



55th
annual meeting
of the American Rhinologic Society

October 3, 2009

Manchester Grand Hyatt, One Market Place, San Diego, CA

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PROGRAM AT-A-GLANCE

October 3, 2009

7:00 AM

Breakfast Symposium
Point of Service in Rhinology
Moderator: Brent A. Senior, M.D.

8:00 AM

Welcome & Opening Remarks
James Stankiewicz, MD - President

**Moderators: Karen Fong, M.D./
Rick Chandra, M.D.**

8:07 AM

TNF-Alpha Inhibits Olfactory
Regeneration in a Transgenic Model of
Chronic Rhinosinusitis-Associated
Olfactory Loss
Justin Turner, M.D.

8:13 AM

The Efficacy of a Novel Chitosan Gel
on Hemostasis and Wound Healing
Following Endoscopic Sinus Surgery
Rowan Valentine, M.D.

8:19 AM

Efficacy of an Antibiotic Eluting
Chitosan Glycerophosphate Implant in
the Setting of Acute Bacterial Sinusitis:
A Rabbit Model
Benjamin Bleier, M.D.

8:25 AM

Discussion and Q&A

**Moderators: Robert Kern, M.D./
James Palmer, M.D.**

8:35 AM

Characterisation of Bacterial and
Fungal Biofilms in Chronