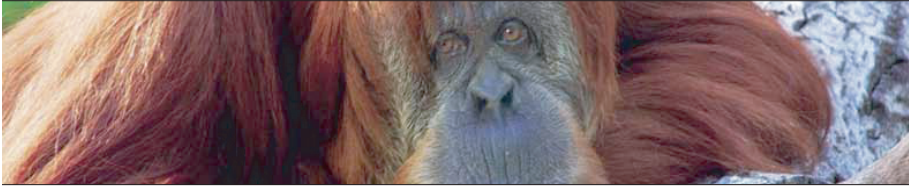
ARS Mission Statement

The American Rhinologic Society's mission is to serve, represent and advance the science and ethical practice of rhinology. The Society promotes excellence in patient care, research and education in Rhinology and Skull Base Disorders. The American Rhinologic Society is dedicated to providing communication and fellowship to the members of the Rhinologic community through on-going medical education, patient advocacy, and social programs. The ARS continuing medical education activities serve to improve professional competence, performance, and promote research.

COSM

COMBINED
OTOLARYNGOLOGY
SPRING
MEETINGS

Future meetings dates & locations



April 18–April 22, 2012
Manchester Grand Hyatt

San Diego



April 10–April 14, 2013
JW Marriott Grande Lakes

Orlando



May 14–May 18, 2014
Caesar's Palace

Las Vegas

Continuing Medical Education

Accreditation Statement: The American Rhinologic Society (ARS) is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Credit Designation Statement

The ARS designates this live activity for a maximum of 11.75 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Learning Objectives:

- Learn the newest information on the medical management of patients with Rhinosinusitis and other rhinologic diseases
- Learn the newest information regarding the surgical management of patients with rhinosinusitis
- Become familiar with the current research in the pathogenesis and pathophysiology of chronic rhinosinusitis and other rhinologic diseases
- Become familiar with the management of complex sinus patients who have failed endoscopic sinus surgery
- Become familiar with the Topical application of drugs post endoscopic Sinus surgery
- Become familiar with the best treatment remedies in Rhinology based on evidenced based practice
- Become familiar with patients with facial pain and headache and how to handle these patients.

Activity Outcomes & Goal:

- The practitioner should be able to choose appropriate therapy for the different subtypes of chronic rhinosinusitis to improve outcomes
- The practitioner should be able to choose appropriate therapy for the patient with rhinosinusitis and allergic rhinitis to improve outcomes
- The practitioner should be able to optimally manage patients with facial pain and headache
- The practitioner should be able to optimally manage patients with complex sinus patients who have failed endoscopic Sinus surgery

Target Audience: Otolaryngologists in training, practicing otolaryngologists, allied health care professionals

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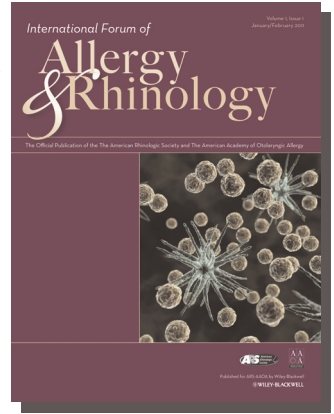
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International Forum of Allergy & Rhinology

- ▶ New launch by AAOA and ARS
- ▶ Only journal to combine allergy and rhinology
- ▶ Largest circulation of any rhinology title
- ▶ First print issue Feb. 2011
- ▶ Free color for authors
- ▶ Top Editor-in-Chief and International Editorial Board



International Forum of Allergy & Rhinology

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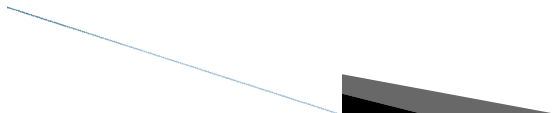


International Forum of Allergy & Rhinology

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Program At-A-Glance

**Wednesday,
April 27, 2011**

SHERATON 4 BALLROOM

1:00PM

Presidential Welcome

Brent Senior, MD

1:05PM

Computer or not? The Benefits and Drawbacks of Intra-operative Image Guidance for Endoscopic Sinus Surgery
Vishnu Sunkaraneni, MD

1:11PM

Correlation of IgE, Eosinophils, and CT Scoring with Patient Symptomatology in Chronic Sinusitis with Nasal Polyposis
Elizabeth Chance, MD

1:17PM

Management of Early Nasal Polyposis Using a Steroid Impregnated Nasal Dressing
Peter Catalano, MD

1:23PM

Discussion

Moderator: Timothy Smith, MD

1:28PM

Disease-Specific and Health-Related QoL are Stable or Improved following Endoscopic Resection of Skull Base Neoplasms: A Pilot Study
Evan Ransom, MD

1:34PM

Endoscopic Skull Base Surgery for Sinonasal Malignancies: A tertiary center experience
John Chi, MD

1:40 PM

An Objective, Automated Method for Assessing Surgical Skill for Functional Endoscopic Sinus Surgery using Eye Tracking and Tool Motion Data
Narges Ahmidi, MD

1:46 PM

Discussion

H. Peter Doble, MD, Joseph Jacobs, MD

1:52 PM

Superoxide Dismutase Prevents Cigarette Smoked Induced Ciliary Dysfunction
Steven Andreoli, MD

1:58 PM

Frontal Sinus Cells: Identification, Prevalence and Association with Frontal Sinus Disease
Morgan Langille, MD

2:04 PM

Frontal Sinus Inverted Papilloma: Systematic Review of Surgical Outcomes
Evan Walgama, MD

2:10 PM

Discussion Response - James Hadley, MD, Stilianos Kountakis, MD

2:15 PM

Invited Keynote Speaker

Michael Stewart, MD
Two Decades of Outcomes Research in Rhinology - What Have We Learned?

2:45 PM

Break with Exhibitors

3:15PM

Polyhydrated Ionogen with MgBr2 Accelerates in vitro Respiratory Epithelial Healing
Noam Cohen, MD

3:21PM

Modulation of ALOX15 Expression in Sinonasal Epithelial Cells
Babar Sultan, MD

3:27 PM

Intraturbinal Steroid Injections Revisited: An Update on Indications, Results and Complications
Evelyne Kalyoussef, MD

3:33 PM

Discussion

Rakesh Chandra, MD, Andrew Lane, MD

3:38 PM

Epigenetics of Chronic Rhinosinusitis and the Role of the Eosinophil
Kristin Seiberling, MD

3:44PM

Immunohistochemical Analysis of Chronic Rhinosinusitis Subtypes
Jacob McAfee, MD

3:50PM

Spontaneous Eosinophilic Nasal Inflammation in a Genetically-Modified Mouse: Comparative Study with an Allergic Inflammation Model
Andrew Lane, MD

3:56PM

Discussion

Robert Kern, MD, Mark Zacharek, MD

4:01 PM

Panel - Business of Medicine in Rhinology: What's New in 2011

Moderator - Pete Batra, MD

Panelists:

Pete Batra, MD
"Update on SGR and Physician Fee Schedule"

Bradley Marple, MD
"Coding update for Balloons"

Mary LeGrand, RN, MA, CCS-P, CPC
"Coding Tips in Rhinology"

Michael Setzen, MD
"Coding update for CT imaging"

Richard Waguespack, MD
"The CPT/RUC Process"

Discussion/Q&A

5:00 PM

Meeting Adjourned

Thursday, April 28, 2011 SHERATON 4 BALLROOM

7:00AM

Residents/Fellows Business Hour
"Pearls of Fellowship"
Moderators: Marc Dubin, MD,
Jivianne Lee, MD

Panelists: *"Surgical Management of Difficult and Revision Patients in The Early Part of Your Practice"*

Benjamin Bleier, MD
"Pearls on Medical Management of the Tertiary Care Sinus Patient"
Carlos Ebert, MD

"Finding the "Right" Fellowship: Assessing the Breadth and Depth Offered in Programs to Find the Right "Fit"
Devyani Lal, MD

"Developing Research Projects from Your Clinical Patients"
Murray Ramanathan, MD

"Developing a Practice Where You Trained"
Bruce Tan, MD

7:50AM

Presidential Welcome Brent Senior, MD

8:00AM

Transnasal Endoscopic Approach to the Cavernous Sinus
Roheen Raithatha, MD

8:06AM

Antimicrobial Photodynamic Therapy Treatment of Chronic Sinusitis Biofilms
Merrill Biel, MD

8:12AM

Septal Deviation Hinders Intranasal Drug Delivery: A Computer Simulation Study
Dennis Frank, PhD

8:18 AM

Discussion

Vijay Anand, MD, Bradley Woodworth, MD

8:24AM

KC (IL-8) Regulation of Sinonasal Cilia Function in a Murine Model
Jessica Shen, MD

8:30AM

Olfactory Dysfunction Treated with Manuka Honey in Chronic Rhinosinusitis Patients
Andrew Thamboo, MD

8:36AM

Intraoperative Saline Irrigations, Do They Reduce Bacterial Load within the Sinus Mucosa?
Richard Mcugh, MD

8:42AM

Discussion

Joseph Han, MD, James Stankiewicz, MD

8:50AM

Presidential Address

Brent Senior, MD

9:00AM

Upfront Point-of-Care Sinus CT

Scanning is a Cost-Effective Diagnostic Alternative to Empiric Medical Therapy for Chronic Rhinosinusitis

Randy Leung, MD

9:06AM

Smoking and Endoscopic Sinus Surgery: Does Smoking Volume Contribute to Clinical Outcome?

Luke Rudmik, MD

9:12AM

The Impact of Osteitis on Disease Severity Measures and Quality of Life Outcomes in Chronic Rhinosinusitis

Naveen Bhandarkar, MD

9:18AM

Discussion

Alexander Chiu, MD, Bradley Marple, MD

9:25AM

Invited Keynote Speaker

Richard Harvey, MD

"Shifting Paradigms of Surgery in CRS: Ventilation or Access for Topical Therapy"

9:45AM

Break with Exhibitors

10:16 AM

An Update on the Management of Recalcitrant Cerebrospinal Fluid Rhinorrhea after Lateral Skull Base Surgery via Endoscopic Endonasal Eustachian Tube Closure

Lori Lemonnier, MD

10:22AM

Case Report of Orbital Violation with Placement of Ethmoid Drug-Eluting Stent

Craig Villari, MD

10:28AM

Endoscopic Medial Maxillectomy for Recalcitrant Chronic Maxillary Sinusitis

Jessica Gullung, MD

10:34AM

Discussion

Roy Casiano, MD, Belachew Tessema, MD

10:40AM

The Effect of Low-Fidelity Endoscopic Sinus Surgery Simulators on Surgical Skill?

Marta Wais, MS

10:46AM

Initial Results of a Novel, Multi-Functional, Multi-Sinus Balloon Dilation Tool

David Brodner, MD

10:52AM

Pituitary Adenoma and Hyposmia

Alla Solyar, MD

10:58AM

Discussion

Peter Hwang, MD, Steven Schaefer, MD

11:05AM

The Great Debate: How to Manage the Patient with Headache: Rhinogenic or Vascular!

Moderator: Michael Setzen, MD

Panelists: Peter Catalano, MD, John Del Gaudio, MD, Frederick Kuhn, MD, Brent Senior, MD

12:00PM

Lunch with Exhibitors

1:00PM

The Utility of the Maxillary Sinus Roof as a Guide for Posterior Ethmoid and Sphenoid Sinus Surgery

John Lee, MD

1:06PM

A Novel Wedge Technique to Correct Curved Deviation of the Cartilaginous Septum

Ji Lee, MD

1:12PM

Post -Operative CSF Rhinorrhea after Endonasal Endoscopic Skull Base Surgery

Nathan Deckard, MD

1:18PM

Discussion

Chris Melroy, MD, Michael Sillers, MD

1:24PM

Sinus Irrigation Bottles: A Potential Source of Infection?
Eun Hae Chang, MD

1:30PM

Oral Antifungal Therapy for Chronic Rhinosinusitis and its Subtypes
Thunchai Thanasumpun, MD

1:36PM

A Pilot Study Comparing 3mm Versus 4mm Rigid Endoscope in Diagnostic Nasal Endoscopy
Devyani Lal, MD

1:42PM

Discussion
Stephanie Joe, MD, Winston Vaughn, MD

1:48PM

Panel Discussion by the Experts
"How I Handle My Patients When FESS Has Failed"

Moderators: Marvin Fried, MD, Alexis Jackman, MD
Panelists: Berrylin J. Ferguson, MD, David Kennedy, MD, Raymond Sacks, MD, James Stankiewicz, MD

2:45PM

Break with Exhibitors

3:15PM

Characterization of the Pig as a New Sinus Animal Model
Eugene Chang, MD

3:22PM

Nasal airflow and air-conditioning after Functional Endoscopic Sinus Surgery: A Fluid Dynamics Model
Kibwei McKinney, MD

3:28PM

Computer Simulation of Drug Delivery in Human Nasal Airway Model
Goutham Mylavarapu, MD

3:34PM

Discussion
Seth Brown, MD, Kevin Welch, MD

3:40PM

Transnasal Endoscopic Approach to Symptomatic Osteomas of the Sinonasal District
Alessandro Pusateri, MD

3:46PM

A Double-Blinded Randomized Controlled Trial of Budesonide Medication - Soaked Meroceol Versus Meroceol Applications for Endoscopic Sinus Surgery
Eun Hae Chang, MD

3:52PM

Methylglyoxal: Invitro Activity Against Bacterial Biofilms
Shaun Kilty, MD (Presented by Melanie Duval, MD)

3:58PM

Questions
Karen Fong, MD, Todd Kingdom, MD

4:10PM

ARS Featured Paper
Medical Therapy Versus Surgery for Chronic Rhinosinusitis: A Prospective, Multi-Institutional Study
Timothy Smith, MD

4:20PM

Discussion
Scott Stringer, MD, Kathleen Yaremchuk, MD

4:25PM

Case Presentations-Interesting Cases in General Rhinology, "This is How I Do It"
Moderators: James Palmer, MD, Rodney Schlosser, MD
Panelists: David Conley, MD, Samer Fakhri, MD, Ashutosh Kacker, MD, Richard Lebowitz, MD, Spencer Payne, MD

5:25PM

Meeting Adjourned

Accreditation Statement

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Program

Wednesday, April 27, 2011

1:00 PM

Presidential Welcome

Brent Senior, MD

1:05 PM

Computer or not? The Benefits and Drawbacks of Intra-operative Image Guidance for Endoscopic Sinus Surgery

*Vishnu Sunkaraneni, MD, David Yeh, MD, Hong Yeh, MD, Hong Qian, MD, Amin Javer, MD
Vancouver, BC, Canada*

Objectives:

The purpose of this study was to evaluate and compare outcomes of image guided endoscopic sinus surgery to standard functional endoscopic sinus surgery (FESS).

Methods:

We retrospectively reviewed the charts of 363 cases of endoscopic sinus surgery performed by a single surgeon at the St. Paul's Sinus Centre in Vancouver, BC over a 3 and a half-year period. 341 cases were performed with computer assistance and 22 cases without. Primary outcomes included the rate of complications and the interval to disease recurrence. Secondary outcomes included the duration of surgery, and estimated blood loss.

Results:

Only one complication (0.003%) was recorded among the computer assisted sinus surgery (CASS) group while no complications occurred in the FESS cases. The log-rank test determining time to disease recurrence showed a statistically significant higher rate of relapse in the FESS group ($p=0.05$). The recurrence rates of the two groups were also compared using a piece-wise Cox proportional hazard model. This revealed a hazard ratio of 4.11 ($p=0.002$) for the FESS group compared to CASS group within 1.5 years of the index sinus surgery.

Conclusions:

No significant difference was found between the two groups with respect to the complication rates. However, the CASS group were 4 times less likely to experience disease relapse within 18 months of

surgery. Additionally, we present a meta-analysis on the available evidence examining these outcomes.

1:11 PM

Correlation of IgE, Eosinophils, and CT Scoring with Patient Symptomatology in Chronic Sinusitis with Nasal Polyposis

Elizabeth Chance, MD, Jose Mattos, BS, Spencer Mattos, BS, Spencer Payne, MD
USA

Introduction:

Previous studies have failed to show an association between symptom scores and CT scan scores in patient with chronic rhinosinusitis (CRS). However, these studies have not accounted for the presence (wNP) or lack (sNP) of nasal polyps. As such, this study attempts to specifically determine whether a correlation exists between symptom and CT scores in patients with CRSwNP while controlling for serum IgE and peripheral eosinophilia.

Methods:

A retrospective analysis of CRSwNP patients presenting between 2007 and 2010 was performed. Patients were included if they had a complete set of data consisting of pre-operative SinoNasal Outcome Test (SNOT-20), CT scan, serum IgE and peripheral serum eosinophil level. CT scans were scored according to Lund-MacKay scoring system. Multivariate linear regression analysis was used to evaluate the correlation amongst the data points.

Results:

46 patients were identified who met criteria. No significant correlation was found between symptoms scores and CT scan when controlling for IgE and eosinophil levels. Regression analysis did however identify a relationship between higher SNOT-20 scores and Lund MacKay score > 20 (Odds Ratio 1.085, $p > 0.04$).

Conclusions:

CRSwNP, like CRS in general, is a variable disease with little correlation between symptoms scores and CT scan severity. Our data does indicate a link between the severest symptoms and most severe CT scores.

1:17 PM

Management of Early Nasal Polyposis Using a Steroid Impregnated Nasal Dressing

*Peter Catalano, MD, Yogesh More, MD, Seth More, MD, Seth Willen, MD
Brighton, MA, USA*

Introduction:

Oral corticosteroids are the main stay in medical management of sinonasal polyposis. However, systemic steroid-related side effects can be significant in both the short and long-term. Topical targeted steroids in optimal concentrations to the affected mucosa present an attractive alternative. Objective: To compare the efficacy of steroid impregnated absorbable nasal dressing with oral steroids in the management of early nasal polyposis after endoscopic sinus surgery.

Design:

Retrospective case control study.

Methods:

21 symptomatic patients with nasal polyposis presenting with endoscopic findings of early polyposis received triamcinolone (20mg/ml) impregnated nasal dressing (Nasopore; Stryker). A control group of 20 similar patients were treated with a short course of oral steroids. Evaluation was based on Sinonasal Assessment Questionnaire (SNAQ-11) and Perioperative Sinus Endoscopy (POSE) score at baseline, 4, and 8 week follow up intervals.

Results:

At baseline, 4, and 8 weeks mean SNAQ scores were 18.42, 8.76, 9.42 in study group and 19.35, 7.15, 7.60 in control group, respectively. Mean POSE scores were 12.14, 5.04, 6.04 in study group and 13.52, 5.01, 5.52 in control group, respectively. No significant difference was found between the groups at 4 and 8 weeks in either SNAQ ($p=0.129$, $p=0.235$) or POSE ($p=0.803$, $p=0.795$) scores.

Conclusion:

Triamcinalone impregnated absorbable nasal dressing is comparable to oral steroids in the management of early nasal polyposis after sinus surgery.

1:23 PM

Discussion

Moderator: Timothy Smith, MD

1:28 PM

Disease-Specific and Health-Related QoL Are Stable or Improved following Endoscopic Resection of Skull Base Neoplasms: A Pilot Study

*Evan Ransom, MD, Laurel Doghramji, RN, James Doghramji, RN, James Palmer, MD, Alexander Chiu, MD
Philadelphia, PA, USA*

Objectives:

Minimally invasive surgery for neoplasms of the paranasal sinuses and anterior skull base has revolutionized the treatment of these diseases. The relative effect of these procedures, however, has not been described in terms of disease-specific and global health-related quality of life (QoL).

Methods:

Single-center, two-surgeon, longitudinal study of patients undergoing completely endoscopic resection of anterior skull base neoplasms. All patients presenting between October 2009 and September 2010 were enrolled. QoL assessments were based on the Health Utilities Index Mark-2 (HUI-2) and Sinonasal Outcomes Test (SNOT-22), and were completed preoperatively and at three and six months postoperatively. Comparisons over time were made within subjects. Patients previously operated were excluded.

Results:

Fourteen patients were enrolled; eleven completed preoperative and postoperative assessments (79%), while three were lost to follow-up. Our cohort consisted of five men and six women; mean age was 55 years. Six patients had malignant tumors, while five had benign neoplasms. Ten (91%) patients had stable or improved HUI2 scores (mean utility gain 0.14), while one patient with a high-grade malignancy experienced decline (-0.40). SNOT-22 scores improved in all but one case (mean -35 points), with a significant difference for the cohort overall ($p < 0.01$).

Conclusions:

Completely endoscopic resection of anterior skull base neoplasms has been shown to be oncologically sound with anecdotal improvements in QoL relative to open transfacial/craniofacial approaches. We demonstrate positive, quantifiable QoL results with validated global and disease-specific instruments. Further work, including twelve-month outcomes, will yield important information about QoL and be used in formal cost-effectiveness analysis.

1:34 PM

Endoscopic Skull Base Surgery for Sinonasal Malignancies: A Tertiary Center Experience

*John Chi, MD, Jeffrey Suh, MD, James Suh, MD, James Palmer, MD, Alexander Chiu, MD
Philadelphia, PA, USA*

Background:

Traditional approaches to the anterior skull base for sinonasal tumors often involve facial incisions and craniotomies, and are associated with prolonged hospital stays and recovery times. Recent advances in endoscopic surgery with reliable techniques for skull base reconstruction have allowed for these tumors to be approached endoscopically. The purpose of this study is to assess the outcomes and complications of the endoscopic approach on a series of patients with malignant skull base tumors.

Methods:

A retrospective chart review was performed of 49 consecutive patients treated with endoscopic or combined open-endoscopic approaches at a tertiary care institution for sinonasal and skull base malignancies from 2002 to 2010. Patient data was collected on symptoms, tumor type, operative technique, and post-operative course.

Results:

Operative technique: 73% exclusively endoscopic, 27% combined open-endoscopic approach. Most common tumors: sarcoma (n=9), squamous cell carcinoma (n=8), adenocarcinoma (n=8), melanoma (n=7). Most common tumor location: ethmoid sinus (n=18). Total mean follow-up 2.2 years. Disease-specific mortality 6%(3/49). Local tumor recurrence rate 16% (8/49). Surgical blood loss: endoscopic group 456mL vs combined open-endoscopic group 808mL

($p < 0.05$). Hospital stay: endoscopic group 2.2 days vs combined open-endoscopic group 5.3 days ($p = 0.21$). Surgical complications: endoscopic group 6% vs combined open-endoscopic group 33%.

Conclusion:

This study demonstrates the safety and efficacy of endoscopic approaches for select sinonasal and skull base malignancies. Endoscopic management may decrease patient morbidity and shorten hospital stays with comparable outcomes to traditional open approaches.

1:40 PM

An Objective, Automated Method for Assessing Surgical Skill for Functional Endoscopic Sinus Surgery using Eye Tracking and Tool Motion Data

*Narges Ahmidi, MD, Masaru Ishii, MD, Gary L. Ishii, MD, Gary L. Gallia, MD, Gregory D. Hager, PH.D.
Kingston, ON, Canada*

Abstract:

In this study we present an objective and unbiased method for assessing the skill of endoscopic sinus surgeons. This method was tested experimentally; our results show that the proposed method accurately identifies the skill levels of expert and novice surgeons. Introduction: Assessment of skill plays a crucial role in determining competency; it also plays a central role in monitoring educational programs and pupil feedback. With the changing health care environment, it will likely play a prominent role in credentialing and maintenance of certification. An ideal assessment tool should be unbiased, objective, and accurate. We hypothesize that tool motions data - how a surgeon moves his/her instruments - and the eye gaze data - what a surgeon looks at when they operate - contain sufficient information to judge skill. This hypothesis was investigated by developing a statistical model of surgery and testing the model experimentally.

Method:

A total of 417 trials were recorded from 5 expert and 6 novice surgeons while performing a series of 10 different FESS tasks. Data was collected from the tool's motion using an electromagnetic tracker. In addition, the location of surgeon's eye gaze was recorded using an infrared eye tracker camera. This data was fit to the model

and used to test the accuracy of skill assessment.

Results & Conclusions:

The skill of expert surgeons was identified correctly for 85.5% of tasks. For surgeries performed by novice surgeons the proposed model properly recognizes the skill level with 92.3% accuracy.

1:46 PM

Discussion

Moderators: H. Peter Doble, MD, Joseph Jacobs, MD

1:52 PM

Superoxide Dismutase Prevents Cigarette Smoked Induced Ciliary Dysfunction

*Steven Andreoli, MD, David White, MD, Ling-Feng White, MD, Ling-Feng Wang, MD, Rodney Schlosser, MD
Charleston, SC*

Introduction:

Cigarette smoke contains several free radical oxygen species. Superoxide dismutase (SOD) is an antioxidant enzyme which converts free radical superoxide into hydrogen peroxide and oxygen. This study investigates the ability of SOD to prevent cigarette smoke extract (CSE) inhibition of stimulated ciliary beat frequency (CBF) in adenoid tissue.

Methods:

Adenoid mucosal explants from children with obstructive sleep apnea secondary to adenotonsillar hypertrophy were harvested using the curette and equilibrated for 24 hours. Baseline CBF was obtained, then explants were incubated with either 0 units (U) or 100 U of SOD for 30 minutes followed by 24 hours incubation with 0% or 5% CSE. Isoproterenol (ISO), a ciliostimulant, was applied and CBF was recorded hourly for four hours. Data was analyzed as percent change from baseline using ANOVA with post hoc t-test.

Results:

Baseline CBF was similar in all patients and ISO stimulated CBF to $121.0 \pm 9.0\%$ of baseline. 5% CSE/0 U SOD inhibited ISO stimulat-

ed CBF at 1, 2, and 3 hours to $105.5 \pm 9.4\%$ ($p=0.042$, 0.0001 , and 0.043 respectively). Preincubation with 100 U SOD mitigated CSE-induced inhibition at 1 and 2 hours restoring ISO stimulated CBF to $113.5 \pm 9.7\%$ of baseline ($p=0.0043$ and 0.039 respectively). Conclusions: CSE inhibits dynamic CBF in pediatric adenoid explants. Pretreatment with SOD prevented smoke induced inhibition at 1 and 2 hours. Therapeutic models using free radical scavengers may be effective in preventing ciliary dysfunction resultant from smoke exposure.

1:58 PM

Frontal Sinus Cells: Identification, Prevalence and Association with Frontal Sinus Disease

*Morgan Langille, MD, Evan Walters, MD, Trevor Walters, MD, Trevor Kotylak, MD, Erin Wright, MD
Edmonton, Alberta, Canada*

Objectives:

To determine the prevalence of frontal sinus cells and their association with frontal sinus disease. The secondary objective of this study is to determine inter-rater correlation when identifying frontal sinus cells.

Methods:

All computed tomography scans of the paranasal sinuses performed at the University of Alberta Hospital between February and October 2010 were reviewed (468 patients). Calculation of sample size had previously determined that 2 groups (with and without frontal cells) each comprising 150 scans would be required to detect a clinically relevant difference. Coronal and sagittal reformats were obtained to differentiate between the types of frontal sinus cells. Scans were assessed for the presence or absence of a frontal cell as well as for the presence of frontal sinusitis. To assess inter-rater reliability, scans were scored independently by both an Otolaryngologist and a Radiologist.

Results:

The overall prevalence of frontal sinus cells in this population was 41% (Type I 33%, Type II 7%, Type III 3%, Type IV 0%). The inter-rater agreement to determine the presence of frontal sinus cells was modest but maintained statistical significance (P -value <0.05). A

patient is significantly more likely to have frontal sinus disease if frontal sinus cells are present (Odds ratio 5.8, P-value <0.05).

Conclusions:

The prevalence of frontal sinus cells presented in the current study is different from previously published literature. Using inter-rater correlation we have determined that frontal sinus cells are difficult to accurately diagnose, particularly with regard to specific type. Frontal sinus cells are significantly associated with radiologically determined frontal sinus disease.

2:04 PM

Frontal Sinus Inverted Papilloma: Systematic Review of Surgical Outcomes

*Evan Walgama, MD, Pete Batra, MD
Dallas, TX*

Background:

Surgical management of frontal sinus (FS) inverted papilloma (IP) remains a significant challenge. The objective of this review was to systematically review the FS IP literature to evaluate outcomes.

Methods: Cases for inclusion were located by a Medline search between 1995 and 2010. Cases reported with sufficient outcomes data, defined as specific surgical approach and disease-free follow-up, were included.

Results:

49 cases identified in 13 studies were deemed adequate for additional analysis. The mean age was 52.9 years with male:female ratio of 3.3:1. The presenting histopathology was IP in 47 and IP with squamous cell carcinoma in 2 cases. 24 cases (49%) were primary and 25 (51%) were secondary (residual or recurrent disease) IP. Surgical approaches employed included endoscopic frontal sinusotomy (eFS) in 30 (61.2%), endoscopic modified Lothrop (EML) in 13 (26.5%), endoscopic trephination (eT) and eFS in 5 (10.2%), and osteoplastic flap (OPF) in 12 (26.5%) cases. The overall rate of recurrence was 22.4% with mean follow up time of 27 months. Statistical comparison of the different surgical techniques demonstrated that the relative risk (RR) of recurrence for eFS versus EML was 1.050 (0.338-3.151), while the RR of recurrence for OPF versus all other surgical approaches was 0.615 (0.156-2.069).

Conclusion:

The literature on FS IP suggests multiple surgical approaches can be used successfully for tumor extirpation with acceptable recurrence rates. Evaluation of the composite data suggests lower risk of recurrence with OPF compared to other open and endoscopic approaches.

2:10 PM

Discussion

Moderators: James Hadley, MD, Stilianos Kountakis, MD

2:15 PM

Invited Keynote Speaker

Michael Stewart, MD

Two Decades of Outcomes Research in Rhinology - What Have we Learned?

2:45 PM

Break with Exhibitors

3:15 PM

Polyhydrated Lonogen with MgBr₂ Accelerates in Vitro Respiratory Epithelial Healing

Noam Cohen, MD, PhD, DePoortere David, MD, Bei David, MD, Bei Chen, MD

Philadelphia, PA USA

Introduction:

Remucosylation of the sinonasal cavity following sinus surgery is critical for successful outcomes. Recently a novel antiprotease and antifibroblast compound, Polyhydrated Lonogen (PHI) with MgBr₂, demonstrated improved wound healing in a rabbit maxillary sinus mucosal wound model. We set out to determine if this effect was reproducible in an in vitro respiratory epithelial culture system.

Methods:

Fully differentiated mature murine nasal septal air liquid interface cultures were injured by creating a full thickness 400 μ M wide scratch through the monolayer. Cultures were then treated with nothing, saline or PHI with MgBr₂ for 1 hour on the apical surface. Twenty four hours following the injury cultures were fixed and processed for immunofluorescence with type IV beta- tubulin and Hoechst stain.

Results:

Initial injury resulted in a wound of 394 μ M \pm 51 μ M (n=12). Following 24 hours with no intervention the wound closed to 161 μ M \pm 60 μ M (n=9) while treatment with saline resulted in a residual gap of 88 μ M \pm 73 μ M (n=9) p<0.01, and treatment with PHI with MgBr₂ resulted in a gap of only 30 μ M \pm 42 μ M (n=9) p<0.01.

Conclusions:

Poor healing of the sinonasal mucosa following surgery with loss of ciliary function results in adverse clinical outcomes. In an in vitro sinonasal respiratory epithelial injury model a one time treatment with PHI with MgBr₂ demonstrated significantly improved wound healing compared to saline or nothing. This is a viable model to further investigate the mechanism by which PHI with MgBr₂ improves sinonasal remucosolization.

3:21 PM

Modulation of ALOX15 Expression in Sinonasal Epithelial Cells

*Babar Sultan, MD, Joan Lee, BA, Andrew Lee, BA, Andrew Lane, MD
Baltimore, MD USA*

Background:

Chronic rhinosinusitis with nasal polyps (CRSwNP) is characterized by eosinophilic inflammation and frequent microbial colonization. Evidence suggests that innate antimicrobial immunity is decreased in CRSwNP, in part due to Th2 cytokine-mediated suppression of epithelial cell innate immune gene expression. Arachidonate 15-lipoxygenase (ALOX15) is a producer of pro-inflammatory metabolites that is upregulated in CRSwNP sinonasal mucosa. In multiple cell types, including lower airway epithelial cells and monocytes, IL-4 and IL-13 induce ALOX15 expression. The regulation of ALOX15 in sinonasal epithelial cells is incompletely understood.

Methods:

Human sinonasal epithelial cells were grown in culture and stimulated with IL4 and IL13 individually, as well as combinations of IL4 with interferon γ , TLR9 agonist, and TLR3 agonist. ALOX15 mRNA and protein expression were assessed, and levels were compared by real-time PCR.

Results:

Sinonasal epithelial cells constitutively express mRNA for the enzyme ALOX15, with no difference in baseline expression between CRSwNP and controls. IL13 stimulation increased expression by 2-fold, while IL4 induced a 16-fold increase. Co-incubation with interferon- γ greatly blunted the ALOX15 response of epithelial cells to IL4, as did TLR agonists to a lesser, but also significant, extent.

Conclusion:

Modulation of ALOX15 expression by cytokines and TLR agonists highlights the complex interplay of adaptive and innate immune pathways in the sinonasal epithelium. Understanding the differential effects of individual Th2 cytokines, as well as counter-regulation by Th1 cytokines and microbial-associated products, better elucidates sinonasal epithelial immune physiology and may suggest novel therapeutic strategies.

3:27 PM

Intraturbinal Steroid Injections Revisited: An Update on Indications, Results and Complications

*Evelyn Kalyoussef, MD, Diego Saporta, MD
North Brunswick, NJ USA*

Introduction:

Patients with allergic and non-allergic rhinitis, with or without chronic sinusitis and/or nasal polyps, often develop severe nasal obstruction related to mucosal swelling of the inferior turbinates. Intraturbinal corticosteroid injections have been used for over sixty years. Their use has significantly decreased since the late 1970s when reports of blindness following corticosteroid injection were made, and topical intranasal steroids came onto the market. The largest case review regarding complications from intraturbinal steroid injections was last published in 1982 and reported a risk of blindness as 0.0067%. However, several authors with experience involving thousands of injections have never reported a single case of blindness.

Methods:

We performed a retrospective chart review of over 2000 injections performed in adults between the ages of 18 and 65 years old. A search was performed by cross referencing the CPT codes for Intratubinal Kenalog Injection and the ICD-9 codes for turbinate hypertrophy and rhinitis to identify patients who were treated from 2005-2010.

Results:

Only two cases out of 2262 injections developed an immediate allergic reaction requiring medical intervention. There were no cases of transitory or permanent visual loss. There were no other major side effects. In our hands, the risk of a major side effect from an intratubinal steroid injection was 0.0000884%.

Conclusions:

While the use of intratubinal steroid injections does not replace definitive medical or surgical treatment of the underlying disease process, it is in our hands a safe and effective treatment option, which is in agreement with other authors with experience of years and thousands of injections.

3:33 PM

Discussion

Moderators: Rakesh Chandra, MD, Andrew Lane, MD

3:38 PM

Epigenetics of Chronic Rhinosinusitis and the Role of the Eosinophil

*Kristin Seiberling, MD, Chris Church, MD, Lawrence Church, MD, Lawrence Sowers, MD, Jason Herring, MD
Loma Linda, CA USA*

Introduction:

One theory for the pathogenesis of chronic rhinosinusitis with nasal polyps (CRSwNP) involves aberration in the expression of genes that maintain the sinonasal innate immune system. We propose that the alteration in gene expression seen in CRSwNP is a result of oxidative byproducts of eosinophils. Activated eosinophils may lead

to the production of hypobromous acid (HOBr) and the posttranslational modification product 5-bromocytosine (5BrC). 5BrC may cause aberrant methylation of cytosine during DNA replication and mimic the endogenous methylation signal associated with gene silencing. We propose to use gas chromatography-mass spectrometry (GC-MS) to identify the presence of 5BrC in nasal polyps and in normal sinus mucosa.

Methods:

Patients with CRSwNP undergoing endoscopic sinus surgery were prospectively recruited into this study. Polyp tissue was obtained at the time of surgery for analysis. Control tissue was harvested from the ethmoid cavities of fresh cadaver heads without endoscopic or radiographic evidence of sinus disease. Using GC-MS, tissue specimens were analyzed for the presence and quantity of 5BrC and amount of 5-methylated cytosine.

Results:

Tissue specimens from 20 patients with CRSwNP and 8 controls were processed using GC-MS. CRSwNP specimens demonstrate varying levels of 5BrC and 5-methylated cytosine not found in normal controls.

Conclusion:

Eosinophils, which are frequently associated with CRSwNP, may lead to DNA modification and gene silencing via 5BrC and aberrant methylation patterns. Further studies are necessary to determine the role this may have on the pathogenesis of nasal polyps and disease presentation.

3:44 PM

Immunohistochemical Analysis of Chronic Rhinosinusitis Subtypes

*Jacob McAfee, MD, Elena Galkina, PhD, Chris Galkina, PhD, Chris Benson, BS, Joseph Han, MD
Norfolk, VA USA*

Introduction:

Chronic rhinosinusitis (CRS) is a diagnosis encompassing a variety of distinct clinical subtypes, whose pathophysiology have been poorly elucidated. Previous tissue analysis has demonstrated prominence of T lymphocyte activity yet the specific inflammatory mecha-

nism remains undefined. This study aims to characterize T cell subset populations amongst the various subtypes of CRS.

Methods:

Sinonasal polyps were collected from 51 patients undergoing endoscopic sinus surgery for CRS and 7 controls. CRS groups were Aspirin-Exacerbated Respiratory Disease (AERD), Allergic Fungal Sinusitis (AFS), Cystic Fibrosis (CF), Eosinophilic Sinusitis with/without allergy (ES c/s A), and Non-Eosinophilic Sinusitis c/s allergy (NES c/s A). Cell suspensions were prepared for flow-cytometry, gated to define and quantify IL-4 and INF- γ producing CD4+ cells. Results between groups were analyzed with ANOVA.

Results:

CD4/CD45+ lymphocytes were increased in NES c A (43.1%) compared to controls (20.3%, $p = 0.04$). CD4+ leukocytes were increased in NES c A (25.9%, $p = 0.04$) and NES s A (17.4%) compared to CHES s A (10.3%). NES s A demonstrated greater IFN- γ production (27.8%) as compared to AFS (3.26%, $p = 0.002$) and controls (6.3%, $p = 0.008$). IL-4 production was greatest from CHES c A (9%).

Conclusions:

CRS groupings demonstrate varying T subset populations. Non-asthmatic CRS subtypes demonstrate a larger fraction of CD4+ cells producing IFN- γ , implicating a TH1 response. Allergic CRS subtypes demonstrated the greatest population of CD4+ cells producing IL-4, implicating TH2 response.

3:50 PM

Spontaneous Eosinophilic Nasal Inflammation in a Genetically-Modified Mouse: Comparative Study with an Allergic Inflammation Model

*Andrew Lane, MD, Seuk Cho, MD, Sun Cho, MD, Sun Oh, PhD,
Zhou Zhu, PhD
Baltimore, MD USA*

Introduction:

Eosinophilic inflammation is a hallmark of CRSwNP. In order to model chronic sinonasal Th2 inflammation experimentally, mice have previously been developed with allergic nasal sensitization to ovalbumin or aspergillus. Here, we describe a genetically-modified

mouse that develops robust spontaneous nasal eosinophilic inflammation. These mice lack the enzyme SHP-1 that down-regulates the IL-4R α /stat6 signaling pathway. We compare the inflammation in these knockout mice (mev) with the published model of acute ovalbumin-induced allergic rhinitis.

Methods:

Nasal allergic inflammation was induced in C57BL/6 mice by sensitization to ovalbumin. Nasal lavage was performed in control, allergic and mev mice using a novel trans-pharyngeal technique. Total and differential cell counts were performed on cytopsin preparations. Mouse heads were processed for histology, and tissue eosinophils were quantified per high-power field.

Results:

By histology, mev mice demonstrate a dramatic eosinophilic mucosal infiltrate as compared to the acute allergic model (100.5 ± 44.32 /HPF vs. 11.29 ± 1.98 /HPF, $P = .0003$). Total cell counts in the allergic mouse were variable and increased versus control, but not significantly different from mev mice ($p=0.27$). Differential counts of the nasal lavage revealed a significantly greater percentage of eosinophils in mev mice than the allergic model ($p=0.02$).

Conclusions:

Knockout mice lacking SHP-1 provide a consistent model of chronic nasal eosinophilic inflammation useful for the study of Th2-skewed sinonasal disease. Powerful genetic tools available in mice will allow future dissection of cellular and molecular mechanisms, with implications for understanding the pathophysiology of human sinonasal eosinophilic inflammatory disease.

3:56 PM

Discussion

Moderators: Robert Kern, MD, Mark Zacharek, MD

4:01 PM

Panel - Business of Medicine in Rhinology: What's New in 2011

Moderator - Pete Batra, MD

Panelists: Pete Batra, MD "Update on SGR and Physician Fee Schedule"

Bradley Marple, MD "Coding update for Balloons"

Mary LeGrand, RN, MA, CCS-P, CPC "Coding Tips in Rhinology"

Michael Setzen, MD "Coding update for CT imaging"

Richard Waguespack, MD " The CPT/RUC Process "

5:00 PM

Meeting Adjourned

Thursday, April 28, 2011

7:00AM

Residents/Fellows Business Hour
“Pearls of Fellowship”

Moderators: Marc Dubin, MD, Jivianne Lee, MD

Panelists:

“Surgical Management of Difficult and Revision Patients in The Early Part of Your Practice”

Benjamin Bleier, MD

“Pearls on Medical Management of the Tertiary Care Sinus Patient”

Carlos Ebert, MD

“Finding the “Right” Fellowship: Assessing the Breadth and Depth Offered in Programs to Find the Right “Fit”

Devyani Lal, MD

“Developing Research Projects from Your Clinical Patients”

Murray Ramanathan, MD

“Developing a Practice Where You Trained”

Bruce Tan, MD

7:50AM

Presidential Welcome - Brent Senior, MD

8:00 AM

Transnasal Endoscopic Approach to the Cavernous Sinus

*Roheen Raithatha, MD, Edward McCoul, MD, Vijay McCoul, MD, Vijay Anand, MD, Theodore Schwartz, MD
New York, NY USA*

Introduction:

Surgical access to the cavernous sinus has proven a challenge for the skull base surgeon. Traditional approaches to the cavernous

sinus include the transcranial approach, which may frequently result in cranial nerve weakness or permanent deficits. The microscopic transnasal approach has limited view and the cavernous sinus may not be clearly visualized. The endoscopic transnasal approach provides an alternative to these approaches. We describe our results using this approach to the cavernous sinus for tumor removal.

Methods:

A retrospective chart review was performed of all patients treated surgically at a tertiary care referral center between February 2006 and November 2010 with a purely endoscopic transnasal approach to the cavernous sinus.

Results:

Out of 384 total endoscopic skull base cases, 35 (9.1%) involved the cavernous sinus. The most common approach was the transsphenoidal, transellar approach (26/35 patients, 74.3%). Other approaches included transtethmoidal (3/35, 8.6%) and transpterygoid (3/35, 8.6%). The most common pathology was pituitary macroadenoma; other tumor types included chordoma, chondrosarcoma, hemangiopericytoma, and lymphoma. Gross total resection was achieved in 16 patients (45.7%). Skull base reconstruction required a gasket-seal closure in 9 patients (25.7%), while regional nasoseptal flap was employed in 9 cases (25.7%). Cerebrospinal fluid leakage was not encountered in any patient post-operatively, and there were no new cranial nerve palsies or other complications following surgery.

Conclusions:

The transnasal endoscopic approach is a safe and effective option for tumor removal in selected cases. Morbidity is low and a variety of reconstructive options are available.

8:06 AM

Antimicrobial Photodynamic Therapy Treatment of Chronic Sinusitis Biofilms

*Merrill Biel, MD, PhD, Jim Balcom, MBA, Cale Balcom, MBA, Cale Street, PhD, Lisa Pedigo
Minneapolis, MN USA*

Background:

Chronic recurrent sinusitis (CRS) affects an estimated 37 million Americans with an aggregated cost of six billion dollars annually.

The potential etiologies of CRS include bacteria, viruses, allergies, fungi, superantigens and microbial biofilms. There is a significant subpopulation of patients with CRS who remain resistant to cure despite rigorous treatment regimens including surgery, allergy therapy and prolonged antibiotic therapy. The cause of treatment failure is the destruction of the sinus mucociliary defense resulting in secondary antibiotic resistant microbial biofilm colonization. Antimicrobial photodynamic therapy (aPDT) is a non-antibiotic broad spectrum antimicrobial treatment that has been demonstrated to eradicate antibiotic resistant bacteria and biofilms.

Objective:

To demonstrate the effectiveness of a non-invasive aPDT treatment method of eradicating antibiotic resistant biofilms known to cause CRS in an in vitro and ex vivo model.

Methods:

Antibiotic resistant polymicrobial biofilms of *Pseudomonas aeruginosa* and MRSA were treated with aPDT. Cultures of the biofilms were obtained before and after light treatment to determine efficacy of biofilm reduction. Results: The in vitro CRS biofilm study demonstrated that aPDT reduced the CRS polymicrobial biofilm by >99.9% after a single treatment. The ex vivo study demonstrated that aPDT was safe and effective in significantly reducing the polymicrobial biofilm on human ciliated respiratory mucosa.

Conclusions:

aPDT effectively treats CRS polymicrobial antibiotic resistant biofilms both in vivo and ex vivo. Human clinical studies are currently planned to assess the safety and efficacy of this treatment for CRS.

8:12 AM

Septal Deviation Hinders Intranasal Drug Delivery: A Computer Simulation Study

*Dennis Frank, PhD, Julia Kimbell, MD, Sachin Kimbell, MD, Sachin Pawar, MD, John Rhee, MD
Chapel Hill, NC USA*

Introduction:

The effectiveness of drug delivery using nasal sprays in the presence of intranasal anatomic deformities has not been well

described. The objective of this study is to investigate how nasal anatomic deformities, head position, and inspiratory airflow affect the distribution of spray particles.

Methods:

Spray particle deposition was analyzed using a computational fluid dynamics model of the human nasal passages with septal deviation on the left side and inferior turbinate hypertrophy on the right. This model was created from computed tomography scans. Simulations were conducted using a particle size distribution ranging from 20 μ m to 110 μ m at a spray speed of 3m/s, with steady state inspiratory airflow either present at 15 L/min or absent.

Results:

With inspiratory airflow present, simulated penetration past the anterior region on the left side (septal deflection) was less than 35%, while more than 56% of particles penetrated on the right (turbinate hypertrophy). Predicted deposition fractions were not sensitive to head position. When inspiratory airflow was absent, simulated deposition fractions on the left and right sides were highly sensitive to head position, with zero penetration predicted unless the head-tipped-back position was used. Combining left and right sides in the head-tipped-back case, particle penetration past the anterior region was 43.85% with airflow present and 34.30% with airflow absent.

Conclusions:

Simulations predicted that presence of septal deviation greatly blocked drug delivery on the affected side. Furthermore, the presence of airflow aided particle penetration; head position also played an important role when inspiratory airflow was absent.

8:18 AM

Discussion

Moderator: Bradley Woodworth, MD

8:24 AM

KC (IL-8) Regulation of Sinonasal Cilia Function in a Murine Model

*Jessica Shen, MD, Noam Cohen, MD, Bei Cohen, MD, Bei Chen, MD, James Palmer, MD
Philadelphia, PA USA*

Introduction/Purpose:

Chronic rhinosinusitis is a multifactorial disease characterized by a local inflammatory response and impaired mucociliary clearance. The relationship between inflammation and disrupted mucociliary clearance is not completely understood. Our prior work suggests that non-polypoid inflammation can blunt ciliary dynamics. Thus, we set out to determine whether exogenously applied recombinant KC, mouse homologue of IL-8, modulates ciliary function.

Methods:

Murine primary sinonasal cultures were established in an air-liquid interface. Exogenous KC was administered to both apical and basal surfaces at 500 pg/ml (n=6) or 5 ng/ml (n=3). Basal and stimulated cilia beat frequency (CBF) were recorded at 6, 12, 24, and 48 hours after exposure. Control groups were treated with buffered saline solution (n=6). Cilia was mechanically stimulated by delivery of a short burst of pressurized air (40 psi).

Results:

KC treated cultures had significantly increased basal CBF at 24H and 48H after exposure. Low concentration KC (500 pg/ml) yielded a 41.6%±9.5% increase in basal CBF (p <0.001) at 24H, which persisted at 48H 35.8%±10.2% (p<0.05), while high concentration KC (5 ng/ml) yielded a 50.2%±6.6% (p<0.01) increase in basal CBF at 24H, which declined to 15.2%±5.2% (p<0.01) at 48H. Furthermore, after 48H, cilia exposed to KC showed decreased response to mechanical stimulus versus control (500 pg/ml: p<0.01, 5 ng/ml: p<0.04). Conclusion: Our results demonstrate modulation of cilia function of murine respiratory epithelial cells grown at an air-liquid interface by the inflammatory cytokine KC, which increases basal CBF while decreasing the response of cilia to mechanical stimulation.

8:30 AM

Olfactory Dysfunction Treated with Manuka Honey in Chronic Rhinosinusitis Patients

*Andrew Thamboo, MD, San Sunkaraneni, MD, Amin Sunkaraneni, MD, Amin Javer, MD
Vancouver, Canada*

Objectives:

To objectively and subjectively assess the effect of Manuka honey topical treatment in chronic rhinosinusitis (CRS) patients with olfactory dysfunction.

Methods:

CRS patients who were recruited into the study had their olfaction tested with the validated Sniffin' Sticks test before they were started on honey. Patients were asked to spray 30cc of 4% Manuka Honey Spray once a day for 4 weeks. At their follow-up appointment, patients had their olfaction retested with the Sniffin' Sticks. Patients also filled in a subjective scoring sheet (SNOT-22) pre- and post-honey treatment. Ten control patients with CRS were placed on nasal saline irrigation and underwent the same subjective and objective regimen.

Results:

Sixty-two patients were recruited for this study and ten patients were recruited as control patients. Before starting the honey rinse there were 25 anosmic patients (40.3%), 31 hyposmic patients (50%) and 6 normosmic (9.7%) patients. After 4 weeks of honey treatment, there were 19 anosmic patients (30.6%), 29 hyposmic patients (46.8%) and 14 normosmic patients (22.6%). Sniffin' Stick scores showed significant improvement in patients on Manuka Honey ($p < 0.05$). Also, patients' subjective scores showed significant improvement in olfaction ($p < 0.05$). Control patients showed no significant change in their subjective and objective olfaction scores.

Conclusion:

Manuka Honey maybe a safe alternative treatment to steroids in treating patients with long-term olfactory dysfunction secondary to chronic sinusitis.

8:36 AM

Intraoperative Saline Irrigations, do they Reduce Bacterial Load within the Sinus Mucosa?

*Richard Mcugh, MD, Chris Church, MD, Wilson Church, MD,
Wilson Aruni, MD, Kristin Seiberling, MD
Loma Linda, CA USA*

Introduction:

Saline irrigations are routinely employed during endoscopic sinus surgery to remove mucous and debris from the sinus cavities. What is unknown is whether this results in a quantitative reduction in pathologic bacteria within the sinus mucosa. The objectives of this study were to quantify the amount of 5 different bacteria (*S. aureus*, *H. influenza*, *P. aeruginosa*, coagulase-negative staphylococcus (CNS), and *S. pneumonia*) within the maxillary sinus and to determine the impact of saline irrigations on bacterial counts.

Methods:

Twenty patients with chronic rhinosinusitis were prospectively enrolled. After bilateral maxillary anrostomies, biopsies were taken of the maxillary sinus mucosa on both sides. In each patient, the left side then was irrigated with 250 cc of normal saline (NS) with a pressurized pulse-irrigation device and the right side was irrigated with 250 cc of NS using a 30 cc syringe attached to a curved suction tip. Repeat maxillary sinus mucosal biopsies were then taken from each side. Each biopsy was analyzed using quantitative polymerase chain reaction to determine the presence and amount of each of the bacteria.

Results:

Saline irrigations were found to significantly reduce the amount of *S. aureus*, *P. aeruginosa* and *S. pneumonia* found within the maxillary sinus mucosa. No difference was found for *H. influenza* or CNS. No difference in bacterial load was able to be shown between the pressurized saline flushes and manual saline rinse methods. Conclusion: Intraoperative saline irrigations are able to significantly reduce the amount of potentially pathogenic bacteria within the diseased sinus mucosa.

8:42 AM

Discussion

Moderators: Joseph Han, MD, James Stankiewicz, MD

8:50 AM

Presidential Address

Brent Senior, MD

9:00 AM

Upfront Point-of-Care Sinus CT Scanning is a Cost-Effective Diagnostic Alternative to Empiric Medical Therapy for Chronic Rhinosinusitis

*Randy Leung, MD, Stella Almassian, MBA, Neil Almassian, MBA, Neil Jordan, PhD, Rakesh Chandra, MD
Chicago, IL USA*

Introduction:

Current algorithms for the management of patients presenting with symptoms of chronic rhinosinusitis (CRS) often involve a trial of medical therapy prior to CT scanning. This approach evolved in an era when same day conventional CT was impractical and economically unreasonable. We sought to determine the threshold at which use of low-radiation, office-based CT scanning obtained at the point of care (POC-CT) is at least as cost effective as empiric medical therapy for patients presenting with CRS symptoms.

Methods:

Cost-effectiveness analysis using Markov modeling and sensitivity analysis was employed. Medication costs, CT costs, treatment response rates, and treatment associated adverse event rates modeled from Red Book 2010 and studies in the literature. Treatment cost values were derived from Medicare reimbursement rates.

Results:

In practices with significant volumes of consultations for potential CRS, there is a clear cost-savings advantage to the upfront POC-CT strategy over empiric therapy. This advantage continues to hold true during the sensitivity analysis when costs and response rates are fully biased toward empiric therapy.

Conclusions:

Inclusion of POC-CT into routine management of CRS should be considered where a significant volume of CRS patients are seen. Initial POC-CT can offer same day diagnosis, facilitate prompt treat-

ment and/or appropriate referral, while costing less and at a lower radiation dosage than empiric therapy strategies.

9:06 AM

Smoking and Endoscopic Sinus Surgery: Does Smoking Volume Contribute to Clinical Outcome?

*Luke Rudmik, MD, Jess Mace, MPH, Timothy Mace, MPH, Timothy Smith, MD
Portland, OR USA*

Introduction:

To evaluate the overall effect of smoking on post-operative outcomes after endoscopic sinus surgery (ESS) for chronic rhinosinusitis (CRS) and determine if volume of daily smoking impacts outcome severity.

Methods:

A total of 784 patients with CRS were prospectively enrolled from three tertiary care centers between January, 2001 and April, 2009 after electing ESS. Follow-up (> 6 months) was available on 39 smoking patients. Smoking volume (cigarettes/day) analysis was performed by dichotomizing patients into either light (< 20 cigarettes per day) or heavy (≥ 20 cigarettes per day) daily smoking subgroups. Primary outcomes were Lund-Kennedy endoscopy scores and two disease-specific health-related QoL (HRQoL) instruments: the Rhinosinusitis Disability Index (RSDI) and Chronic Sinusitis Survey (CSS). Results: Smokers and non-smokers experienced a statistically similar improvement in HRQoL following surgery (RSDI, $p=0.792$; CSS, $p=0.117$). There was no difference in HRQoL improvements between the light and heavy smoking subgroups. While overall changes in endoscopy scores did not differ between smokers and non-smokers, there was a significant difference in the prevalence of worsening post-operative endoscopy scores between heavy, light, and non-smokers (100%, 33%, and 20%, respectively; $p=0.002$).

Conclusion:

Active smoking status does not alter post-operative improvement in HRQoL after ESS, however increased smoking volume does appear to contribute to worse post-operative endoscopy scores.

9:12 AM

The Impact of Osteitis on Disease Severity Measures and Quality of Life Outcomes in Chronic Rhinosinusitis

*Naveen Bhandarkar, MD, Jess Mace, MPH, Timothy Mace, MPH, Timothy Smith, MD
Orange, CA USA*

Objective:

The significance of osteitis in the management of recalcitrant chronic rhinosinusitis (CRS) has yet to be clearly understood and clinical outcomes data for these patients is lacking. Osteitis has been characterized by inflammatory infiltrate, osteoneogenesis, and bony sclerosis with remodeling. In this study we sought to determine if osteitis negatively impacts quality-of-life (QOL) or clinical outcomes following endoscopic sinus surgery (ESS).

Methods:

190 adult patients with CRS were prospectively enrolled. Osteitis was characterized by quantifiable bony thickening on sinus computed tomography (CT). Baseline measures and post-operative outcomes were evaluated using endoscopy exam, olfactory testing, and two validated disease-specific QOL surveys: the Chronic Sinusitis Survey and Rhinosinusitis Disability Index (RSDI). Bivariate and multivariate analyses were performed to evaluate differences between patients with and without osteitis.

Results:

Patients with osteitis (n=79) had higher prevalence of nasal polyposis and prior ESS (both $p < 0.001$) and significantly worse baseline CT, endoscopy, and olfactory scores (all $p < 0.001$) than patients without osteitis. There was no difference in baseline QOL scores between patients with and without osteitis. Following ESS, there were significant improvements in all QOL measures in both groups, however patients without osteitis were more likely to exhibit clinically meaningful improvement on physical RSDI subscale scores, independent of other clinical factors (79.0% vs 62.3%; OR: 3.85, $p = 0.011$). Conclusion: Osteitis is associated with worse clinical and objective measures of disease severity and inflammation. Our data suggest that while patients with osteitis improve after ESS, the presence of osteitis is associated with a reduced chance of improvement in some outcome measures.

9:18 AM

Discussion

Moderators: Alexander Chiu, MD, Bradley Marple, MD

9:25 AM

Invited Keynote Speaker

Richard Harvey, MD

“Shifting Paradigms of Surgery in CRS: Ventilation or Access for Topical Therapy”

9:45 AM

Break with Exhibitors

10:16 AM

An Update on the Management of Recalcitrant Cerebrospinal Fluid Rhinorrhea after Lateral Skull Base Surgery via Endoscopic Endonasal Eustachian Tube Closure

*Lori Lemonnier, MD, Belachew Tessema, MD, Fred Tessema, MD, Fred Telischi, MD, Roy Casiano, MD
Miami, FL USA*

Purpose:

Cerebrospinal fluid (CSF) leakage, commonly presenting as rhinorrhea, is a well recognized complication of lateral skull base surgery. Failure of conservative treatment measures in these cases necessitates surgical closure of the eustachian tube (ET). Our aim is to demonstrate that endoscopic endonasal closure of the ET is an alternative to more traditional techniques for management of recalcitrant postoperative CSF rhinorrhea after removal of middle and posterior cranial fossa lesions.

Method:

A retrospective chart review was performed for patients who presented with CSF rhinorrhea after lateral skull base surgery at a tertiary medical center over a 13 year period, from 1997 to 2010. Patients managed with endoscopic endonasal closure of the ET

were evaluated for preoperative hearing status, approach for lateral skull base surgery, pathology, timing and presentation of CSF leak, methods of treatment, length of hospital stay, complications, and success of the procedure.

Results:

Of the eight patients included in this review, six were managed successfully with endoscopic endonasal eustachian tube closure. Of those six, one required a revision procedure. Average length of post-operative stay was 5.8 days. There were no major complications. Follow up of greater than 90 months has been achieved since the first procedure.

Conclusion:

Endoscopic endonasal closure of the eustachian tube is a safe, minimally invasive and effective method for obliteration of the eustachian tube orifice. The algorithm for management of recalcitrant postoperative CSF rhinorrhea after lateral skull base surgery should include endoscopic endonasal closure of the eustachian tube.

10:22 AM

Case Report of Orbital Violation with Placement of Ethmoid Drug-Eluting Stent

*Craig Villari, MD, Ted Wojno, MD, John Wojno, MD, John DelGaudio, MD
Atlanta, GA, USA*

Introduction:

Delivery of topical therapy has been a long-standing goal for treatment of paranasal sinusitis. Ethmoid sinus stenting has recently been introduced as a potentially minimally invasive mechanism to deliver topical medication. We review the available literature on ethmoid stenting and present a case report involving orbital violation and ocular injury.

Methods:

Retrospective review and literature review

Results:

A 37 year-old female underwent bilateral ethmoid sinus drug-eluting stents at an outside facility. Post-operatively the patient endorsed right-sided ocular pain and pressure. She was seen in the emergency

setting on post-operative day (POD) 2 and found to have a dilated right pupil; a CT scan performed was read to be normal. She was managed conservatively for 19 days post-operatively. The left stent was removed successfully on POD 19 but the right could not be removed in the outpatient setting secondary to severe pain. The patient was transferred to our facility on POD 21 with some right-sided visual defects. The CT from POD 2 was reviewed and demonstrated that the stent violated the lamina papyracea and traversed the right orbit, abutting the lateral orbital wall. The nasal septum was severely deviated to the side of the involved orbit on imaging. On POD 24, the patient underwent orbital decompression and successful stent removal but continues to have a dilated pupil in the affected eye.

Conclusion:

This is the first reported case of orbital violation and ocular injury with placement of an ethmoid drug-eluting stent. The literature shows feasibility in cadaveric studies but the practitioner must be diligent in placement and appropriate trajectories are essential to safe, effective intervention. Ethmoid sinus stenting is an emerging option for topical treatment of ethmoid sinusitis but cognizant of potential risks when counseling pre-operative patients.

10:28 AM

Endoscopic Medial Maxillectomy For Recalcitrant Chronic Maxillary Sinusitis

*Jessica Gullung, MD, Eric Wang, MD, Rodney Wang, MD, Rodney Schlosser, MD
Charleston, SC USA*

Introduction:

Endoscopic medial maxillectomy (EMM) is an accepted treatment for benign sinonasal neoplasms. Its use as definitive treatment for inflammatory disease of the maxillary sinus has yet to be adequately explored. We evaluated the efficacy of EMM for recalcitrant chronic maxillary sinusitis and attempted to identify factors that predispose patients for failure.

Methods:

A retrospective chart review of 47 patients who underwent a total of 63 medial maxillectomies for recalcitrant chronic maxillary sinusitis from 2003 to 2010 was performed. Data was collected regarding patient demographics, prior therapies, and exudative cultures.

Results:

Complete endoscopic and symptomatic resolution of disease was achieved in 38 of 47 patients (81%). Four patients required additional post-operative topical medical therapy for resolution of their inflammatory disease. Resolution of disease was seen in 90% of patients with negative cultures. When *P. aeruginosa* was cultured, the rate of disease resolution dropped to 75%. When *S. aureus* was cultured, only 60% of patients demonstrated complete disease resolution. Of patients who had previous Caldwell-Luc procedures, 73% were successfully salvaged. No revision surgeries or intravenous antibiotics were required. The mean follow up time was 35 months.

Conclusions:

Endoscopic medial maxillectomy is an effective and acceptable treatment for chronic maxillary sinusitis refractory to standard medical treatment and middle meatal antrostomies. The presence of *P. aeruginosa* and *S. aureus* may be associated with worse outcomes.

10:34 AM

Discussion

Moderators: Roy Casiano, MD, Belachew Tessema, MD

10:40 AM

The Effect of Low-Fidelity Endoscopic Sinus Surgery Simulators on Surgical Skill?

Marta Wais, MD, Randy Leung, MD, Eng Leung, MD, Eng Ooi, Ian Witterick, MD

Toronto, Ontario, Canada

Background:

Surgical training models have been used increasingly to provide an environment for surgical trainees to practice their skills with no risk to the patient. With limited operative opportunities through residency, it is critical to optimize the efficiency of learning in the operative experience. In this study, we used previously published, inexpensive, low fidelity surgical training models to determine their construct validity as endoscopic sinus surgery simulators.

Methods:

Otolaryngology residents were recruited and randomized to one of two groups also stratified for training level. The first group participated in a pre-training session with all five different modules. The following day, all study participants took part in a cadaveric endoscopic sinus surgery course. Participants completed a set of predetermined tasks and their performances were videotaped. The videos were then evaluated by three experts using a Global Rating Scale and a Task Specific Checklist. The performance of those who trained using the models was compared to the performance of those who did not.

Results:

Fourteen subjects at various levels of training participated. Pre-training using the modules appeared to improve performance on cadaver tasks. The improvement was also significant when looking at only senior subjects (PGY3,4). However, any enhancement of skills of junior residents was not statistically significant.

Conclusion:

The modules appear to have a positive impact on endoscopic sinus surgery skills. These low cost, easily constructed training modules have the potential to be integrated into otolaryngology resident training. Assessment of long term training effects with a larger number of participants is planned.

10:46 AM

Initial Results of a Novel, Multi-Functional, Multi-Sinus Balloon Dilation Tool

David Brodner, MD

Boynton Beach, FL USA

Introduction:

A multi-center prospective Registry study is underway to assess the safety and early outcomes of a new minimally invasive tool that combines seeker functionality with balloon dilation, suction, and irrigation. The device incorporates a malleable tip that may be reshaped intraoperatively to treat multiple sinus ostia/recesses.

Methods:

Adults age 18 and older underwent trans-nasal balloon dilation of the frontal recess and/or sphenoid sinus ostia with or without additional sinonasal surgery. Data from the first 50 patients enrolled in

the study were collected at baseline, during the procedure, and at 1-month follow-up to assess device safety and post-procedure sinus symptoms.

Results:

One hundred and thirteen dilations of the frontal recess and sphenoid ostia were planned with 111 successfully dilated, demonstrating a 98% technical success rate. Eighty-six percent (43/50) of subjects underwent concomitant maxillary antrostomy, 88% an anterior ethmoidectomy, and 52% a septoplasty. All procedures were performed under general anesthesia with an average operating room time of 104+/-32 minutes. Endoscopy and image guidance were most commonly used to confirm balloon position prior to dilation. Fluoroscopy was used in 4 cases to confirm location. No device-related adverse events reported. Epistaxis requiring spray thrombin was reported in one polypoid patient who underwent a hybrid balloon procedure. Average symptom status (SNOT 20 score) prior to treatment was 1.97+/-1.06; significantly improving by 58% to 0.82+/-0.81 ($p < 0.0001$) at follow-up.

Conclusion:

These results indicate that the versatile multi-sinus balloon dilation tool is safe, with early results demonstrating statistically significant and meaningful improvement in symptoms after hybrid procedures.

10:52 AM

Pituitary Adenoma and Hyposmia

*Alla Solyar, MD, Annie Lee, MD, Jeffrey Lee, MD, Jeffrey Fasick, Ph.D., Donald Lanza, MD
St. Petersburg, FL USA*

Introduction:

Concern that endoscopic transsphenoidal hypophysectomy (e-TSH) might disrupt the olfactory cleft and olfaction has been raised in the literature. In monitoring our own surgical series as part of quality assessment and improvement, we identified the existence of pre-treatment hyposmia in our patients with pituitary adenoma (PA). The purpose of this study is to describe this observation and to discuss the potential association between PA and hyposmia.

Materials and Methods:

Retrospective chart review of patients diagnosed with lesions of the sella tursica between April 2007 and August 2010 was performed.

Relevant data including patient awareness of hyposmia, past medical history, smoking history, rhinosinusitis history, medications, and post-operative pathology results was collated.

Results:

Eighteen patients were diagnosed with a new or recurrent sella turcica lesions and 11 patients underwent pre-treatment olfactory evaluation with the University of Pennsylvania Smell Identification Test(UPSIT). Among those tested, 10 patients had PA and 1 had meningioma based upon surgical pathology. The average UPSIT score among patients with a PA was 26.1(out of 40), with a range of 8 to 34. Eighty percent of patients with PA had no knowledge of pre-treatment depressed olfaction. One patient with a meningioma involving the sella tursica scored 39/40 on the UPSIT.

Conclusions:

Unsuspected pre-treatment hyposmia is prevalent in patients with PA compared to the general population of similar age where the average UPSIT score is 37 (P<0.001). Whether or not other sella turcica lesions or PA alone could disrupt olfactory function is unclear. This apparent association between hyposmia and PA requires additional investigation.

10:58 AM

Discussion

Moderators: Peter Hwang, MD, Steven Schaefer, MD

11:05AM

The Great Debate

How to Manage the Patient with Headache: Rhinogenic or Vascular!

Moderator: Michael Setzen, MD

Panelists: Peter Catalano, MD, John Del Gaudio, MD, Frederick Kuhn, MD, Brent Senior, MD

12:00 PM

Lunch with Exhibitors

1:00 PM

The Utility of the Maxillary Sinus Roof as a Guide for Posterior Ethmoid and Sphenoid Sinus Surgery

*John Lee, MD, Aman Grewal, MD, Trevor Grewal, MD, Trevor Wood, PhrmD
Toronto, Ontario Canada*

Background:

Safe endoscopic sinus surgery continues to depend on the ability of the surgeon to recognize important anatomical landmarks in the paranasal sinuses to minimize the risk of complications. As both a guide for posterior ethmoid and sphenoid sinus dissection, the medial maxillary sinus roof has previously shown to be a reliable reference point in a cadaveric study. However, the utility of this landmark in pre-operative radiologic surgical planning has not been fully investigated.

Objective:

To perform a radiologic anatomical study using the maxillary sinus roof as a fixed reference point for pre-operative evaluation of the posterior ethmoid height and the sphenoid sinus.

Methods:

This study was a retrospective evaluation of fifty consecutive adult subjects who were seen at a tertiary rhinology clinic for chronic rhinosinusitis. As part of the diagnostic work-up, each subject had previously undergone a high resolution, multi-slice computed tomography (CT) scan of the nose and paranasal sinuses. Each CT scan was reviewed and analyzed by two independent observers who were blinded to each other's results. Using the medial maxillary sinus roof as a fixed reference point, five measurement distances were recorded from each side of the paranasal sinuses, giving a total of 100 sides for comparison.

Results:

A total of 500 measurements were recorded by each independent examiner. Overall, the mean vertical height of the medial maxillary sinus roof relative to the nasal cavity floor was 33.45 +/- 0.40mm. The mean vertical distance from the medial maxillary sinus roof to

the posterior ethmoid skull base was 14.08 +/- 0.13mm. With regards to the sphenoid sinus, the mean vertical distance from the maxillary sinus roof to the sphenoid ostium, sphenoid floor and sphenoid roof were 2.76 +/- 0.27mm, 12.18 +/-0.14mm, and 5.93 +/- 0.98mm respectively. Using an independent samples t-test, there was no statistically significant difference between the mean measurement distances recorded by each examiner.

Conclusion:

The results from this radiologic anatomical study has demonstrated the medial maxillary sinus roof is a reliable reference point for safe surgical entry into posterior ethmoid or the sphenoid sinus. This may be especially important when other anatomical landmarks are obscured either due to disease or previous surgery.

1:06 PM

A Novel Wedge Technique to Correct Curved Deviation of the Cartilaginous Septum

Ji Lee, MD, Hong Ryul Jin, MD

Seoul, South Korea

Objective:

Curved cartilaginous deformity is the most frequent type of septal deviation. Various techniques to correct this deformity are often unsatisfactory in obtaining a straight septum. The authors introduce a novel technique to correct the curved deviation of the cartilaginous septum and report the surgical technique and results.

Method:

A retrospective analysis was performed on 14 patients (M=14) who had a novel “wedge technique” to correct the curved deviation of the cartilaginous septum. Surgical technique, materials used for wedge, surgical results, symptom improvement, acoustic rhinometry findings and surgical complications were investigated. In the new method, a 2-2.5 cm-long wedge made of septal cartilage or ethmoid bone is inserted through an incision located 1-1.5 cm caudal to the bony-cartilaginous junction near the dorsum. This wedge acts as a lever on a bony septum to correct the curved cartilaginous deviation.

Result: The degree of deviation was moderate or severe in all patients. For the wedge, bony septum was used in 9 patients and septal cartilage in 5 patients. Among 14 patients, 12 had a completely straight septum while 2 had a minimal curvature remaining.

Subjective symptoms of nasal obstruction evaluated by the VAS score and NOSE scale improved in all patients. In acoustic rhinometry, MCA changed from 0.33 cm² to 0.42 cm² (P=0.019) and nasal volume from 4.71mL to 6.28mL (P=0.022) after surgery. There were no major complications including septal perforation, saddle nose, or revision surgery.

Conclusion:

A novel wedge technique is a safe and useful technique to straighten the curved deviation of the cartilaginous septum in selected patient.

1:12 PM

Post -Operative CSF Rhinorrhea After Endonasal Endoscopic Skull Base Surgery

*Nathan Deckard, MD, Mahdi Shkoukani, MD, Adam Shkoukani, MD, Adam Folbe, MD
Royal Oak, MI USA*

Background:

There has been considerable advances in endonasal endoscopic skull base surgery in the past decade and likewise, so have methods of endoscopic CSF leak repair advanced from onlay grafts to vascularized flaps. Attempts have been made to identify factors that predict intra/post operative rates of CSF leak. In some studies, it has been proposed that tumor size, consistency of tumor, extent of margins, pathology, and method of repair are factors in rates of intra/postoperative CSF rhinorrhea. It is the aim of this study to assess our experience with endonasal endoscopic skull base surgery, including pathology, tumor volume, technique of sellar repair, as well as rates and predictors of CSF leak. Materials and Methods: Retrospective review from 2007 to 2010 of all adult patients who underwent endoscopic trans-nasal surgery at our institution.

Results:

70% of surgeries were performed for pathology of the pituitary with a tumor volume of 11.3+/-23.2 mm³. There was 40% intraoperative CSF leak compared to 3.7% postoperatively. Interestingly, in our review, larger tumor volume did not relate to higher rates of intraoperative (12.5+/-28.5mm³ without vs. 9.4+/-10.7mm³ with leak) nor postoperative (11.6+/-23.7mm³ vs. 3.8+/-3.5mm³) CSF leaks, nor were revision cases more prone to postoperative leak. All patients

were intraoperatively repaired with fat, surgical, septal flap or underlay technique for high flow leaks, and gel foam.

Conclusions:

CSF rhinorrhea remains a concerning issue in endoscopic skull base surgery. However, in the present study, we did not find a significant correlation between tumor volume and CSF rhinorrhea, nor were revision cases more prone to CSF leak.

1:18 PM

Discussion

Moderators: Chris Melroy, MD, Michael Sillers, MD

1:24 PM

Sinus Irrigation Bottles: A Potential Source of Infection?

*Eun Hae Chang, MD CM, Kevin Wong, MD, Carl Wong, MD, Carl Philpott, MD, Amin Javer, MD
Vancouver, BC, Canada*

Introduction:

Normal saline irrigation is an important component of the treatment of sinusitis. Sinus irrigation bottles are commonly utilized to perform this task. It is not uncommon for the irrigation solution to backflow out of the nasal cavity onto the patients' hands and into the tubing of the irrigation bottle itself. This potentially can contaminate the tubing in the bottle and the bottle itself.

Objective:

To determine if organisms responsible for sinusitis can be cultured from the tubing and the sinus irrigation bottles.

Methods:

A prospective study was performed. Twenty-four patients were given sinus irrigation bottles for a period of four weeks for the treatment of their sinusitis. All patients had endoscopically guided swabs taken directly from the middle meatus on the first visit prior to the initiation of the sinus bottle use. The bottles were then returned and cultured. Microbiology data was collected.

Results:

Twelve bottles had a positive culture. Majority of positive samples grew more than one organism. Eight samples grew normal respiratory flora originating from the patients' nasal mucosa. Three cultures grew *Pseudomonas*, and two bottles grew *Acinetobacter* sp. and other environmental pathogens. The growth of potentially infectious pathogens such as *S.Aureus* and *Enterobacter* sp. has also been detected.

Conclusion:

Sinus irrigation bottles are potential source of sinus re-infection. We recommend that patients change their irrigation bottles on a biweekly basis and clean them after each use. A sinus irrigation bottle without tubing and one that is not prone to nasal backwash may be an alternative option.

1:30 PM

Oral Antifungal Therapy for Chronic Rhinosinusitis and its Subtypes

Thunchai Thanasumpun, MD, Sukhrpreet Pete Batra, MD, Dallas, TX USA

Background:

The objective of the evidence base review was to systematically evaluate the literature to delineate the potential role of oral antifungal therapy in management of chronic rhinosinusitis (CRS) and its subtypes.

Methods:

Articles for inclusion were identified by query of appropriate search terms in the PubMed database. The articles were reviewed independently by two authors and assigned an evidence level. The composite outcome data was reviewed to determine the impact of oral antifungals in CRS.

Results:

The search yielded 356 abstracts for review, retrieved 60 articles for full review, and incorporated 28 studies in this report. The majority of literature included level 4 (15) and level 5 (12) studies. One study met criteria for level 1 evidence. Most common disease entity studied was allergic fungal rhinosinusitis in 19 series; the most common antifungals reported were itraconazole and ketoconazole in 19 and 6

studies, respectively. Subjective parameters were assessed in 12 (42.8%) studies; overall, 64 (78%) of 82 patients reported symptom resolution or improvement. Objective parameters were reported in 6 (21.4%) studies, including improvement in endoscopic findings (3), CT imaging (3), reduction in oral steroid usage (1), and less revision surgery (2). Median length of follow-up was 14.7 months (3 - 60).

Conclusions:

The composite data would suggest a potential beneficial effect in patients with CRS and its subtypes with oral itraconazole and ketoconazole. However, majority of the studies are uncontrolled case series, confounded by non-validated outcome variables.

Randomized controlled trials are required to better elucidate their role in CRS.

1:36 PM

A Pilot Study Comparing 3mm versus 4mm Rigid Endoscope in Diagnostic Nasal Endoscopy

*Devyani Lal, MD, Ryan Kau, MD, Stephen Kau, MD, Stephen Bansberg, MD
Phoenix, AZ USA*

Background:

3 millimeter (mm) rigid endoscopes are expensive and perhaps less sturdy, but may be superior at visualization and patient comfort.

Objective: Compare nasal endoscopy with 3mm versus conventional 4 mm rigid 30 degree endoscopes for visualization, patient comfort and examiner ease.

Methods:

Ten volunteers with no previous sinus surgery underwent bilateral nasal endoscopy with both 4 mm and 3 mm endoscopes (resulting in 20 paired nasal endoscopies). Visualization, patient discomfort and examiner's difficulty were assessed with every endoscopy. Sino-nasal structures were checked on a list if visualized satisfactorily. Patients rated discomfort on a standardized numerical pain scale (0-10). Examiners rated difficulty of examination on a scale of 0-5 (1=easiest).

Results:

Visualization with 3mm scope was superior for the sphenoid ostium ($p=0.002$), superior turbinate ($p=0.007$), spheno-ethmoid recess ($p=0.006$), uncinate process ($p=0.002$), cribriform area ($p=0.007$), and Valve of Hasner ($p=0.002$). Patient discomfort was not significantly different for 3mm vs. 4mm endoscopes but correlated with the examiners' assessment of difficulty ($r= 0.73$). Examiners found endoscopy with 4mm scopes more difficult ($p=0.027$).

Conclusions:

The 3mm scope was superior in visualizing the sphenoid ostium, superior turbinate, spheno-ethmoid recess, uncinate process, cribriform plate, and Valve of Hasner. It therefore may be useful in assessment of posterior meatus, nasolacrimal duct, and cribriform area pathologies (e.g. tumor, fungus ball, scarring, inflammation, anosmia, cerebrospinal rhinorrhea). Although patient discomfort was not significantly different, discomfort with 3mm scopes was mostly noted during examination of structures that were not visualized with the 4mm endoscope. Patients' discomfort correlated with examiner's assessment of difficulty.

1:42 PM

Discussion

Moderators: Stephanie Joe, MD, Winston Vaughan, MD

1:48PM

Panel Discussion by the Experts

“How I Handle My Patients When FESS Has Failed”

Moderators: Marvin Fried, MD, Alexis Jackman, MD

Panelists: Berrylin J. Ferguson, MD, David Kennedy, MD, Raymond Sacks, MD, James Stankiewicz, MD

2:45 PM

Break with Exhibitors

3:15 PM

Characterization of the Pig as a New Sinus Animal Model

*Eugene Chang, MD, Alejandro Pezzulo, MD, Andrea Pezzulo, MD, Andrea Potash, MD
Iowa City, IA USA*

Objective:

Characterize the pig (*Sus scrofa*) as a new animal model to study paranasal sinus development, anatomy and electrophysiology. Subjects and methods: Six pigs were followed from birth to six months with sinus computed tomography (CT) scans every month. 3-dimensional volumetric analysis was used to determine the rate of sinus growth and development. Samples of sinus epithelia were fixed and examined via light and electron microscopy to highlight normal airway cellular architecture. Paranasal sinus epithelia were grown in air-liquid interface in-vitro cultures and Ussing chamber electrophysiology measurements taken. Three one-month old pigs underwent endoscopic examination with visualization of sinus anatomy.

Results:

The pig has remarkable similarities to humans for sinus anatomy and development. They are born with ethmoid and maxillary sinuses and develop frontal and sphenoid sinuses at 2 and 4 months of age. Porcine sinus epithelia consist of a pseudo-stratified layer of ciliated respiratory epithelial cells. Ion transport studies highlight the presence of sodium and chloride channels. At one-month of age, we were able to visualize the sino-nasal cavities with a 2.7mm endoscope.

Conclusion:

The pig is a valuable addition to previously characterized sinus animal models including the mouse, rabbit, and sheep. Advantages to the pig model include the rapid growth of the paranasal sinus and craniofacial skull, anatomic similarity to humans, and accessibility via endoscopy. To our knowledge, this is the first detailed report of sinus development and anatomy in the pig, and will serve as a base for future studies in paranasal sinus development and disease.

3:22 PM

Nasal Airflow and Air-Conditioning after Functional Endoscopic Sinus Surgery: A Fluid Dynamics Model

*Kibwei McKinney, MD, Dennis Frank, Ph.D, Adam Frank, Ph.D,
Adam Zanation, MD, Julia Kimbell, Ph.D
Chapel Hill, NC USA*

Introduction:

Functional endoscopic sinus surgery (FESS) is used to treat Chronic Rhinosinusitis (CRS) by improving drainage from the affected sinus, removing diseased tissues, enhancing ventilation, and permitting more effective deposition of adjuvant topical medications. The goal of this study is to use a computational fluid dynamics (CFD) model to objectively quantify the ability of FESS to improve ventilation in the ostiomeatal complex (OMC).

Methods:

As part of an IRB-approved prospective study (N=10), pre- and post-operative CT scans of each patient were obtained to construct CFD models using MimicsTM and ICEM-CFDTM software. Steady-state inspiratory airflow, heat, and water vapor transport were simulated using FluentTM in a CRS patient with unilateral-predominant disease (left side). Airflow allocations to dorsal, ventral and OMC areas were determined in both pre- and post-FESS states for a coronal section at the level of the natural os of the maxillary antrum. Water flux was calculated near the dorsal margin of the maxillary os.

Results:

Preliminary simulations indicated that FESS increased airflow allocated to the left OMC area (pre-FESS: 54%, post-FESS: 77%). FESS also decreased the rate of water flux into inspired air from nasal walls at a point anterior to the maxillary os (pre-FESS: 19.9×10^{-4} kg/s/m², post-FESS: 4.5×10^{-4} kg/s/m²), indicating reduced drying in the area of the left OMC.

Conclusions:

FESS appears to have a substantial impact on nasal airflow and air-conditioning. Comparisons between patient-reported symptoms using RSOM-31 and simulated heat flux, airflow, and particle deposition in additional CRS patients are underway.

3:28 PM

Computer Simulation of Drug Delivery in Human Nasal Airway Model

Goutham Mylavarapu, MD, Mihai Mihaescu, MD, Ephraim Mihaescu, MD, Ephraim Gutmark, MD, Allen Seiden, MD Cincinnati, OH USA

Introduction:

The pharmaceutical treatment of several nasal disorders includes drug delivery locally into the nasal airway. The nasal route is also often used as an alternate route for the systemic delivery of a number of medications. The primary objective of this study is to determine the influence of airflow characteristics, drug particle deposition patterns, and other parameters on drug distribution in a realistic model of the human nasal airway.

Methods:

A nasal airway model is reconstructed from axial Computed Tomography scans of a patient. Flow and particle tracking simulations are carried on this model for a range of peak inspiratory volumetric flow rates, 5- 30 lpm and a range of particle diameters in the range of 0.5-30 microns, using the Computational Fluid Dynamics. The effect of several parameters like flowrate, particle diameter, density, spraycone angle, turbulence intensity on deposition efficiency inside the nasal cavity is studied.

Results:

An increase in particle diameter, density and flowrate increases deposition in the nasal cavity. Local and total deposition patterns vary with all these parameters. A qualitative and quantitative comparison of different phenomena is studied to understand the most effective drug-delivery techniques.

Conclusion:

With greater flexibility and other advantages like non-invasiveness, minimum patient interactions, low cost, computational studies can help to better understand the mechanism of drug delivery, and airflow dynamics in the nasal airway. Also, computer simulations potentially enable scientists to develop more efficient devices for drug delivery as well as providing the opportunity to target specific regions of interest in the airway.

3:34 PM

Discussion

Moderators: Seth Brown, MD, Kevin Welch, MD

3:40 PM

Transnasal Endoscopic Approach to Symptomatic Osteomas of the Sinonasal District

Alessandro Pusateri, MD, Elina Matti, MD, Georgios Matti, MD, Georgios Giourgos, MD, Fabio Pagella, MD Pavia, Italy

Introduction:

One of the most challenging benign tumors for the ENT surgeon is represented by osteomas of the frontoethmoidal junction. The removal of such lesions is performed along the anterior skull base and areas of potential damage are the horizontal-lateral lamella of the cribra, the lamina papiracea and the ethmoidal arteries. Surgical treatment should regard just symptomatic osteomas, as this tumors can provoke rhinosinusitis and mucocoeles. In the last years new instruments have been applied in ESS (endoscopic sinus surgery) for the treatment of sinonasal osteomas .

Methods:

We retrospectively reviewed clinical records of patients who underwent ESS for symptomatic sinonasal osteomas between 2003 and 2010 in our Institution.

Results:

We have treated, between 2003 and 2010, 19 patients affected by symptomatic osteomas (9 males, 10 females, age range 28-74 years, mean 49). We found a frontoethmoidal localization in 18 patients and sphenoidal in 1. In all cases we've applied a transnasal endoscopic approach. Initially, patients were treated by the cavitation technique with standard ESS instruments, whereas in more recent cases surgery was assisted by the use of ENT navigation system and ultrasound bone emulsifier. No major complications occurred. No radiologic or endoscopic signs of recurrence (mean follow up 52 months, range 6 - 89 months) have been observed.

Conclusion: Endoscopic removal of osteomas of the sinonasal district is feasible, taking into account the location and size of the lesion. Particular importance should be given to new instruments that have been applied in the last years in ESS.

3:46 PM

A Double-Blinded Randomized Controlled Trial of Budesonide Medication-Soaked Merocel Versus Merocel Applications for Endoscopic Sinus Surgery

*Eun Hae Chang, MD CM, Elaheh Akbari, MD, Avi Akbari, MD, Avi Ostry, MD, Amin Javer, MD
Vancouver, BC, Canada*

Objective:

This study aims to compare the histopathological effects of Merocel middle meatal spacer (MMS) and Budesonide (Pulmicort) medication-soaked Merocel MMS on mucosal healing and patient's discomfort following functional endoscopic sinus surgery.

Methods:

Forty-six patients with chronic rhinosinusitis undergoing bilateral functional endoscopic sinus surgery were enrolled in a perspective study. Patients were randomized and blinded to receive Budesonide medication-soaked Merocel MMS in one nostril and unmedicated Merocel MMS on the contralateral side. Patients were seen one week post-operatively where they were asked to complete a visual analogue score (VAS) to report the level of discomfort on each side. Biopsies of the mucosa were taken from both middle turbinates after spacer removal 6d post op and sent to a blinded pathologist to determine the level of mucosal inflammation.

Results:

There was no statistically significant difference in the results in all three objectives' outcomes. Although the results were statistically insignificant, there was a trend towards decreased degree of mucosal inflammation and increased level of discomfort upon the removal of the packings for the Budesonide-soaked Merocel MMS group. Conclusions: Budesonide-soaked Merocel MMS was found be a safe alternative to a standard Merocel MMS. Further studies should be done, perhaps even involving different types of medication to determine their potential benefits and long-term outcomes.

3:52 PM

Methylglyoxal: Invitro Activity Against Bacterial Biofilms

*Shaun Kilty, MD, Melanie Duval, MDCM, Francis Duval, MDCM, Francis Chan, PhD, Robert Slinger, MD
Ottawa, ON, Canada*

Introduction:

Pseudomonas aeruginosa (PA) and *Staphylococcus aureus* (SA) biofilms have been associated with poor chronic rhinosinusitis (CRS) disease control following surgery. Manuka honey has been shown to both be an effective invitro treatment agent for SA and PA biofilms and nontoxic to sinonasal respiratory mucosa. Methylglyoxal (MGO) is reported to be the major antibacterial agent in Manuka honey. The effect of this agent against SA and PA biofilms has yet to be reported.

Methods:

An established biofilm model was used to determine the effective concentration (EC) of MGO against 11 isolates of methicillin-resistant SA (MRSA) and PA. The EC of MGO was also determined against planktonic (broth) MRSA and PA.

Results:

For MRSA, the EC against planktonic organisms was a dilution of 1/16,000 (0.001 mM) to 1/4,000 (0.004 mM) whereas against the biofilm MRSA isolates, the EC ranged from 1/2,560 (0.006 mM) to 1/320 (0.05 mM). For PA, the EC against planktonic organisms was a dilution of 1/8,000 (0.002 mM) to 1/1,000 (0.016 mM) for planktonic organisms whereas against the biofilm PA isolates, the EC ranged from a dilution of 1/640 (0.025 mM) to 1/160 (0.1 mM).

Conclusions:

MGO, a component of Manuka honey, may be an effective antimicrobial agent against both planktonic and biofilm MRSA and PA organisms.

3:58 PM

Discussion

Moderators: Karen Fong, MD, Todd Kingdom, MD

4:10PM

ARS Featured Paper

Medical Therapy versus Surgery for Chronic Rhinosinusitis: A Prospective, Multi-Institutional Study

Timothy Smith, MD

4:20 PM

Discussion

Moderators: Scott Stringer, MD, Kathleen Yaremchuk, MD

4:25PM

Case Presentations - Interesting Cases in General Rhinology - "This is How I Do It"

Moderators: James Palmer, MD, Rodney Schlosser, MD

Panelists: David Conley, MD, Samer Fakhri, MD, Ashutosh Kacker, MD, Richard Lebowitz, MD, Spencer Payne, MD

5:25 PM

Business Meeting

5:45 PM

Meeting Adjourned

Posters

Poster Reception

COSM 2011-River Exhibit Hall

Thursday, April 28, 2011

5:30 - 7:00pm

Posters

A Case Report of Sphenoid Bony Obliteration and Clival Erosion from a Fungus Ball

*Andrea Potash, MD, Erin O'Brien, MD
Iowa City, Iowa, USA*

Fungal balls are being increasingly identified with unclear pathogenesis. Isolated sphenoid pathology is rare with varying, nonspecific symptoms. Definitive diagnosis and treatment often involves imaging and endoscopic sphenoidotomy with tissue removal. We present a case report of a 65 year old farmer's wife who presented with right cranial nerve six palsy and neck pain. MRI and CT scans showed bony obliteration of left sphenoid sinus with a soft tissue mass eroding posteriorly through the clivus abutting the basilar artery and carotid and exerting mass effect on the right cavernous sinus. Endoscopic image guided sinus surgery required drilling of the bone filling the left sphenoid sinus. A cavity posterior to the sphenoid sinus was identified and material consistent with fungal ball was removed in entirety. Pathology showed a fungal ball with septate hyphae, favoring *Aspergillus* species. On follow up patient's neck pain and cranial nerve six palsy had resolved. In addition, the patient's husband reported using *Aspergillus* on his fields as a nitrogen source. In this case both bony erosion and hypertrophy were seen in the setting of an isolated sphenoid fungus ball that presented as cranial nerve deficit and neck pain in a patient with a history of environmental exposure to fungus.

A Comparison of Functional Endoscopic Sinus Surgery: Balloon Catheter Dilation vs. Microdebrider Instrumentation

*Regina Rodman, MD, Quintin Cappelle, MD, Jordan Pritikin, MD
Galveston, TX USA*

Introduction:

Chronic rhinosinusitis is a condition that affects thirteen percent (13%) of the US population, and carries an economic burden of exceeding \$5.8B annually. There has been considerable debate about the approach to sinus surgery, and whether tissue-sparing techniques can compare with traditional tissue-removal techniques

in terms of efficacy. Currently, there are two main options for patients who undergo endoscopic sinus surgery: use of cutting blades and microdebrider instrumentation to open the sinus ostia, and the use of balloon catheter instruments to dilate the sinus ostia. The objective of this study done to compare these two instrumentation options with regard to their impact on symptom severity, economic burden and quality of life outcomes.

Method:

66 patients, 23 microdebrider ESS (MESS) and 33 balloon catheter dilation (BCD), were selected from a single surgeon's experience from 05/2007-02/2009, and contacted by telephone to complete our survey. They rated their current symptoms of chronic rhinosinusitis using a standardized symptom survey, and their responses were compared to the ratings recorded at their initial (pre-op) clinic visit. They were then asked about the number of days needed to recover before returning to work, estimated productive ability on return, and return to full function of ADL, including exercise. The final aspect was to compare days missed from work due to sinus disease before and after surgery.

Results:

There was no significant difference between the two surgical groups in any category. Both groups were comparable in days of recovery needed before returning to full ADL, and before returning to work, and were similarly productive on return. There was marked improvement in symptoms of obstruction/stuffiness, headache/facial pain, post nasal drainage, and abnormal taste/smell in both groups, suggesting an improvement in quality of life after sinus surgery. Furthermore, this study clearly demonstrates the economic benefit of surgery in fewer days of work missed due to chronic sinus disease.

Conclusion:

There was no appreciable difference in outcomes between the two instrumentation options in sinus surgery in terms of recovery time, return to work and return to normal function. More importantly, there was significant improvement in chronic sinusitis symptoms after sinus surgery, regardless of which instrumentation system was used. Balloon catheter dilation of the sinus ostia is therefore felt to be equally efficacious in the surgical treatment of chronic sinusitis.

A Rare Case of Pneumosinus Dilatans Involving the Frontal Sinus

*Darshni Vira, MD, Joel Sercarz, MD, Jeffrey Suh, MD
Los Angeles, CA USA*

Introduction:

Pneumosinus dilatans (PD), a term coined by Benjamins in 1918, is a rare condition causing abnormal expansion of one or more aerated sinuses beyond its normal boundaries without the presence of a mass lesion. The frontal and sphenoid sinuses are the most common to be affected. The sinus walls, however, remain normal in thickness with no evidence of mucosal changes. Many hypotheses exist as to the etiology of PD though its pathogenesis still remains unclear. We present a case of pneumosinus dilatans involving the frontal sinus that resulted in significant frontal deformity. Patients and Methods: Case report of a 42 year-old man with a 3-year history of progressive frontal bossing resulting in significant frontal deformity.

Results:

The CT scan of this patient demonstrated findings of extensive frontal sinus pneumatization, consistent with pneumosinus dilatans. The patient underwent a successful combined approach involving an open bicoronal approach to recontour the frontal bone as well as endoscopic surgery to aerate the frontal sinus. Pre- and post-operative results are presented.

Conclusion:

Pneumosinus dilatans should be considered in the differential diagnosis of expansile lesions of the sinuses. Though sometimes the terms are incorrectly used interchangeably, this entity must also be distinguished from hypersinus as well as pneumoceles. Treatment for this disease process is commonly offered for symptomatic relief of sinus obstruction, pressure symptoms, or cosmetic deformity.

Adenoid Tissue as a Biofilm Reservoir in the Pathogenesis of Chronic Rhinosinusitis in Children

*Gregory Kruper, MD, Aleksandra Evkoska, MD, James Coticchia, MD
Detroit, MI USA*

The pathogenesis and development of chronic rhinosinusitis (CRS) in children is poorly understood and likely multifactorial. Bacterial biofilms have been recognized as a major factor in the progression

of chronic respiratory tract infections in both the pediatric and adult populations. Biofilms have been identified in the adenoid mucosa of children with chronic otitis media and CRS. Multiple studies have shown that removal of adenoid tissue is efficacious in relieving the symptoms of CRS in children. This is thought to be due to the removal of a reservoir of bacterial pathogens. This study was designed to further investigate the role of polymicrobial biofilms in the adenoids and sinus mucosa of children with CRS. Matched pairs of middle meatus tissue biopsies and adenoid tissue were obtained from 15 children presenting with CRS. Pairs were analyzed using fluorescent in-situ hybridization for the presence of bacterial biofilms. Specific bacteria strains were identified using PCR with probes specific for *Haemophilus influenzae*, *Streptococcus pneumoniae* and *Moraxella catarrhalis*. This was compared to bacteria grown from middle meatus tissue biopsies and cultures. The presence of bacterial biofilms on adenoid tissue and matched middle meatus biopsies correlated with bacteria identified by PCR, and culture from children with CRS. The correlation of bacteria identified by PCR from adenoid biofilms and matched middle meatus biopsies suggest that bacterial biofilms present on adenoid tissue are providing a reservoir for the paranasal sinuses. The therapeutic benefit seen from adenoidectomy seen in children with CRS may result from debridement of the polymicrobial adenoid biofilm.

Anatomical Analysis of the Endoscopic Endonasal Approach to the Medial Orbital Wall and Orbital Apex

*Carrie Bush, MD, Eyad Khabbaz, MD, Tarik Farrag, MD, Arturo Solares, MD
Augusta, GA USA*

Objective:

To describe the endoscopic endonasal approach to the medial orbital wall and orbital apex. Sinonasal and orbital endoscopic anatomy is delineated to provide improved surgical access within this complex region.

Methods:

We performed an endoscopic endonasal approach to the medial orbital wall and orbital apex on eight cadaveric specimens. Complete ethmoidectomy and sphenoidotomy were completed to provide access. The lamina papyracea was then excised. The periorbita was then opened and meticulous dissection of the medial

orbit contents and orbital apex was performed. Photographs were obtained for review.

Results:

The endoscopic endonasal approach allowed for wide access to the medial orbital wall and the orbital apex. This provided appropriate endoscopic visualization to describe the relevant sinonasal and orbital anatomy.

Conclusion:

The endoscopic endonasal approach to the medial orbital wall and orbital apex is anatomically feasible. Much of the morbidity associated with open approaches to the orbit (orbitotomy and transcranial) can be avoided. The definition of the endoscopic anatomy within this region can continue to allow for further advances in endoscopic endonasal surgery and improve the safety and efficacy of these procedures.

Argon Plasma Coagulation is an Effective Treatment for Hereditary Hemorrhagic Telangiectasia Patients with Severe Nosebleeds

*Alessandro Pusateri, MD, Francesco Chu, MD, Elina Matti, MD, Fabio Pagella, MD
Pavia, Italy*

Introduction:

Hereditary Haemorrhagic Telangiectasia (HHT) is a rare autosomal dominant disease. The most frequent symptom is epistaxis. Current therapies improve the control of nosebleeds being far from providing a definitive cure. The aim of this study is to test the efficacy of Argon Plasma Coagulation (APC) in HHT patients affected by severe epistaxis.

Methods:

The ENT Unit of IRCCS “Policlinico S. Matteo” in Pavia is a reference centre for the treatment and diagnosis of HHT since 1996. Nowadays 264 patients have been hospitalized and screened for the HHT in our department and of these, 191 underwent surgical procedures for their epistaxis. We selected 26 HHT patients treated with APC, affected by severe epistaxis according to the classification of Pagella et al and blood transfused in order to evaluate with a questionnaire the intensity, frequency and duration of the nosebleeds and

the number of blood transfusions before and after the treatment.

Results:

Frequency, intensity and duration of epistaxis had grade 1 (minimum level of expression) respectively in 7,6%, 0% and 0% of cases before surgery increasing to 50%, 73% and 77% after the procedure; grade 3 (severe involvement) behaved in the opposite way and the differences are statistically significant ($p < 0.0001$). Blood transfused patients before and after the APC treatment were respectively 84,2% and 42,3% and the difference is statistically significant ($p < 0.02$)

Conclusions:

APC treatment is a mini-invasive procedure which demonstrated to reduce the severity of nosebleeds and the need of blood transfusions even in HHT patients affected by severe epistaxis.

Back and Forth Endoscopic Septoplasty: Analysis of the Technique and Outcomes

*Matteo Trimarchi, MD, Chiara Bellini, MD, Mario Bussi, MD
Milan, Italy*

Introduction:

To describe our clinical experience in 243 consecutive patients undergoing endoscopic back-and-forth septoplasty (EBFS), examining surgical indications, technique, and follow-up.

Methods:

From January 2005 to November 2008, 243 patients, 50 females and 193 males (age range 17.5-78.7 years) underwent EBFS at the Department of Otorhinolaryngology, San Raffaele Hospital, Milan. The indication for EBFS in this series was nasal airway obstruction. Patients were studied with nasal rigid endoscopy, and in some cases CT was used to exclude rhinosinusitis. The most common concomitant diagnoses included allergic rhinitis and turbinate hypertrophy. EBFS facilitates the interruption of perichondrial and periosteal bridges, which are more represented in the anterior portion of the septum between the caudal quadrangular cartilage and the vomeropremaxillary crest. Septal splints were positioned. No nasal packing was required. No cases required conversion to a traditional headlight approach, and no intraoperative complications were encountered. 72% of intraoperative monolateral mucosal

microlacerations occurred; suturing was required in only 8% cases.

Results:

Of 243 patients, 74.1% experienced resolution of nasal airway obstruction, while 16.4% experienced only improvement; 9.5% noted the persistence of symptoms. Complications included transient dental pain/hypesthesia (6.1%), septal hematoma (4.86%), septal perforation (1.64%), synechiae formation (2.05%), epistaxis (2.05%), cheek swelling (0.41%), and septal abscess (0.41%).

Conclusions:

EBFS is a viable alternative to traditional headlight septoplasty with good outcomes and an acceptable rate of complications. This technique allows lysis of tissue fibers, thereby preserving the integrity of mucosa at the critical area using less force and reducing the probability of mucosal tears compared to traditional techniques.

Chronic Foreign Body of the Nasal Cavity and Sphenoid Sinus: Surgical Implications

*Abtin Tabae, MD, Ameet Kamat, MD
New York, NY USA*

Background:

The complexity of sinonasal foreign bodies is based on anatomic location, material of the foreign body and duration of retention. Chronic sinonasal foreign bodies with osseo-integration and migration present unique challenges in surgical management.

Methods:

Case report. A 48 year old male with a childhood history of multiple surgeries for cleft lip, palate and nasal deformity as a child presented with radiographic findings of a 4.3 cm linear high density foreign body traversing the nasal cavity and sphenoid sinus. Surgical management of the foreign body is described.

Results:

Mucosalization overlying the foreign body and integration into the bony sphenoid rostrum were noted at the time of surgery. Successful surgical extraction required removal of the overlying mucosa and encasing bone in the area of the sphenoid rostrum. Gross inspection of the foreign body was most consistent with a retained surgical Kirshner wire. Potential pathophysiologic and man-

agement implications of this case are discussed.

Conclusion:

Chronic sinonasal foreign bodies present unique surgical challenges including tissue integration and anatomic migration. The potential for the surgical complexity exists with this issue. Endoscopic surgery techniques were associated with successful visualization and mobilization in this case.

Computer Simulation and Evaluation of Nasal Surgery

*Goutham Mylavarapu, MD, Mihai Mihaescu, MD. Ephraim Gutmark, MD, Lee Zimmer, MD
Cincinnati, OH USA*

Introduction:

Nasal airway is highly complex and patient specific. Success rates for several surgical treatments associated to correct nasal disorders are disappointing. There is considerable scope for improvement in these treatment modalities. The objective of this study is to demonstrate how computer simulations can be used to evaluate a surgical procedure. Numerical predictions can be used further, to choose the most appropriate surgery.

Methods:

Three dimensional, anatomically accurate, patient specific nasal airway model of a patient suffering from chronic sinusitis is reconstructed from Computed Tomography (CT) axial scans (baseline). Boundaries for the airway were identified on each of axial scans while reconstructing airway model. Baseline airway boundaries are then modified by opening passages to sinuses and as how they would change if Functional Endoscopic Sinus Surgery (FESS) is performed on this patient. A post-virtually-operative model of FESS on this patient is reconstructed. Computational Fluid Dynamics (CFD) technique is used to simulate steady inspiration and expiration phases in pre and post-op models for different volumetric flow rates.

Results:

Virtual surgical treatment of airway resulted in an increase of airway volume from 21.5 ml to 33.6 ml. Airway resistance, maximum velocity, maximum wall shear stress decreased significantly in post-op model. Other quantitative parameters of nasal airway function were

compared to evaluate virtual-surgical outcome.

Conclusion:

FESS is evaluated in an actual patient airway model and the drop in airflow resistance is quantified. A non-invasive 'virtual surgery' technique that helps in surgical planning and decision making for a surgeon and patient is demonstrated.

Developing an Endoscopic Skull Base Surgery Program: What are the Challenges?

*C. Arturo Solares, MD, John Vender, MD, Cargill Alleyne, MD
Augusta GA USA*

Background:

Endoscopic skull base surgery has significantly revolutionized the management of skull base disease. Experience in endoscopic techniques continues to grow across the world. This is due in part to advances in instrumentation and technology, improvements in technique and, more importantly, an increase in the number of surgeons with training in endoscopic techniques. Implementation of endoscopic techniques remains a challenge.

Methods:

We reviewed our initial experience on the implementation of endoscopic skull base surgery at the Medical College of Georgia.

Results:

During the first 10 months, since the opening of the MCG multidisciplinary skull base center in January, 44 patients have been managed. Of these, 36 patients have been managed via a fully endoscopic approach. Endoscopic transphenoidal approaches to the sella have comprised 40% of our practice and have facilitated the “learning curve” of working as a team. Various pathologies including sinonasal malignancies, skull base meningiomas, petrous apex lesions, and skull base defects have been managed at our institution despite the short life of our program. As our experience grows, we will be able to critically analyze our outcomes. Nonetheless, we have had no major perioperative complications in our endoscopic series.

Conclusion:

The implementation of an endoscopic skull base surgery program requires an active participation from neurosurgery and otolaryngology. Endoscopic transphenoidal surgery is key to successfully building an endoscopic team. We have successfully established an endoscopic skull base surgery program with an integrated team of otolaryngology and neurosurgery.

Development of a Hereditary Hemorrhagic Telangiectasia Center for Excellence

*Jagmeet Mundi, MD, Justin McWilliams, MD, Jeff Suh, MD, Marilene Wang, MD
Los Angeles, CA, USA*

Hereditary Hemorrhagic Telangiectasia (HHT) a dominant genetic multi-system blood vessel disorder, affects approximately 70k Americans, and 1.2 million individuals worldwide. HHT is associated with significant morbidity; however, 9 out of 10 of the HHT population is undiagnosed due to widespread lack of knowledge by medical professionals. HHT Center of Excellence (HHTCE) is defined as a medical team recognized by the HHT Foundation International as possessing the personal and resources necessary to provide comprehensive evaluation, treatment, and education to persons with HHT. Establishment of the HHTCE at UCLA took approximately one year. After forming the core team, the medical director visited the first center at Yale for approximately 2 weeks. This was followed by a visit from the Center Committee for facility tours and faculty interviews. UCLA was then approved as the 10th HHTCE in the country in June, 2010, and to date over 40 patients have been seen here. Centers are reviewed by the committee every two years for reaccreditation. The UCLA Center was spear-headed by Co-directors Justin McWilliams and Gary Duckwiler, both interventional radiologist. Other Core staff members include Otolaryngologists Dr Marilene Wang and Dr Jeffrey Suh and Geneticist Michelle Fox. Centers such as the HHTCE, may prove to be a fundamental model for delivery of healthcare to sub-populations suffering from serious, yet neglected disorders such as HHT, as they provide expert care with the goals of reducing patient morbidity and improving quality of life, while decreasing healthcare expenditure by early detection and prevention/treatment of complications.

Ectopic Prolactin-Secreting Pituitary Adenoma Presenting as an Isolated Nasopharyngeal Mass

*Sameer Ahmed, MD, Trac Duong, MD, Marilene Wang, MD, Veling Tsai, MD
Los Angeles, CA, USA*

Introduction:

Extracranial, hyperfunctioning ectopic pituitary adenomas are extremely rare. We present a case report of an ectopic prolactin-secreting pituitary adenoma presenting as an isolated midline, nasopharyngeal mass.

Methods:

One patient's clinical presentation was analyzed. A 49 year-old male undergoing evaluation for hyperprolactinemia was found to have an isolated nasopharyngeal mass on MRI. The pituitary gland and sella were not expanded and there was no evidence of sphenoid sinus involvement. The nasopharyngeal mass measured 2 x 2 x 2.6cm. A biopsy was performed, and the diagnosis of ectopic pituitary adenoma was made based on histology and diffuse prolactin reactivity in the tumor cells. Results: The patient underwent surgical excision of the tumor by a transoral approach with ablation of the remnant tissues using electrocautery.

Conclusion:

Although rare, ectopic pituitary adenoma should be considered in the differential diagnosis of a midline nasopharyngeal mass. In a few cases, these tumors can be secretory and cause clinical endocrinopathy. Surgery is the mainstay of treatment.

Effects of Low Frequency Pulsed Ultrasound Delivery Device in Cadaver Sinuses

*Zara Patel, MD, Peter Hwang, MD, Ary Chernomorsky, MS, Jayakar Nayak, MD, PhD
Palo Alto, CA, USA*

Introduction:

Bacterial biofilms have been implicated in refractory rhinosinusitis. Biofilms have been shown to respond to treatment with low frequency ultrasound (LFU) therapy in vitro, and exposure to LFU has shown efficacy in wound repair and topical drug delivery in other fields. This preliminary study was designed to evaluate the safety

and feasibility of LFU in the paranasal sinuses.

Methods:

Experimental prospective study. Six cadaver heads were used to deliver a Renograffin and methylene blue solvent mixture to the paranasal sinuses via LFU both before and after a resident dissection. Sinus CT scans were performed before and after mixture delivery, and blinded assessments were made for distribution to individual sinuses. Mucosa was harvested from two subsites to evaluate LFU-treated cadaver tissue.

Results:

Pre-dissection, LFU delivered solution to 12/12 inferior and middle turbinates, 6/12 of the superior turbinates and ethmoid sinuses, and 1/12 maxillary sinuses. Post-dissection, all heads showed delivery to the maxillary and sphenoid sinuses, with 4/6 heads showing delivery to the ethmoid region, and 2/6 to the frontal recess. Harvested tissue demonstrated methylene blue presence without architectural damage from LFU exposure on frozen sectioning.

Conclusion:

LFU appears to be capable of delivering solution to the turbinates and ethmoid region preoperatively and to all sinuses, save the frontal, postoperatively. Tissue does not appear to be harmed histologically from LFU at this time and distance. This data provides a foundation for a prospective human protocol studying the safety and efficacy of this modality in the treatment of patients with chronic rhinosinusitis.

Endoscopic Management of Cribriform Plate Spontaneous Cerebrospinal Fluid Leaks

*Eyad Khabbaz, MD, Tarik Farrag, MD, Carrie Bush, MD, Stilianos Kountakis, MD
Augusta, GA USA*

Introduction:

Cerebrospinal fluid leaks (CSF) are uncommon but can lead to serious complications. They can originate after trauma and iatrogenic injuries, or can be spontaneous, and can occur anywhere in the anterior or middle skull base. Spontaneous cribriform plate CSF leaks are uncommon and the surgical site involved is unique because of its relation to the olfactory region. Access to the space between the mid-

dle turbinate and nasal septum is narrow and challenging.

Methods:

Retrospective data analysis of patients who were diagnosed with spontaneous cribriform plate CSF rhinorrhea and underwent endoscopic repair at a tertiary institution. Diagnostic measures, surgical techniques, and surgical outcomes were reviewed.

Results:

Ten patients diagnosed with cribriform plate spontaneous CSF rhinorrhea were included. We used α -2 transferrin for laboratory confirmation. We obtained high resolution computed tomography scanning, magnetic resonance imaging, and/or cisternography for all patients. The defect was on the right in six cases and on the left in four cases. In all cases, the CSF leak presented with meningocele or meningoencephalocele. All patients underwent endoscopic transnasal repair with inferior turbinate free graft. The success rate was 100%, with post operative follow up ranged from 6 month to 6 years. No major complications were reported.

Conclusion:

The intranasal endoscopic approach to cribriform CSF leak repair using inferior turbinate free graft is an effective and safe technique. Long-term success rate in our patient population was 100%.

Endoscopic Management of Nasal Stenosis Using Tubed Allograft Stent

*Ethan Handler, MD, Barry Rasgon, MD, Jeff Eaton, MD, Joshua Gottschall, MD
Oakland, CA USA*

Congenital choanal atresia is an uncommon disorder which may present as life-threatening respiratory distress in the newborn infant. The many methods for treating congenital choanal atresia indicate that no surgical operation is universally accepted as treatment for all deformities. Four classical surgical approaches have been described including transnasal, trans-septal, transantral, and transpalatal. Multiple transnasal approaches have been advocated, but the primary problem is exposure and recurrent stenosis. Surgical failure may result from inability and/or difficulty to raise mucosal flaps and from subsequent development of scars. For this reason, stenting

must be meticulous. We advocate a novel technique employing the transnasal approach combined with a tubed allograft stent to prevent circumferential scarring. We have used this technique successfully in two consecutive patients. One patient had acquired nasal stenosis at the internal nasal valve secondary to battery foreign body, and the second, re-stenosis following primary endoscopic transnasal choanal atresia repair. We report the details of the procedure and the clinical outcomes. Furthermore, we expand upon the use of autologous grafts having harvested hard palate mucosa successfully as a donor tissue for the tubed graft. This surgical technique is simple and has shown promise in preventing re-stenosis in choanal atresia and nasal stenosis.

Endoscopic Neural Blockade for Rhinogenic Headaches

*Regina Rodman, MD, Jay Dutton, MD
Galveston, TX USA*

Introduction:

Over 45 Million Americans suffer from recurrent headaches, and an estimated \$11.9 million in doctor's visits was spent for rhinogenic pain last year. Sphenopalatine blocks have been described for various facial pain syndromes, but its use and the type of blockade agents remain controversial.

Objective:

The objective of this study was to demonstrate that endoscopic nerve blocks, using a mixture of bupivacaine and Triamcinalone acetonide suspension, injected into the anterior ethmoid or sphenopalatine regions, can be a relative safe and effective option for refractory pain.

Methods:

The charts of all patients undergoing endoscopic neural blockade, in a private practice setting from 1998 to 2008 were retrospectively reviewed. Patients were injected with a 1:1 mixture of 0.5% bupivacaine and triamcinalone acetonide injectable suspension into the anterior ethmoid or sphenopalatine neural distribution, or both, depending on the pain distribution. Charts were reviewed to assess outcomes and any adverse events from nerve blocks.

Results:

882 nerve blocks were administered to 147 patients, over the course of 431 office visits. 4 mild complications, 2 moderate complications, and no severe nor permanent complications were noted. 85% of the charts had documented effects of the nerve block at follow up. Of those, 81.3% claimed improvement, 17.9% reported feeling the same, and 0.79% stated they had worse pain.

Conclusion:

Endoscopic neural blockade appears to be a relatively safe and viable option in the treatment of refractory headache and facial pain with a rhinogenic component.

Endoscopic Radiofrequency Volumetric Inferior Turbinate Tissue Reduction with Local Anesthesia

*Andrea Gallo, MD, Salvatore Martellucci, MD, Giulio Pagliuca, MD, Marco de Vincentiis, MD
Rome, Italy*

Objective:

Radiofrequency turbinoplasty (RT) is usually performed under local anesthesia. Although this is a simple procedure, patients often report perioperative discomfort. The aim of this prospective study was to determine the effectiveness of lidocaine 10% as a topical anesthetic for RT. A comparison between liquid and gel formulation has also been made.

Method:

200 consecutive patients undergoing RT with topical anesthesia were enrolled. The patients were divided into two groups: Group 1 included 100 patients treated with cotton pledgets soaked with lidocaine 10%, whereas Group 2 included 100 patients treated with lidocaine gel 10%. Patients were evaluated before and after surgery using endoscopy, rhinomanometry and a questionnaire concerning obstructive symptoms. Five 10 cm visual analogue scale (VAS) were administered to each patient immediately after surgery and after 2 months to assess various aspects of perioperative discomfort (pain, choking sensation, troublesome swallowing, throat irritation).

Results:

A significant increase of nasal airflow and a subjective improvement of symptoms was observed without difference between the two groups. Subjective evaluation regarding perioperative discomfort

showed a significant difference between group A and group B immediately after surgery and a slight, but not significant difference after two months.

Conclusions:

RT is an effective technique in the treatment of turbinate hypertrophy. The unintentional passage of anesthetic liquid in the pharynx is likely the cause of greater discomfort. The higher viscosity of the gel formulation provides greater permanence on the nasal mucosa and a more effective anesthesia. Lidocaine gel 10% provides comfortable surgical circumstances for surgeons and patients.

Endoscopic Removal of an Odontogenic Keratocyst in the Maxillary Sinus

*Alan Chu, MD, Chi Lai, MD, Marilene Wang, MD
Los Angeles, CA USA*

Introduction:

Odontogenic keratocyst is the third most common odontogenic cyst, following radicular and dentigerous cysts. We present a rare case of an odontogenic keratocyst involving the maxillary sinus.

Method:

Case report and review of the literature.

Results:

A 16-year-old female presented with a history of persistent left-sided cheek swelling and exophthalmos for eight months without any other sinonasal symptoms. Computed tomography imaging revealed an expansile cystic lesion associated with an ectopic molar tooth in the left maxillary sinus. There was compression and erosion into the left pterygopalatine fossa and left buccal space, with dehiscence of the postero-lateral wall of the maxillary sinus. The patient underwent endoscopic removal of the lesion followed by resolution of symptoms. Pathologic analysis of the specimen demonstrated an odontogenic keratocyst.

Conclusion:

Odontogenic keratocyst frequently presents with findings which mimic that of a dentigerous cyst. The clinical features include aggressive behavior and a high rate of recurrence. Involvement of the maxillary sinus is rare. Definitive diagnosis requires histopatho-

logical analysis of specimen. It is imperative to include odontogenic keratocyst in the differential diagnosis of a cystic expansile mass in the maxilla or mandible. Incomplete removal of the cystic lesion is associated with an increased risk of recurrence. Patients will require long term follow up after excision of the lesion.

Endoscopic Repair of Pterygopalatine Fossa Meningocele Resulting from a Spontaneous Skull Base Defect: A Case Report and Review of the Literature

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Introduction:

Spontaneous skull base defects of the pterygopalatine fossa are exceedingly rare. To our knowledge, there is no current source summarizing the body of knowledge on the presentation, workup, and management of patients with skull base defects of the pterygopalatine fossa.

Methods:

Case report and literature review

Results:

A 36-year-old male presented to our clinic with slowly worsening left temporal and infraorbital pain. A high resolution CT scan and MRI of the skull base showed an expansile lytic lesion involving the left sphenoid wing, the floor of the left middle cranial fossa, the superior extent of the left pterygoid plates, and the lateral wall of the left orbital apex. The patient was subsequently taken to the operating room where he underwent a left endoscopic maxillary antrostomy, sphenoidotomy, partial ethmoidectomy, posterior maxillary wall resection, and anterior skull base repair using banked cadaveric iliac crest bone and synthetic sealant. A review of the literature showed eleven reports of patients with such defects. Of the eleven cases, six cases had no identifiable etiology, three were likely from disordered embryogenesis, and two were associated with other syndromes. The most common symptom was recurrent seizures, followed by recurrent episodes of meningitis, hearing loss, recurrent CSF rhinorrhea and anosmia. Computed tomography scanning was the predominant method of detecting the skull base defects. A variety of surgical approaches have been utilized to access the ptery-

gopalatine fossa with more recent literature all supporting an endoscopic approach. In the majority of cases, septal bone or cadaveric bone were used to fill the defect along with a synthetic sealant.

Conclusions:

Spontaneous skull base defects involving the pterygopalatine fossa are exceedingly rare. They tend to present with recurrent seizures and are best imaged with computed tomography. Currently, these defects are routinely repaired endoscopically.

Endoscopic Trans-Nasal Reduction of Anterior Table Frontal Sinus Fractures: A Case Report and Literature Review

*Eli Gordin, MD, Madeleine Schaberg, MD, Marc Rosen, MD
Philadelphia, PA, USA*

Introduction:

Frontal sinus fractures represent approximately 5-15% of all facial fractures and are generally isolated to the anterior table.

Complications resulting from frontal sinus fractures include CSF leak, meningitis, brain abscess, frontal sinusitis, mucocele, mucopyocele, and chronic facial pain. Absolute indications for surgery include significant posterior table defect or nasofrontal outflow tract obstruction. Depressed anterior table fractures are primarily a cosmetic issue.

Methods:

We present a case of a depressed anterior table frontal sinus fracture that was successfully reduced using a completely trans-nasal endoscopic technique, via a Draf III exposure, thus avoiding the need for any external incisions.

Results:

We achieved good reduction of the anterior table through this endoscopic approach, and ensured patency of the nasofrontal outflow tract.

Conclusions:

Traditional treatments for frontal sinus fractures involve a bicoronal incision or brow incision when utilization of lacerations sustained during trauma is not possible. While newer techniques have focused on endoscopic exposure through an approach similar to the endoscopic brow lift, the trans-nasal endoscopic approach is a useful technique for addressing anterior table fractures, while eliminat-

ing external incisions, and represents the next evolution in the management of these injuries.

Endoscopic Transnasal Resections of Extensive Sellar and Parasellar Skull Base Lesions: A Preliminary Report

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Introduction:

The management of large sellar and parasellar skull base lesions is challenging secondary to their location and proximity to vital structures such as the optic nerve and carotid artery. Due to this, achieving wide surgical exposure is often challenging. Transcranial approaches are often favored when dealing with these lesions. Endoscopic transnasal approaches to the skull base have revolutionized treatment of pituitary lesion without extrasellar extension. Large lesions with parasellar or suprasellar extension have been proposed as limitations to this approach. Herein we review our initial experience with endoscopic transnasal treatment of extensive sellar and parasellar lesions.

Study Design:

Retrospective Chart Review.

Methods:

Patients with sellar tumors measuring >3cm with significant parasellar or suprasellar extension (defined as significant brain parenchymal involvement, or encasement of neurovascular structures) who were treated with endoscopic transnasal resections in the last year were identified. Charts were reviewed for clinical characteristics, previous therapies, diagnosis, tumor extent, management modalities, length of hospital stay, complications, and outcome.

Results:

A total of five patients were identified. There were two males and three females with a mean age of 49 years (21-65). The most common presenting sign was visual disturbance. One patient had undergone previous transsphenoidal debulking by a different surgeon. Pathology included two non-secreting pituitary macroadenomas, one invasive atypical pituitary adenoma and 2 meningiomas. All patients were managed with computer-aided transnasal endo-

scopic tumor resection with a pedicled nasal septal flap reconstruction by a combined otolaryngology/neurosurgical team. One of the patients required an additional craniotomy for residual disease at the far cranial extent of resection. Intensity-modulated radiation therapy was used in two patients post-operatively. The average length of hospital stay was 6.6 days (range, 3-16). There were no CSF leaks. One patient had delayed post-operative bilateral CN VI palsies, despite anatomic preservation of the nerve. No other complications were noted. At the last follow-up, all patients were alive with two patients being free of disease.

Conclusions:

This preliminary report suggests that transnasal endoscopic management of extensive sellar and parasellar lesions is a viable option to traditional open approaches with acceptable morbidity and mortality. The use of computer-aided surgery further minimizes surgical risks while maximizing tumor resection.

Endoscopic Transnasal Septotomy for Contralateral Infratemporal Fossa Access: A Cadaveric Study

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Background:

Few clinical studies exist regarding the use of a transnasal septotomy for access to the infratemporal fossa; those to date describe this approach for access to the anterior and posterior maxillary sinus, as well as pterygopalatine and infratemporal fossae. In this unique cadaveric study, we photodocument the surgical technique for performing a transnasal septotomy for access to the infratemporal fossa.

Methods:

A review of the literature and anatomic study via cadaveric dissection and pictorial documentation was used to demonstrate the surgical steps to provide access to the infratemporal fossa via transnasal septotomy.

Results:

Using cadaveric photodocumentation, the surgical technique and steps required to perform a transnasal septotomy were clearly demonstrated. The transnasal septotomy provided adequate access

to the infratemporal fossa. Based on this approach, it is difficult to obtain adequate exposure of the internal carotid artery and internal jugular vein.

Conclusion:

The transnasal septotomy is a well defined approach to providing access to the infratemporal fossa and it should be utilized when such surgical exposure is required. This surgical technique study complements prior data showing increased contralateral instrument maneuverability with a transseptal approach to the maxillary sinus. Pathology involving the infratemporal fossa via the internal carotid artery or internal jugular vein may be a contraindication to transnasal septotomy, since formal control of the great vessels with this exposure is tenuous.

Endoscopic Treatment of Anterior Skull Base Meningoencephaloceles

*Matteo Trimarchi, MD, Nicola Boari, MD, Chiara Bellini, MD, Mario Bussi, MD
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Introduction:

Meningoencephaloceles represent only an aspect of the wide spectrum of skull base defects. They are usually congenital or related to traumatic or iatrogenic injury. Endoscopic treatment allows for safe and effective management of anterior skull base defects. We report our experience in the endonasal treatment of meningoencephaloceles.

Methods:

A series of 4 patients who underwent endoscopic repair of spontaneous meningoencephalocele of anterior skull base at the Department of Otorhinolaryngology of San Raffaele Hospital in Milan, is reviewed. Onset symptoms were unilateral nasal obstruction, chronic headache and, only in one case, rhinorrhea. Nobody of them suffered from meningitis. Diagnostic work-up included fluorescein test and computed tomography. The surgical equipe was made by one Otorhinolaryngologist and one Neurosurgeon.

Results:

All patients underwent an endoscopic approach with a multilayer reconstructive technique and in all of them a lumbar spinal drainage

was positioned; it was removed on 5th post-operative day. One case of CSF leak was observed on 5th postoperative day; it was treated successfully by an endoscopic revision of the skull base closure. One patient presented meningitis 2 years after surgery. The patient didn't show any nasal leakage. A CT scan and a fluoresceine test were done and they excluded an occult CSF leak. The follow up went on. We registered a 100% cure success-rate.

Conclusions:

Endoscopic endonasal approach is a safe and effective procedure in the treatment of spontaneous meningoencephaloceles of the anterior skull base.

Endoscopic Treatment of Sinonasal Teratocarcinosarcomas

*Clarice Clemmens, MD, James Palmer, MD
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Background:

Sinonasal teratocarcinosarcomas (SNTCS) are rare and highly malignant neoplasms characterized by features of both teratomas and carcinomas. There are fewer than 60 reported cases of SNTCS resulting in limited data regarding standard treatment modalities. Previous studies have reported open procedures for resection of SNTCS with no discussion of the potential for endoscopic resection of these highly aggressive tumors.

Methods:

We report two cases of SNTCS, the first in a 53 year old male who presented with bilateral sinus congestion with a large nasal mass extending through the cribriform plate on CT scan, and the second in a 41 year old male who presented with right sided nasal congestion with a right nasal cavity and ethmoid mass on CT scan. Both patients had biopsy proven SNTCS and were treated with endoscopic resection followed by concurrent chemoradiation therapy.

Results:

Both patients in our series underwent endoscopic resection of SNTCS without complications and are now seven and two years post-treatment with no evidence of disease.

Evidence for Altered Antimicrobial Properties of Nasal Lavage Specimens from Patients with Chronic Rhinosinusitis

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Background:

Components of the innate immune system are being increasingly implicated in the etiology of CRS.

Methods:

Nasal lavage (NL) specimens from normal subjects and CRS patients with and without polyposis (CRSwNP and CRSsNP, respectively) were evaluated for inhibition of growth of *S. aureus*, *E. coli*, and *C. albicans* using a growth assay. Lactoperoxidase (LPO) and the permeablizing peptide psoriasin were quantified in nasal tissue extracts by ELISA. In vitro effects of innate defense proteins were also determined using microbial inhibition assays.

Results:

Significant inhibition of growth of *S. aureus* was observed only for NL samples from normal subjects ($p < 0.009$), an effect that was most profound 24 hours. There was no statistically significant inhibition of growth of *E. coli* or *C. albicans* by NL from normal subjects or patients with CRSsNP or CRSwNP. ELISA from extracts of sinonasal tissue revealed that LPO ($p < 0.0108$) and psoriasin ($p < 0.01$) levels were reduced in tissue extracts from patients with CRS. In vitro, neither LPO nor psoriasin was found to inhibit the growth of the microorganisms studied at the concentrations tested (2-5ug/mL and 100ug/mL, respectively).

Conclusion:

The antimicrobial factor that inhibits growth of *S. aureus* is unknown, but unlikely to be LPO, psoriasin, or calprotectin based on our in vitro studies. Reduced ability of nasal secretions to inhibit growth of *S. aureus* in CRS patients may have pathological significance.

Improved Function of Prototype Clover-Leaf Microdebrider Blade Over Standard 4.0mm Medtronic TriCut Blade

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Introduction:

of powered instrumentation radically changed performance of endoscopic sinus surgery. This technology finds specific application in addressing chronic rhinosinusitis with nasal polyposis (CRScNP) in its various forms. One significant limitation encountered with powered instrumentation is a tendency for the instrument to clog. Clogging requires significant time to remedy, disrupts surgical flow, and can theoretically increase blood loss. In light of these considerations, much effort has been invested into ways to decrease clogging, while preserving safe application of this surgical technology. In this study, the standard commercially-available 4.0mm Medtronic Tri-Cut blade was tested against a prototype blade in experimental surgical conditions using previously described nasal polyp (NP) analog^{1,2} and a novel allergic fungal sinusitis (AFS) analog. The primary outcome measure was number of clogs, and the secondary outcome measure was time required for complete removal of a specified weight of debris analog. The working hypotheses of the investigating team were: 1. AFS-analog would take longer to clear and involve more clogging than NP-analog, and 2. the prototype blade would clog less frequently than the standard blade.

Methods:

Exempt IRB status was received for this cadaveric study from Wilford Hall Medical Center Institutional Review Board. Both maxillary sinuses of 5 thawed fresh-frozen cadaveric heads were utilized for this study. The surgical preparation of the cadaveric heads included bilateral canine fossa punctures widened to Caldwell-Luc sized osteotomies, bilateral uncinectomies and wide maxillary antrostomies. No specimen had a deviated nasal septum that interfered with the surgical procedures. Equipment utilized included a Medtronic 4.0mm Tri-Cut blade and a prototype (Clover-Leaf) Medtronic blade (Figure 1) that were loaded into an M4 microdebrider/XPS3000 running at 5000 RPM (40% irrigation) and attached to full strength continuous wall suction (psi??). Figure 1: Picture displaying the standard TriCut blade design (left) in relation to the prototype clover-leaf design (right). Nasal Polyp Analog Testing: One large chopped HEB brand fresh gulf oyster mixed with crushed eggshell fragments was placed through the anterior maxillary sinus osteotomy in order to fill the maxillary sinus to over-flowing. Using a

30 degree Hopkins II endoscope angled laterally intranasally, the TriCut blade and then the Prototype blade were placed through the canine fossa to microdebride out the nasal polyp analog according to previously described technique³. Total time until complete removal of debris and number of clogs were recorded. Timing was stopped for clog evacuation and restarted as soon as the surgeon cleaned the blade with the supplied wire brush and began further microdebriding.

Allergic Fungal Analog:

80 grams of Science Diet Minced Gourmet Beef Entrée cat food was thoroughly mixed with one crushed Hill Country Fare Grade A extra large egg shell/inner eggshell membrane (no fragments larger than 3mm in size). This mixture was divided into 4 equal parts and placed in plastic specimen cups. This procedure was repeated to create a total of 20 specimens. The TriCut blade and Prototype blade were then tested on 10 samples each. The time to remove all AFS analog and number of clogs were recorded. Again, the timer was stopped when the microdebrider clogged and was cleaned. The time required to unclog the microdebrider for the last 10 clogs (after expertise with this maneuver was achieved) was recorded. Time to eradicate the debris was calculated by subtracting the cumulative time spent addressing clogging from the overall surgical time.

Results:

Clogging Rate: Comparison of the frequency of clogs was performed using both the NP-analog (raw oysters + egg shells) and AFS-analog (cat food + egg shells). Neither the standard blade nor the prototype blade experienced any clogs with the NP-analog. However, the AFS-analog caused a median of 4.5 clogs per removal of 5 grams of debris (range 3 to 7) for the standard blade versus a median of 0 clogs (range 0 to 2) per removal of 5 grams debris for the prototype blade (Mann-Whitney U: $p < 0.0001$) (Table).

TriCut/Prototype/tp AFS/4.5/0/0/0/NS Table:
Median clogs recorded for each blade tested. Non-parametric analysis showed a significant advantage of the Prototype blade for simulated AFS. There was a statistically significant difference noted in the clog rate of the standard blade with NP-analog (median 0 clogs) and AFS-analog (median 4.5 clogs) (Mann-Whitney U: $p < 0.0001$). There was no statistical difference in clog rate for the prototype blade for the polyp and AFS analogs.

Time Comparison:

There was a statistically-significant decrease in operative time

(Figure 2) required to eradicate the NP-analog from cadaveric maxillary sinuses when using the prototype blade as compared to the standard blades (43.7 vs 112.1 seconds, paired t-test: $p < 0.0001$). Similarly, the AFS debris-analog was removed more rapidly using the prototype blade as compared to the standard blade (147.4 vs. 262.0 seconds, paired t-test: $p < 0.0001$). Figure 2: Time comparison for complete removal of the two simulated materials. The prototype blade is significantly faster for both materials. Although different methodologies were implemented in eradicating debris, with the easier technique favoring the AFS analog, the NP-analog was removed faster than the AFS-analog with both the standard and prototype blades (unpaired t-test: $p < 0.0001$). On average, clogs took 34.0 seconds (range 24 to 47.1) from the point time of a clog occurring to the point of returning the instrument back into the nose in working order.

Discussion:

Experimental analogs were carefully chosen for their basic material properties (viscosity, stickiness, and heterogeneity for an AFS analog and elasticity, strength for polyp). Although formal engineering analysis of these properties has not yet been completed, the analogs were judged by the senior authors to serve as reasonable substitutes. Based on our results, the analogs appear to have served well in their roles and give credence to our operative intuition. Expounding on this rationale, it is consistent with anecdotal experience that polyps clog in the microdebrider less frequently than AFS debris. Our data show that the frequency of clogs was significantly higher with an AFS-analog than a NP-analog, supporting one of the experimental hypotheses. Additionally, removal of AFS-analog took longer than NP-analog. These findings also agree with the study hypotheses. Finally, previous authors have concluded that oysters with crushed eggshells are a reasonable analog to polyps^{1,2} although this study is novel in describing a widely available material with similar properties. In this study, the prototype blade significantly reduced clogs in the setting of an AFS analog. The standard blade clogged a median of 4.5 times per surgical attempt whereas the prototype blade clogged a median of 0 times. This statistically significant reduction is also clinically important in that clogs take 34.1 seconds to return the instrument to working order, adding unnecessary time and frustration to a case. Regarding the operative time of removal, again the prototype blade showed a significant advantage over the standard blade. The prototype blade removed the material of interest in approximately 50% of the time that the standard blade required. One potential downside to the new prototype blade may lie in its improved function. While

the new prototype blade is less apt to clog, it is more aggressive by nature and may lead to greater unintended bony and soft tissue removal. The major limitation of this study is that it does not utilize actual surgical specimens in these trials. While estimated to be reasonable substitutes, the NP-analog and AFS-analog may differ in important ways from true surgical experience. This could affect the results described in this study.

Conclusion:

The introduction of this new clover-leaf designed prototype blade has potential benefits in terms of decreased clogging and decreased operative time; however, this excitement should be tempered by a cautious Introduction: as it clearly represents a significant change from current technology. Thorough intra-operative testing and training should occur to minimize any unintended surgical results.

Inverted Papilloma with Invasive Adenosquamous Carcinoma: Case Report and Review

*John Clinger, MD, Nitin Pagedar, MD, Robert Robinson, MD, Erin O'Brien, MD
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Introduction:

Sinonasal papillomas are rare lesions of the nasal cavity that comprise less than 4% of all primary nasal tumors. Of these, 70% are inverted papilloma - lesions characterized by their involvement of surrounding structures, high recurrence rate, and association with malignancy. Squamous cell carcinoma is the most commonly associated malignancy; occurring in 5-10% of inverted papillomas. Here we present an unusual case of inverted papilloma with associated invasive adenosquamous carcinoma.

Case Report:

A 75 year-old man presented locally with a history of chronic rhinosinusitis and nasal obstruction. He was noted to have right-sided nasal polyposis and CT scan confirmed a right nasal mass consistent with antrochoanal polyp. He was taken to the operating room for functional endoscopic sinus surgery and polypectomy. The procedure was aborted due to hemorrhage and the surgical specimen was insufficient to characterize the lesion. Repeat endoscopic biopsy was performed. Pathology was consistent with inverted papilloma with associated invasive adenosquamous carcinoma. The patient

underwent complete resection of the lesion via lateral rhinotomy approach to medial maxillectomy. He did well post-operatively and continues without evidence of recurrent disease at 5 months follow-up. Pub-Med review showed no other cases of adenosquamous carcinoma associated with inverted papilloma. One similar case was found of concurrent squamous cell carcinoma in situ arising from inverting papilloma and adenocarcinoma in situ as a separate lesion.

Conclusions:

The reported case of adenosquamous carcinoma associated with inverted papilloma is a unique pathologic presentation. The propensity for squamous cell carcinoma or other rare malignancies to develop within inverted papilloma should be recognized and taken into account during treatment planning.

IP-10 is a Potential Biomarker of Acute Pulmonary Exacerbations of Cystic Fibrosis in Nasal Lavage

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Colonization, infection, and inflammation within the nasal passages are common among CF patients. In addition, chronic rhinosinusitis (CRS) has been postulated to contribute to CF pathogenesis, including its role as an early marker of descending pulmonary infection. The purpose of the current study was to evaluate nasal lavage fluid (NLF) for potential cytokine biomarkers of acute pulmonary exacerbation (APE).

Methods:

Luminex profile of NLF from CF patients at the onset and resolution of CF APE was compared to stable CF outpatients and normal controls. In vitro evaluation in primary murine (transgenic CFTR^{-/-}) nasal septal epithelial (MNSE) cultures was also performed.

Results:

Of the 27 cytokines evaluated, IP-10 was identified as the most promising biomarker. In subjects hospitalized for APE (mean duration 16±0.6 days), IP-10 significantly decreased following antimicrobial therapy (2582 pg/mL[818, 8165] vs. 647 pg/mL[357,1174];n=13;p<0.05). Stable CF outpatients exhibited

intermediately elevated levels (680 pg/mL[281,1644],n=13)) that were not significantly different than normal controls (342 pg/mL[110,1061];p=0.3,n=10) but less than CF inpatients upon admission (p=0.056). Resolution of elevated IP-10 was associated with concomitant improvement in FEV1% (46±6 admission vs. 55±8 upon discharge,p<0.05). IP-10 levels in the basolateral compartment of CFTR-/- MNSE exposed to PAO-1 (bacteria-free prep from 20 hour log-phase growth) or LPS (100 nm) apically were significantly elevated (PAO-1;1159±147 and LPS;1373±191) compared with vehicle controls (305±68;p<0.001).

Conclusion:

IP-10 is elevated in the nasal lavage of CF patients with APE and responds to antimicrobial therapy. Further exploration of IP-10 as a potential biomarker and the pathogenic role of this TH-2 cytokine is warranted.

Isolated Sphenoid Sinus Inverted Papilloma. Diagnosis and management options.

*Jonathan Bass, MD, Elie Rebeiz, MD
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Educational Objectives:

At the conclusion of this presentation, participants will recognize and learn to treat isolated sphenoid sinus inverted papillomas. Objective: To present 3 cases, discuss the diagnosis and management and review the literature of sphenoid sinus Inverted Papilloma. Study Design: A case series and literature review.

Methods:

A retrospective medical records review of three patients with sphenoid sinus Inverted Papilloma and literature review, were done through Ovid utilizing the keywords “inverted papilloma” and “sphenoid sinus”.

Results:

Three male patients ages 61, 68, and 91 presented with sphenoid sinus Inverted Papilloma. Two had nasal obstruction. Imaging showed isolated sphenoid sinus mass in all cases. All patients underwent nasal endoscopic biopsy revealing Inverted Papilloma without atypia. Two patients underwent transnasal endoscopic sphenoidotomy with complete resection. The 91 year old patient is fol-

lowed with serial CT showing no growth. We discuss the diagnosis and management of sphenoid sinus Inverted Papilloma and review the literature.

Conclusions:

Sphenoid sinus Inverted Papilloma is a rare neoplasm with 18 reported cases in the English literature. We present 3 additional cases. It is difficult to diagnose due to its insidious onset and vague symptomatology. Symptoms include nasal obstruction. Management is typically surgical with endoscopic resection favored. Two out of three of the patients in this series underwent endoscopic resection. The third was managed conservatively with serial imaging, which we purpose as a safe alternative in patients who are poor surgical candidates.

Lacrimal System Endoscopy Assisted Endonasal Dacryocystorhinostomy

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Introduction:

Endoscopic dacryocystorhinostomy (EDCR) is a well accepted treatment modality for nasolacrimal duct obstruction resulting in conditions such as chronic dacryocystitis and epiphora. The miniature endoscope which has proven to be a useful tool in the evaluation and management of sialolithiasis, may serve as a useful means of evaluating and treating obstruction of the lacrimal system. Methods: We describe our initial experience with a new method of lacrimal system endoscopy (LSE) using the semi-rigid miniature endoscope inserted through the puncta and canaliculi during EDCR in three cases.

Results:

Two patients underwent three LSE assisted EDCR between May and October, 2010. LSE was successful in identifying the level of nasolacrimal duct obstruction in all three cases. One LSE revealed obstruction at the level of the valve of Hasner at the opening of the nasolacrimal duct within the inferior meatus; this patient subsequently underwent EDCR at this level. The other two LSE procedures revealed obstruction at a higher point in the nasolacrimal duct necessitating EDCR at the level of the lacrimal sac. Insertion of Crawford tubes was performed in all three cases. Both patients have

complete resolution of symptoms at a mean follow-up time of three months (range 1 to 5 months).

Conclusions:

Evaluation and management of obstruction in the lacrimal drainage system may be greatly enhanced with the use of LSE which improves the surgeon's ability to visualize the area of obstruction. LSE assisted EDCR allows the surgeon to target the area of obstruction and confirm adequate patency of the outflow tract.

Microbiome of Normal Sphenoid Sinus Mucosa

*Erin O'Brien, MD, William Page, MD, John Kirby, PhD, Michael Apicella, MD
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Introduction: Recent literature has shown that the lower airways of healthy humans are not sterile and may contain a core microbiome or bacterial flora based on molecular techniques for bacterial DNA detection. This contradicts the “conventional wisdom” (and traditional teaching) that lower airways are sterile. Similarly, the paranasal sinuses have been described as sterile due to clearance of mucus from the sinuses and antimicrobial innate immunity. However, several studies have cultured organisms from healthy maxillary sinuses and have detected bacterial DNA of a few selected organisms.

Methods:

We collected healthy mucosa from sphenoid sinuses of patients undergoing endoscopic transsphenoidal tumor resection. The mucosa was digested and total DNA was extracted. We designed primers to amplify the 16S ribosomal DNA sequence from bacteria. The PCR products were sequenced by 454 pyrosequencing. The amplicons were clustered and matched to known 16S sequences within RNA databases.

Results:

Each sample revealed 16S bacterial DNA and included *Streptococcus*, *Staphylococcus*, *Prevotella*, and *Escherichia*, as well as uncultured *Actinobacterium* and other *Corynebacteria*, *Aerococcus*, *Rothia*, *Burkholderia* and *Stenotrophomonas*.

Conclusion:

The presence of “normal flora” as well as organisms usually associated with infection reveals that normal sinus mucosa is not sterile and contains a polymicrobial microbiome. We are expanding our current analysis with additional samples that include patients with chronic rhinosinusitis.

Nasal Cavity Measurements Using Computed Tomography Scanning

*Joseph Hall, MD, Samuel Becker, MD, James Duncavage, MD
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Introduction:

Nasal cavity size has implications for a multitude of procedures including, but not limited to, nasal endoscopy, sinus surgery, and septorhinoplasty. To date, normal nasal width measurements in non-operated patients at important nasal subsites have not been defined.

Methods:

We analyzed CT scans from 100 consecutive patients without previous nasal operations who presented to our rhinology clinic.

Results:

The average age for our patient population was 49 years with 56.6% females. The average size of the nasal cavity from the natural maxillary ostium to the septum was 1.09cm on the left and 1.09cm on the right, from the lateral nasal wall at the anterior inferior turbinate to the septum was 1.44cm on the left and 1.45cm on the right, and from the pyriform aperture to the septum was 1.00cm on the left and 0.99cm on the right. No significant differences were found between the size of the nasal cavity from the natural maxillary ostium to the septum bilaterally ($p=0.95$), from the lateral nasal wall at the anterior inferior turbinate to the septum bilaterally ($p=0.94$), or from the pyriform aperture to the septum bilaterally ($p=0.89$). Females were noted to have greater average nasal widths at the natural maxillary ostia ($p=0.26$) while males averaged greater nasal widths at the anterior inferior turbinate ($p=0.28$) and pyriform aperture ($p=0.09$), although these differences were not statistically significant. Conclusions: We define normal nasal width measurements at important nasal cavity sites in non-operated patients presenting with CT scans.

Nasal Chloroma: An Important Differential Diagnosis in a Patient with Hematologic Malignancy

*Brent Benscoter, MD, Kevin Welch, MD, Kelly Cunningham, MD, Francis Ruggiero, MD
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Introduction:

We present the case of a patient with hematologic malignancy with suspected invasive fungal sinusitis in which final pathology was nasal chloroma (granulocystic sarcoma). The nasal cavity is an unusual site for this extra-medullary neoplasm. It is common in patients with hematologic malignancy, specifically acute myeloid leukemia. This patient population has similar risk factors for invasive fungal sinusitis. We aim to discuss the symptoms, etiology, classification, and differential diagnoses of nasal chloroma. In addition, we will review radiographic imaging and histopathologic features of nasal chloroma. Finally, we will discuss diagnostic and treatment challenges of nasal chloroma.

Methods:

Case report and literature review.

Results:

A patient with a history of recurrent acute myeloid leukemia (AML) was worked up for invasive fungal sinusitis based upon symptoms and endoscopic evaluation. Frozen section biopsies of the anterior middle turbinate was highly suspicious for invasive fungal sinusitis. The patient was taken urgently to the operating room for resection of all diseased mucosa. Final pathology revealed chloroma. The patient was treated with chemotherapy and has shown complete resolution of all sinus and eye symptoms.

Conclusions:

This scenario highlights an important differential diagnosis in that patients with hematologic malignancy are at high risk for both nasal chloroma and invasive fungal sinusitis. Given the devastating consequences of delayed treatment in invasive fungal sinusitis, we do not advocate change in treatment for invasive fungal sinusitis. However, in this specific patient population, caution should be taken before sacrificing major structures in debridement of suspected invasive fungal sinusitis.

Nasolacrimal Duct Obstruction in a Patient with Waldenstrom's Macroglobulinemia: A Unique Presentation of Diffuse Large B-Cell Lymphoma in the Head and Neck

*Whitney Pafford, MD, Calvin Wei, MD, Gady Har-El, MD
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Objectives:

To review the presentation and management of nasolacrimal duct lymphoma and to present a case with unique radiologic and gross pathologic findings.

Study Design:

Case report and a review of the literature.

Methods:

We describe a case of a 77-year-old female with Waldenstrom's Macroglobulinemia who presented with left sided epiphora for the past few months and a one week history of diplopia. On examination she was noted to have lateral displacement of the left eye with fullness in the left middle meatus. An MRI of the sinuses demonstrated a soft tissue mass in the left ethmoid and lacrimal fossa with corresponding displacement of the left orbit.

Results:

The patient underwent endoscopic exploration with biopsy and decompression of the left orbit. Histopathology demonstrated small diffuse blue cells found to be Diffuse Large B-Cell Lymphoma (DLBCL) by immunohistochemistry. Postoperative PET/CT showed interval increase in generalized lymphadenopathy with increased hypermetabolic activity involving several lymph nodes.

Postoperatively her diplopia and epiphora improved. She is currently undergoing chemotherapy with Rituximab- CHOP and is doing well.

Conclusions:

A quarter of all extranodal lymphomas occur in the head and neck making lymphoma the second most common primary malignancy in this region. Although lymphoma of the nasolacrimal duct is exceedingly rare, it should be considered in the differential diagnosis of any small round blue cell tumor of the sinonasal area. Patients with Waldenstrom's Macroglobulinemia have an increased risk of transformation to the more aggressive DLBCL. This is the first known case to present in the nasolacrimal duct.

Nasoseptal Cholesterol Granuloma

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Background:

Cholesterol Granulomas are benign lesions resulting from an inflammatory reaction to cholesterol and hemosiderin. This entity is most commonly found in the petrous apex of the temporal bone.

Paranasal sinus cholesterol granulomas, although rare, have previously been reported. However, this entity has not been identified in the nasal septum. We present an unusual case of a cholesterol granuloma arising from the superior nasal septum.

Methods:

Case report and review of the literature.

Results:

A 60 year-old male presented with bilateral nasal obstruction and anosmia of 2 years duration. Nasal endoscopy revealed bilateral submucosal sinonasal masses just anterior to the middle turbinates. Radiographic imaging including CT and MRI revealed a large expansile anterior nasal mass with superior septal and right nasal bone destruction, thinning of the left lateral nasal wall, and an intact skull base. Endoscopic surgical resection was performed and revealed a superior septal cholesterol granuloma.

Conclusion:

Cholesterol granulomas usually present in the middle ear or petrous apex of the temporal bone. They can rarely present in the paranasal sinuses and are usually not associated with the nasal septum. We present the first reported case of a nasoseptal cholesterol granuloma and describe the presentation, imaging findings, histopathological characteristics, and surgical management of this entity.

Non-Hodgkin's Lymphoma of the Frontal Bone

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Introduction:

Primary extranodal lymphoma in the head and neck region presents in the nasal cavities, paranasal sinuses, thyroid or salivary glands.

Non-Hodgkin's lymphoma of the frontal bone is a rare clinical entity.

Objective: We present a case report of non-Hodgkin's lymphoma (diffuse large B-cell type) of the frontal bone.

Methods:

Illustrative case report and literature review of the diagnosis, imaging, pathologic features, prognostic factors, and treatment of non-Hodgkin's lymphoma of the frontal bone.

Results:

This is a report of a 61 year old man with persistent frontal swelling for five weeks after hitting his forehead on a metal pipe while performing housework. On physical exam, there was a 4 cm area of frontal swelling with a doughy consistency. The patient's neurologic, visual field, and cranial nerve exams were within normal limits. CT of the head revealed a 2.0 x 4.0 x 1.5 cm destructive soft tissue lesion involving the superior aspect of the frontal sinus and frontal bone. MRI of the brain demonstrated a 5.0 cm destructive lesion that abutted the dura. A T1 weighted image after gadolinium contrast administration failed to demonstrate any enhancement. T2 weighted imaging demonstrated low signal intensity. Biopsy of the lesion revealed non-Hodgkin's lymphoma (diffuse large B-cell type). The patient is undergoing treatment with R-CHOP (cyclophosphamide, hydroxydaunorubicin (doxorubicin), oncovin (vincristine), and prednisone/prednisolone).

Conclusion:

Several features in this case suggested the patient's pathology was not inflammatory in nature: 1. lack of facial cellulitis associated with significant frontal swelling; 2. lack of ethmoid sinus mucosal disease on CT imaging with low signal intensity on T2 weighted MRI; and 3. normal nasal endoscopy without mucopus. The otolaryngologist must carefully differentiate between inflammatory and neoplastic etiologies of persistent frontal sinus disease.

Non-Invasive Radiologic Evaluation of Intermittent CSF Rhinorrhea: The NYU Experience and Review of the Literature

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Background:

The diagnosis of CSF rhinorrhea can be challenging, especially in cases of intermittent CSF leak. A variety of imaging modalities are available for localizing the site of the CSF leak, which include non-contrast CT (CT), CT cisternography (CTC), MRI cisternography (MRC), and radionuclide cisternography. Studies have shown that while CTC is highly sensitive for active leaks, it is invasive, time-consuming, and not as sensitive for intermittent leaks. CT and MRC on the other hand have higher sensitivity and specificity without the discomfort of a lumbar puncture. The aim of this study was to present the NYU experience with imaging of intermittent CSF rhinorrhea, review the literature, and propose an algorithm for non-invasive radiologic evaluation.

Methods:

A retrospective chart review of patients with suspected, intermittent CSF rhinorrhea from 1/1/06- 11/1/10 was performed. Patients undergoing CT, CTC, and/or MRC were included in the study. Data from diagnostic endoscopy, beta-2 transferrin testing, and intraoperative findings are also included.

Results:

The combination of CT and MRC had high sensitivity and specificity in patients with intermittent CSF rhinorrhea. The findings on CT and MRC correlated well with intraoperative findings. In one patient, diagnostic endoscopy revealed a meningoencephalocele.

Conclusion:

The diagnosis of intermittent CSF rhinorrhea can be difficult. This study shows that CT and MRC are highly effective, non-invasive studies. Based on the NYU experience, we propose that patients in whom intermittent CSF rhinorrhea is suspected undergo CT and MRC. These two non-invasive modalities together have high sensitivity and specificity, obviating the need for more invasive studies.

Palate Perforation: A Clinical Marker for Differential Diagnosis of Wegener Granulomatosis And Cocaine-Induced Midline Destructive Lesion

*Matteo Trimarchi, MD, Mario Bussi, MD
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Objectives:

The American National Household Survey on Drug Abuse reported that cocaine was used by 3.8 million Americans. Cocaine abuse occasionally causes extensive destruction of the osteocartilaginous structures of the nose, sinuses, and palate, which mimics the clinical picture of other diseases associated with necrotizing midfacial lesions. The differentiation of cocaine-induced midline destructive lesions (CIMDL) and limited Wegener granulomatosis (WG) may be difficult, particularly if patients do not readily admit substance abuse. It is generally believed that the presence of a positive ANCA test with either of the two antigen specificities, proteinase 3 (PR3) or myeloperoxidase (MPO), facilitates the differential diagnosis of WG from CIMDL. However, instances of positive ANCA tests have been reported in patients with lesions attributed to cocaine abuse. A positive ANCA test is found in the majority of patients with CIMDL. More detailed analysis of the ANCA in CIMDL may discriminate between CIMDL and WG. As most patients with CIMDL have ANCA reacting with human neutrophil elastase (HNE) and some also have PR3-ANCA, the former is a useful tool to differentiate CIMDL from WG, whereas the later is not(3).

Methods:

Between 2002 and 2009 we studied 9 patients with CIMDL with palate perforation at the Department of Otorhinolaryngology, San Raffaele Scientific Hospital in Milan. All cases underwent to nasal endoscopy, sinus CT scan and ANCA test. In 6 patients a nasal biopsy was performed. Pubmed database was also analyzed in order to review all cases of palate perforations described in patients affected by CIMDL and WG.

Results:

All patients presented with septal perforation and inferior turbinate destruction. We also found a hard palate perforation in 6 patients and a soft palate perforation in 2 patients. In only 1 case a perforation of both was documented. Eight patients resulted negative on ANCA test, 1 showed positive feedback with a C-ANCA pattern. In our sample, palate perforation was present in 28 % of CIMDL and not in WG patients. From review of the literature, there is only 1

report of patient with palate perforation affected by WG, while palate perforation is frequently described in CIMDL.

Conclusion:

We conclude that if there is doubt about the diagnosis in ANCA-negative patients with a midline destructive lesion, palate perforation could be a clinical marker that strongly favors CIMDL versus WG.

Pathophysiology of Lumbar Drain Associated Pneumocephalus after Anterior Skull Base Surgery

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Background:

Tension pneumocephalus, an uncommon complication of anterior skull base surgery, often occurs when intracranial air is present in association with cerebrospinal fluid (CSF) drainage. The pathophysiology of this morbid complication has not been well explained. We propose a mechanism for the development of tension pneumocephalus involving respiratory gas diffusion into an air cavity.

Methods:

A clinical case of a patient who developed tension pneumocephalus after lumbar drainage of CSF following skull base surgery is reported. A bench study was designed to simulate the clinical situation of CSF drainage when intracranial air is present followed by CSF replenishment by natural means. We studied the pressure-volume relationship in an enclosed fluidic system with and without saturated respiratory gas (carbon dioxide). A fixed volume was aspirated and then reinfused. Initial pressure within the system was compared to pressure after reinfusion, and the effect of respiratory gas was analyzed.

Results:

Removal of fluid from the two systems resulted in a similar decrease in pressure ($p = .19$). When the same volume of water was replaced, pressure in both containers was greater than starting pressure ($p = .008$), demonstrating hysteresis. However, the pressure in the system containing respiratory gas rose significantly higher than the control ($p = .004$).

Conclusion:

This study offers a mechanism of how tension pneumocephalus can develop when a lumbar drain is placed and there is a small amount of intracranial air present following skull base surgery. In this situation a lumbar drain should be avoided or used with extreme caution.

Peri-Operative Care In Functional Endoscopic Sinus Surgery: A Survey Study

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Introduction:

Functional endoscopic sinus surgery (FESS) is largely viewed as the standard of care in the treatment of chronic rhinosinusitis (CRS) refractory to medical treatment. While there is an understanding regarding the importance of some form of routine post-operative FESS care, no consensus currently exists regarding what the specific management routine should include. The authors of this survey study intended not to examine the efficacy of such treatment protocols, but rather to determine and report on the current practice patterns of peri-operative FESS care amongst otolaryngologists.

Methods:

This survey study was designed in accordance with and approved by our institutional review board. The online-based survey was designed using the online product SurveyMonkey®. A total of 859 otolaryngologists were identified and email addresses were obtained from the AAO-HNS website directory. Responses were collected anonymously.

Results:

Our survey response rate was 32%. Multiple parameters of the otolaryngologists' perioperative care were collected. 93.2% of respondents use nasal saline irrigations post-operatively. 86.8% of otolaryngologists surveyed prescribe antibiotics in the immediate post-operative period. Office-based endoscopic sinus debridements are performed by a majority (87.9%) of those surveyed.

Conclusion:

This survey study demonstrates that certain practices in peri-operative FESS care can vary widely amongst otolaryngologists, and few are based on evidence-based outcomes research. However, pat-

terns emerge regarding practices including utilization of nasal saline irrigations, antibiotics, and debridements as routine post-operative management in FESS.

Plasmablastic Lymphoma in the Maxillary Sinus of an Immunocompetent Patient

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Introduction:

We present a unique case of sinonasal plasmablastic lymphoma (PBL) in an elderly patient with no immunodeficiencies.

Presentation:

A 75-year-old male presented to our clinic complaining of a mass over his right cheek with a four day history of right-sided epistaxis and blurred vision in his right eye. He did not complain of nasal airway obstruction, anosmia, rhinorrhea, facial pain/pressure, or fevers. He did not have any immunodeficiencies (Human immunodeficiency virus (HIV) negative, HBsAg negative, hepatitis C virus negative, and white blood count of 9.09). Nasal endoscopy revealed a large flesh colored mass emanating from the right maxillary sinus ostium with extension into the middle meatus. The CT scan revealed an expansile right maxillary sinus mass with erosion of the sinus walls and expansion into the right ethmoid sinus. The mass stained positive by immunohistochemistry for CD138 and CD79a. By in-situ hybridization, the neoplastic cells were positive for Epstein-Barr Virus (EBV) and demonstrated a lambda light-chain expression with minimal kappa staining. This lesion was most consistent with PBL.

Brief Discussion:

PBL is a rare subset of non-Hodgkin's lymphoma (NHL) most commonly seen in the oral cavities of patients with HIV with a strong association with EBV and Human herpes virus 8 (HHV-8) positivity. This particular case may indicate that elderly are more susceptible to EBV positive PBL due to normal immunologic deterioration. Treatment guidelines for PBL have not been established, although many instances have been treated with chemotherapy and/or radiation.

Prevention of the Frontal Sinus Ostium Restenosis After the Endoscopic Modified Lothrop Procedure

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Objectives:

Endoscopic modified Lothrop procedure• iEMLP• jjs a relatively less invasive approach for intractable frontal sinus diseases. The usefulness of EMLP has recently come to be reported by many surgeons. However, the frontal sinus ostium restenosis frequently occurs due to postoperative scar formation, bone regeneration, and so forth. We present our preliminary report on prevention of the restenosis here.

Methods:

We applied the new technique to recent three cases with intractable frontal sinus diseases (2; recurrent frontal sinusitis, 1; recurrent frontal mucocele). The three cases consisted of two males and one female, and the age was 35, 66, 75 years old, respectively. They all had undergone previous surgeries including the extra nasal approach. A diamond burr was almost used during the surgical procedure. After dilating the frontal sinus ostium, chitin gauzes (2 • ~15 cm) kept left in the ostium for 10 to 14 days postoperatively. Results: Any intraoperative or postoperative complications were not encountered in the three cases. Their follow-up period ranged from 6 to 12 months. Their frontal ostium displayed at least 3 mm in diameter at the last endoscopic evaluation.

Conclusion:

Chitin gauze is known as the material which facilitates regeneration of the skin or the mucosa. Our preliminary report suggested that the long term chitin gauze packing prevent the frontal sinus ostium restenosis.

Psychiatric Basis for a Phantom Turbinate Sensation

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Introduction:

Phantom sensations are the perception of a body part that is no longer present. Sensory-input from transected nerve-endings provides the physiologic basis for the perceived sensation. Less com-

monly, a psychiatric disorder is the underlying etiology. We present a patient who underwent nasal surgery but subsequently developed the perception of the persistence of his turbinates.

Case History:

A 41 year-old male presented with nasal obstruction following trauma and sub-optimal repair as a teenager. He developed left mid-facial pain, attributable to intra-nasal contact points and a concha bullosa. Medical and dental therapy failed. He underwent nasal reconstruction, including bilateral subtotal inferior turbinectomy and partial middle turbinectomy, to establish an airway and to potentially provide pain relief. Pre-operatively, he failed to disclose his obsessive-compulsive disorder, requiring lithium.

Clinical Course:

After an uneventful peri-operative course, upon learning of the extent of turbinate removal he fixated on their near-absence. Despite contrary clinical evidence, he expressed multiple subjective symptoms associated with Empty Nose Syndrome. Conversely, he tried to convince numerous physicians that he sensed the presence of his left middle turbinate, the source of much pre-operative angst, moving around inside his nose. One manifestation of his psychogenic disorder was his belief that he swallowed a turbinate, which became lodged in his throat, prompting an ER visit. Diagnostic evaluation proved otherwise. He has refused psychiatric counseling.

Conclusion:

This is the first reported case of phantom turbinate sensation. Patients with an underlying psychiatric illness may perceive the presence of intact turbinates post-operatively despite clinical evidence proving otherwise.

Radiofrequency Adenoid Tissue Reduction During Video-Assisted Septoplasty.

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Introduction:

Detection of hypertrophic lymphoid tissue in the nasopharynx during a video-assisted septoplasty is not uncommon. Nasal obstruction in

patients with nasal septal deviation may cause post nasal drip and adenoid hypertrophy in adults. Since 2008 we have been performing the totally video-assisted septoplasty technique. Endoscopic visualization of the nasopharynx during video-assisted septoplasty allows us to observe that in patients with nasal septal deviation there is a high incidence of adenoid tissue hypertrophy. The aim of this study is to evaluate the effectiveness of radiofrequency adenoid tissue reduction in adult patients with adenoid hypertrophy during video-assisted septoplasty.

Methods:

82 consecutive patients underwent video-assisted septoplasty. 26/82 (31.7%) showed adenoid tissue hypertrophy and a radiofrequency adenoid tissue reduction was performed in all 26 by multiple applications using a bipolar handpiece, thus avoiding surgical adenoid tissue removal in adults. Rhinomanometric evaluation performed two months after surgery provided information concerning both nasal and nasopharyngeal patency.

Results:

No patients complained of retronasal pain or bleeding in the post-operative period. The healing process was monitored by endoscopy during routine post-operative controls two weeks after nasal packing removal. Rhinomanometric evaluation showed that the patients exhibited a significant improvement of nasal airflow compared to the pre-operative values.

Conclusion:

An endoscopic volumetric reduction of the inferior turbinate is often performed during functional procedure for septal deviation. The use of the same bipolar handpiece for radiofrequency-induced tissue reduction under direct endoscopic control make it easy to perform a simultaneous volumetric reduction of lymphatic tissue.

Refractory Epistaxis Resulting from a Traumatic Pseudoaneurysm of the Sphenopalatine Artery: Case Report And Review of the Literature

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Introduction:

Traumatic pseudoaneurysms of external carotid artery (ECA) branches have been rarely described in the literature. We present a case of blunt head trauma resulting in refractory epistaxis from a pseudoaneurysm of the sphenopalatine artery (SPA) and a review of traumatic ECA branch pseudoaneurysms.

Methods:

A retrospective chart review and review of the literature was performed.

Results:

A 64-year-old male presented to the emergency room after a ground level fall with altered mental status, a left orbital hematoma and left sided epistaxis. The patient was intubated and bilateral anterior nasal cavity packing was placed. A non-contrast CT scan of the face showed a comminuted left orbital blow out fracture and bilateral nasal fractures. On hospital day #3, the patient required posterior and bilateral anterior nasal packing for increasing epistaxis. A contrast CT scan of the face was obtained which showed a 4.1 x 1 cm hematoma adjacent to the fractured left inferior orbital wall with extravasation of contrast into the left maxillary sinus. The patient was taken urgently for diagnostic angiography, which showed a pseudoaneurysm of the left SPA. He underwent successful coil embolization of the left SPA pseudoaneurysm by interventional radiology.

Conclusions:

We present a case of blunt trauma causing a pseudoaneurysm of the SPA resulting in refractory epistaxis. The findings in this case in addition to a review of the literature suggest a role for early diagnostic angiography in patients presenting with multiple facial fractures from any type of trauma and severe epistaxis.

Rhino-orbito-cerebral Mucormycosis with Multiple Cranial Neuropathies: A Case Report

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Introduction:

Mucormycosis is an opportunistic invasive fungal rhinosinusitis predominantly affecting immunocompromised individuals known for its angioinvasive nature. This study discusses a destructive course of mucormycosis in an uncontrolled diabetic 20-year-old man involving unilateral maxillary and ethmoid sinuses, the orbit, and the brainstem presenting with multiple cranial neuropathies.

Method:

Retrospective case report. Results: A 20-year-old man in diabetic ketoacidosis with blood glucose level of 513 mg/dl and paralysis of cranial nerves II, III, IV, V, VI, VII, and XII on presentation, found to have a dusky right middle turbinate, loss of light reflex in the right eye, with a MRI evidence of an enhancing lesion in the brainstem involving the middle cerebellar peduncle to pons. The patient underwent series of extensive surgical removal of the affected sites including medial maxillectomy, total ethmoidectomy, orbital exenteration, and retrosigmoid craniotomy to extirpate the necrosis and fungal debris. During the initial course of the disease, the patient became clinically stable from sepsis after a series of surgical management that consisted of a medial maxillectomy and an orbital exenteration. Other adjuvant medical therapies included amphotericin B nasal irrigation applied topically and the amphotericin lipid B complex intravenously.

Conclusions:

Rhino-orbito-cerebral mucormycosis remains as an important differential of rhinosinusitis in the immunocompromised population. A definitive management of this disease warrants an aggressive surgical management in a multidisciplinary team to reduce expected mortality from this disease.

Role of IL-17 in the Airway Remodeling in a Murine Model of Allergic Rhinitis

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Background:

It is well known that the airway remodeling process develops in asthma and Th17 cell producing IL-17 have been found to participate in the development of allergic asthma. However, the role of IL-17 in the pathogenesis of nasal airway remodeling and allergic rhinitis has not yet been fully elucidated. This study was performed to investigate the role of IL-17 on the nasal airway remodeling in an experimental allergic rhinitis (AR) model.

Methods:

Wild type BALB/c mice (n=20) and IL-17 deficient mice (n=20) were sensitized by intraperitoneal ovalbumin (OVA) injection and subsequently challenged with inhaled OVA on 7 consecutive days. After then, they were repeatedly exposed to inhaled OVA administration 3 days per week for 2 months. Matched control mice were challenged with phosphate buffered saline instead of OVA. In the 4 groups, allergic symptoms, OVA-specific immunoglobulin E (IgE) and airway remodeling were assessed.

Results:

IL-17 deficient mice showed decreases in allergic symptom scores (sneezing, 9.63 ± 2.64 vs. 6.00 ± 2.45 , $P = .376$; rubbing 5.00 ± 4.69 vs. 2.40 ± 1.52 , $P = .372$), mean serum level of OVA-specific IgE (11.00 ± 0.00 vs. 8.22 ± 1.30 , $P = .005$), interleukin-4. Histologic examination revealed that airway remodeling was more prominent in the lung of BALB/c mice. However, airway remodeling in the nasal tissue was identified later than in the lung tissue. In the IL-17 deficient mice, matrix metalloproteinase-9 (MMP-9) mRNA expression level in the nasal mucosa was lower than that of BALB/c mice. Also, immunofluorescence staining against MMP-9 revealed more intensity in the BALB/c mice.

Conclusion:

Our results, which demonstrate that IL-17 deficient mice have low MMP-9 levels in the nasal tissue, suggest that IL-17 might have the potential role in the airway remodeling of allergic rhinitis.

Septal Re-Positioning Using Disproportionate Biodegradable Packing

*Andrew Lerrick, MD, Alexis Mandli, PA-C
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Introduction:

Long-standing septal deformities retain some memory of the deflection following removal of the underlying framework during septal surgery due to the presence of an intrinsic collagen matrix. We present our technique utilizing resorbable packing applied in disproportionate ratios to re-position the septum when plication methods fail.

Background:

Fractures, peripheral disarticulations, and contour deformities contribute to septal mal-positioning. Removal (SMR) or alteration (septoplasty) of bone and cartilage permits flap re-positioning. Apical, caudal, and step-off deformities are least amenable to correction because the cicatrix often adheres to adjacent fixed structures. The absence of elastic fibers in collagen further restricts tissue mobility. All packing materials are amenable to being placed disproportionately to achieve ideal septal alignment. Non-resorbable packing requires timely removal to avoid infection. Biodegradable packing is more suitable because of a lower risk of infection, its compressibility properties, and ease of supplementation.

Surgical Technique:

Upon closure, whip-stitches facilitate midline septal re-positioning. Placement of tacking stitches usually overcomes the resistance inherent to fibrous tissue. Packing of identical size is ordinarily placed because its primary purpose is hemostatic. When necessary, supplemental packing with a biodegradable dressing, diffusely or selectively, for purposes of maintaining realignment is highly effective. Topical antibiotic ointment is applied before insertion. Supplemental packing can be placed if early septal drift occurs. Antibiotic solution can periodically be instilled into the packing to maintain prophylaxis.

Conclusion:

Maintenance of force against septal flaps with biodegradable packing in the peri-operative period is an effective adjunctive method to achieve septal realignment.

Silastic splints reduce middle meatal adhesions after endoscopic sinus surgery

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Introduction:

Middle meatal adhesions occur frequently after sinus surgery and may have a negative impact on patient outcomes. Many non-removable middle meatal splints have not reduced adhesion rates. We conducted a randomized controlled trial to investigate the efficacy of silastic splints in preventing adhesions following bilateral sphenoidectomies and frontal recess dissections (“full house” FESS).

Methods:

Forty patients undergoing FH FESS were randomized to have a silastic splint placed into one middle meatus and not the other at the completion of surgery. The splint was cut from a silastic sheet (5x5 cm, 0.51 mm) with an upper and lower limb fitting on either side of the horizontal portion of the ground lamella. The splint was secured anteriorly to the septum with a suture and was removed at the end of the second postoperative week. Symptom scores for each side were recorded at each clinic visit. Endoscopy was video recorded at the 12 week clinic visit and scores using the Lund-Kennedy scoring system assigned by 2 of the study authors blinded to which side had been splinted.

Results:

34 patients have completed 2 weeks postoperative follow up with significantly higher nasal obstruction scores (out of 5) and facial pain/discomfort scores for the splinted side (3.2 vs 2, 3.15 vs 2.3 respectively, $p < 0.05$). 19 patients have reached 12 weeks postoperative follow up. There were significantly more adhesions in the non-splinted side (8 vs 0 patients, $p < 0.01$).

Conclusion:

Placement of a silastic splint in the middle meatus at the end of sinus surgery markedly reduces the incidence of adhesions, but increases early obstruction and discomfort. We are continuing to follow this patient to group to determine the impact of the reduced adhesion rate on long term outcomes.

Simplified Bath-Plug Closure for Intraoperative Cerebrospinal Fluid Leak in Endoscopic Endonasal Sinus Surgery

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Introduction:

Cerebrospinal fluid (CSF) leak is one of the major complications in endoscopic endonasal sinus surgery (ESS). Many techniques to close CSF leak, using mucosa, cartilage, fat, and/or bone, have been reported. However, closure of CSF leak may be difficult in even a small dura defect case. We developed a simplified technique based on the bath-plug method. The surgical procedure was demonstrated, and the preliminary results were presented here.

Materials and Methods:

In a series of 255 ESS cases for the last two years, we encountered three cases that CSF leak occurred during surgery. One had inverted papilloma and two cases had chronic sinusitis. CSF leak occurred when removing the tumor tissue around the base of the superior turbinate in papilloma case, and when dilating the frontal sinus ostium in sinusitis case. The dura defect of all cases seemed within 3 mm in diameter. The septum mucosa as a free flap was harvested, was rolled, and then was plugged into the defect. Fibrin glue was used after stopping CSF leak. Nasal cavity was packed with tampon gauzes for two days postoperatively, and then the gauzes were removed. Spinal drainage was not required.

Results:

CT scan evaluation was performed immediately after and one or two days after surgery. Any infection including meningitis or recurrence of CSF leak was not found.

Conclusion:

This simplified technique for intraoperative CSF leak is useful and practical in ESS. In case of larger dura defects, cartilage or fatty tissue may be required.

Staged Bilateral Paired Mitek Suspension for Nasal Valve Collapse

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Chicago, IL USA*

Introduction:

Suspension techniques effectively correct internal nasal valve collapse. Profound conditions often require ancillary methods to achieve satisfactory airway patency. We present the first patient in whom a second pair of micro-Mitek (DePuy) implants was placed to effectively suspend the superior and inferior components of the internal valve.

Case History:

A 64 year-old female presented 30+ years after having undergone cosmetic rhinoplasty, which included division of the lower lateral cartilages (LLC). Despite an acceptable aesthetic result, the cephalic border of each LLC collapsed on inspiration. Over time, she developed laxity of the inferior border of the upper lateral cartilages (ULC), worsening the condition. She rejected oral breathing for decades. Over-the-counter remedies did not alleviate the condition. Nasal breathing necessitated Venturi-type (rapid, high-velocity) inspiration. The Cottle maneuver was positive bilaterally.

Surgical Technique/Clinical Course:

A single micro-Mitek implant was placed bilaterally, with one suture providing medial support to the ULC and the other providing lateral support to the LLC. Following surgery her airway was much improved, documented by acoustic rhinometry, but not to her satisfaction. Thin skin prohibited use of a titanium implant and her narrow inlet precluded batten grafts. Two additional micro-Mitek implants were subsequently placed, this time with one limb suspending the lateral aspect of the ULC and the other suspending the medial aspect of the LLC, achieving excellent results.

Conclusion:

Bilateral, paired medial and lateral cartilage suspension in a single or staged procedure can overcome profound nasal valve collapse.

Subconjunctival Emphysema after Orbital Decompression in Graves' Disease

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Introduction:

Subconjunctival emphysema is a recognized yet uncommonly seen post-operative complication of sinus surgery that can have several potentially serious sequelae. Sneezing, nose blowing, or other means of forced exhalation can drive air into the orbit, allowing it to dissect through a dehiscence of the medial orbital wall or orbital floor and track under the conjunctiva.

Methods:

Retrospective case review.

Results:

A 63-year-old man presented with a 25-year history of worsening proptosis and extraocular motility difficulty of his right eye secondary to Graves' ophthalmopathy. He underwent endoscopic sinus surgery with a right medial and inferior orbital decompression. Despite preoperative counseling, the patient blew his nose on post-operative day one and subsequently developed acute right-sided proptosis and subconjunctival emphysema. Examination revealed a cystic appearance of the right lower bulbar conjunctiva with crepitus on palpation of the upper and lower eyelids. Vision and light reflexes were normal, and extraocular movements were full and unrestricted. The patient was managed conservatively with ice-packs, avoidance of activities that elevate sinus pressures, steroids, and eye care. The subcutaneous and subconjunctival emphysema resolved gradually without complications.

Conclusion:

Subconjunctival emphysema can develop when air forcibly tracks into orbital soft tissue through a dehiscence of the orbital wall, most commonly through the lamina papyracea or orbital floor overlying the maxillary sinus. Such bony defects usually result from facial bone trauma or are iatrogenic secondary to otolaryngologic procedures. This condition is typically self-limited and completely resolves, but can lead to serious complications, such as lagophthalmos, exposure keratopathy, and optic atrophy.

Supraorbital Ethmoidal Cell: Anatomical Prevalence & Surgical Significance

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Objective:

The objective of this study is to investigate the prevalence of Supraorbital Ethmoidal Cells (SOEC) and their extent in relationship to the Anterior and Posterior Ethmoidal Arteries.

Methods:

We investigated paranasal sinus computed tomography scans (CT) of 40 patients with various diagnoses in association with an expert board certified radiologist for the presence and extent of supraorbital ethmoidal cells. The CT scans used in the study were all obtained using IGP Protocol, providing 1.25 mm cross sections. This provided views in coronal, axial, and sagittal planes and facilitated the examination of the relationship of the anterior and posterior ethmoidal arteries with these cells.

Results:

Our results showed us that SOEC were present bilaterally in 20 cases (50%). In 8 cases (20%) they were present only on the left side. In 12 cases (30%) the SOEC were undetectable. In 25 cases, (62.5%), either one or both SOEC extended beyond the anterior ethmoidal artery. Only in 2 rare cases (5%) did the SOEC extend till the posterior ethmoidal artery. Also, in 2 cases (5%), the SOEC ended before the anterior ethmoidal artery, while in 2 other cases (5%), the SOEC ended at the level of the anterior ethmoidal artery. Frontal sinuses were present in nearly all of the cases (97.5%).

Conclusion:

The presence of SOEC is not rare and these cells frequently extend beyond the anterior ethmoidal arteries. This leaves these vessels vulnerable to injury during surgery if not properly accounted for. It is of critical importance to identify the SOEC, to determine it's height above the entrance of the anterior ethmoidal artery and to define it's posterior extent in order to avoid vascular injury during endoscopic sinus surgery.

Technique to Control Epistaxis and Maintain Nasal Airway Patency

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Introduction:

The key to any successful epistaxis treatment is maintaining pressure while mucosal healing occurs. This is typically accomplished with the use of nasal packing. However, in so doing, the entire nasal airway becomes obstructed, and numerous annoying and potentially serious problems can result. Frequently, patients cannot easily tolerate the packing. A better technique would allow satisfactory pressure against the mucosa, while maintaining a patent nasal airway. We tested such an approach in five adults with anterior epistaxis.

Methods:

We evaluated three men and two women with epistaxis from anterior septal ulceration. We placed a hollow intranasal dilator in the nostril, then inserted absorbable or non-absorbable nasal packing against the anterior nasal septum. We taped the intranasal dilator to the ala to secure the packing in place. Patients were covered with antibiotics to reduce the chance of rhinosinusitis. One patient continued to use her intranasal oxygen with the dilator/packing in place. The dilator/packing was removed at day 3, 4 or 5, and patients were given instructions on nasal hygiene. They were reevaluated at 3 and 6 weeks.

Results:

Epistaxis was controlled in all patients. No patients suffered recurrent epistaxis, nasal cicatrix or septal perforation within 6 weeks of treatment. Patients reported being able to tolerate the sinus cone packing without difficulty. Several had previous experiences with obstructing nasal packing, and described this technique as being more comfortable.

Conclusions:

The use of nasal packing with intranasal sinus dilators is an effective and easily tolerated technique to control epistaxis in adults.

The History of Rhinoplasty: and the Contribution of Indian Surgeons Toward its Evolution

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Introduction:

History helps us to know how things have originated and how it has progressed. The various obstructions and failures in its path of progression, and how to overcome them. History points out the mistakes that had been made and helps us learn from those mistakes. The effort of nose reconstruction and beautification is as old as the civilization itself. India has a significant contribution towards the plastic reconstruction of nose which few people appreciate today. The reconstruction of nose with the forehead flap and cheek flap originated and progressed in India. According to Hindu mythology the 1st plastic reconstruction was most probably done when Lord Shiva attempted to reconstruct the head of his son with that of the head of an elephant and name him Ganesha. The forehead flap described by Shushruta for reconstruction of nose is also termed the "GANESHA FLAP" after the name of the god who has an elephant's head. He is known as the "Father of Surgery" for his significant contribution towards many surgical procedures, and designing of various instruments. The great Greek physician Hippocrates also known as the Father of Medicine and other European physicians like Celsus and Galen had significant contributions towards the development of rhinoplasty in Europe. There was a period of stagnation after the fall of the Roman Empire in the 5th century. The art of nasal reconstruction or rhinoplasty was revived by the renewed interest of Leonardo de Vinci. Thereafter many surgeons had been working for its betterment and modified the procedure. Earlier rhinoplastic procedures had mostly been reconstructive rhinoplasty. Jacques Joseph in Berlin and John Roe in New York started the new era of corrective rhinoplasty.

Objective:

To look back into the history of rhinoplasty, its origin and evolution.

Methods:

Review of articles on print matters in books and scripts and online.

Conclusion:

Looking back into history always helps us look forward. Each time history is studied it gives something new, helping us know the topic better and giving us inspiration to carry on with newer discoveries.

The Impact of a Steroid Eluting Frontal Sinus Stent in Chronic Frontal Sinusitis

*Seth Kaplan, MD, Madeleine Schaberg, MD, Marc Rosen, MD
USA*

Introduction:

Maintaining frontal outflow patency after frontal sinus surgery continues to be a challenge due to post-operative stenosis. The re-stenosis rates are in excess of 30% after either endoscopic or open frontal sinus surgery. Frontal sinus stents have been used for over 100 years to maintain patency. This study evaluates a novel drug eluting stent; the Relieva Stratus used with triamcinolone.

Methods:

A retrospective chart review was performed at a large tertiary care hospital of all patients who underwent placement of the Relieva Stratus stent by the senior author (M.R.R.) from January 2010 to November 2010.

Results:

A total of 45 patients (90 frontal sinuses) underwent endoscopic frontal sinusotomy with placement of the Relieva Stratus stent during the study period. The most common pre-operative symptoms included congestion (93%), rhinorrhea (64%), headache (62%), polyposis (42%), and anosmia (42%). 24 patients (53%) had previously undergone sinus surgery. All stents were intraoperatively infused with .3ml of triamcinolone. The stent remained in place for an average of 12 days. Postoperatively, patients' initial symptomatology resolved in 84% with congestion, 92% with rhinorrhea, and 75% with headache. All patients with polyposis and anosmia had resolution of symptoms. Patients were followed for 4 months post-operatively and frontal sinus patency was achieved in 95% of patients.

Conclusions:

The steroid eluting frontal sinus Relieva Stratus stent appears to be safe and effective in relieving frontal sinus outflow obstruction when used in combination with endoscopic sinusotomy. Placement of this stent can therefore be considered when treating complex frontal sinus disease.

The Repair of Anterior Skull Base Dural-Osseous Defects using Platelet Gel - The St Paul's Experience

*Vishnu Sunkaraneni, MD, Richard Byaruhanga, Krista Genoway, MD, Amin Javer, MD
Vancouver, Canada*

Objective:

To assess the efficacy of platelet gel as a biological sealant during endoscopic, endonasal repair of dural-osseous defects of the skull base.

Methods:

Eighteen cases of cerebrospinal fluid (CSF) rhinorrhea were reviewed retrospectively. Using an intranasal endoscopic approach, all dural-osseous defects were repaired in a similar fashion using a multi-layered closure. Platelet gel was used as the sealant for all cases.

Results:

All eighteen cases of CSF rhinorrhea were repaired utilizing platelet gel as the biological sealant. The mean time for follow-up was 23 months. There were 6 cases requiring revision surgery for recurrent CSF rhinorrhea. Two cases were successfully repaired endoscopically using platelet gel, two required intracranial approach to seal the csf leaks, one patient objected to having another operation to close the re-leak and one patient died.

Conclusion:

Platelet gel is an effective biological sealant in the majority of cases when used during intranasal, endoscopic, multi-layered closure of skull base defects. Its advantage is that it is an autologous product and can be made within minutes of taking blood. Utilizing platelet gel alleviates concerns regarding the use of foreign blood products in surgical patients.

Totally Video-assisted Septoplasty: Indications, Outcomes and Complications

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Objective:

Functional septoplasty is a commonly performed surgical procedure for management of nasal airway obstruction. The use of a 0° endoscope allows to perform all surgical steps with a better and magnified view allowing at same time to pursue an effective teaching purpose. The aim of this study is to evaluate outcomes and complications of Totally video-assisted septoplasty (TVAS) for the treatment of septal deviation.

Methods:

82 consecutive patients who underwent TVAS were enrolled. All the patients had a marked septal deviation confirmed by an endoscopic evaluation, a multislice CT study and elevated nasal airway resistance measured at active anterior rhinomanometry. Five dependent variables were considered with rhinomanometry (right, left, total, higher unilateral and lower unilateral nasal resistance). A post-operative rhinomanometric evaluation was performed two months after surgery. A Nasal Obstruction Septoplasty Effectiveness (NOSE) score was used to measure the subjective sensation of nasal obstruction pre- and post-operatively. Outcomes and complications were recorded.

Results:

Compared to the pre-operative values, the patients showed a significant improvement of nasal airflow ($p < 0.05$) in both subjective and rhinomanometric evaluation. Two patients (2.4%) reported a slight post-operative deviation and one (1.2%) a turbinoseptal synechia. Complications such as septal hematoma, septal perforation or post-operative infections were not reported. No post-operative bleeding, orbital injuries or cerebral spinal fluid leaks occurred.

Use of the Gold Laser in the Management of Sinonasal Polyposis

Bradley Johnson, MD, Knight Worley, MD

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Background:

The management of sinonasal polyposis (SP) presents a challenge for the otolaryngologist and can have a tremendous impact on patients' quality of life. Functional endoscopic sinus surgery with polypectomy remains the treatment of choice in cases of SP that are unresponsive to medical therapy. This paper presents a novel and safe technique for polypectomy.

Materials and Methods:

The Gold Laser (Medical Energy, Pensacola, Florida) is a 980nm device that combines indium and gallium with elemental gold. The beam can be delivered in a noncontact mode for coagulation as well as a contact mode for ablation. The fiberoptic delivery system is available in both ball and scalpel tips and is threaded through a handpiece that incorporates suction (Fig 1). This setup allows the dominant hand the ability to simultaneously suction smoke and blood as well as the ability to cut and coagulate with the scalpel tip. The scalpel tip allows controlled amputation of the polyp at its stalk where the blood supply enters, which minimizes bleeding.

Results:

Here a series of 50 patients with sinonasal polyposis is presented that were successfully treated with the Gold Laser. Each patient reported an improved sense of smell and decreased nasal obstruction postoperatively. There were no minor complications such as bleeding that led to the premature termination of the procedure or major complications.

Conclusion:

The Gold Laser allows controlled nasal polyp removal and affords greater visualization, which leads to safer sinus surgery and improved patient outcomes.

Use of the Hadad-Bassagasteguy Nasoseptal Flap for Repair of Recurrent Cerebrospinal Fluid Leak Following Transsphenoidal Surgery

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Introduction:

The Hadad-Bassagasteguy vascularized nasoseptal pedicled flap (HBF) is an effective technique for reconstruction of skull base defects with low incidence of post-operative cerebrospinal fluid (CSF) leak. Advanced planning is required as posterior septectomy during transsphenoidal surgery can preclude its use due to destruction of the vascular pedicle. We present 3 cases where the HBF was successfully employed to repair recurrent CSF leaks despite prior posterior septectomy and transsphenoidal surgery.

Methods:

Case series of 3 patients with prior transsphenoidal surgery in which the HBF was used for revision CSF leak repair. The demographic data, clinical presentation, intraoperative findings, and surgical outcomes were retrospectively reviewed.

Results:

Three female patients ages 24, 34, and 38 years underwent resection of a pituitary lesion (macroadenoma-2, Rathke's cyst-1) via a transnasal/transsphenoidal approach. All patients' intraoperative CSF leaks were initially repaired with multilayered free grafts. Recurrent CSF leaks developed 1 month to 1 year after initial surgery. In one patient with a body mass index of 50, revision CSF leak repair was attempted twice with fat graft and lumbar drain. Ultimately, all 3 patients were referred for revision CSF leak repair. Intraoperatively, active CSF leakage was visualized and small posterior septal perforations (<1cm) were present. The HBF was successfully utilized in all 3 patients during revision CSF leak repair with no evidence of recurrence to date.

Conclusion:

The Hadad-Bassagasteguy flap may be salvaged for repair of recurrent CSF leaks even in the context of prior posterior septectomy and transsphenoidal surgery. However, longer follow-up is necessary to assess long term efficacy.

Validation of the 9-Item Eustachian Tube Dysfunction Questionnaire

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Introduction:

Eustachian tube dysfunction (ETD) is a common otologic condition that can produce auditory and rhinologic symptoms. The complete assessment of ETD is limited without a valid measure of health status and quality of life. We performed initial validation of the 9-item Eustachian Tube Dysfunction Questionnaire (ETDQ-9), a disease-specific instrument to assess patient quality of life with respect to ETD.

Methods:

The ETDQ-9 was developed by the authors using standard survey methodology. Data was collected prospectively on a group of 25 consecutive patients diagnosed with ETD and 25 non-patients who served as a control group. Data was collected prior to institution of any treatment measures for ETD. A subset of respondents repeated the ETDQ-9 at an interval of 4 weeks for assessment of test-retest reliability.

Results:

Content validity for the ETDQ-9 was established by focus group and review of the literature. Reliability testing yielded a Cronbach's alpha of 0.71, indicating fair internal consistency. The test-retest reliability coefficient was 0.97, indicating a very high correlation between the two questionnaires completed by the same patient 4 weeks apart. The ETDQ-9 was able to discriminate between patients known to have ETD and a group of healthy controls ($t=12.7$, $P<0.0001$), indicating excellent discriminate validity.

Conclusions:

The ETDQ-9 is a valid outcome measure for patients with ETD. Its use may facilitate routine clinical practice by highlighting the impact of ETD. Further testing is needed to determine its usefulness in assessing treatment response.

Variable CT Scan Interpretations of Sino-Nasal Abnormalities

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Introduction:

Concha bullosa are common radiologic findings. Frontal and sphenoid sinus septations are uncommon variants. A maxillary sinus bony plate is rare. We present a patient with multiple bony abnormalities not detected on initial CT scan and disregarded as lacking clinical significance when apparent in another. Failure to identify and report these findings led to a complicated clinical course. Case History: A 41 year-old male presented with left mid-facial pain. A hospital-based CT revealed a concha bullosa, but was not reported as a diagnosis of “sinusitis” was sought. Due to a “washout” imaging effect, multiple bony sinus septations went undetected. A subsequent scan performed off-site detected frontal, sphenoid, and maxillary sinus septations. Other discreet bony findings, including displaced nasal bones, a sizeable maxillary crest spur, turbinate hypertrophy, septal deflections, septal fracture, and septal-turbinate contact points were disregarded. Subtle evidence of ethmoid sinusitis was dismissed as “artifact”. The radiologist reported “no sinusitis”, failing to mention any bony irregularity.

Clinical Course:

Two otolaryngologists attributed the pain to trigeminal neuralgia or dental origin, respectively, based-upon the negative CT reports. The radiologic variants were easily identified upon direct inspection of the higher quality image. Ultimately, the patient underwent sino-nasal surgery, requiring a Caldwell-Luc to remove the bony maxillary septation to correct intractable maxillary sinusitis that developed following the primary sino-nasal procedure.

Conclusions:

CT images and interpretations vary widely. Normal variants and subtle findings may not be detected or reported. The presence of any abnormalities should alert the physician to consider potential clinical ramifications.



57th Annual Meeting

September 10, 2011- Intercontinental Hotel, San Francisco, CA

Meeting Highlights:

- Closest hotel to the Moscone Convention Center
- Breakfast Symposium
- Poster Presentation Wine & Cheese Reception (Facilitated by an expert Sommelier)
- **7th Annual David W. Kennedy Lectureship**
Professor Heinz Stammberger – “My Lifetime Experience in the Management of Sinusitis: Then & Now”
- 2011 Guest Countries: *Vietnam, Indonesia and the Philippines*
- Exhibit Hall
- Interactive Audience Response Session
- Specialty/Expert Panels
- Free meeting registration to first time attendees who register prior to 7/31

Abstract Submission Deadline: May 31, 2011

Submit your abstract on-line: www.american-rhinologic.org

Manuscript Submission Deadline: Deadline: August 1, 2011

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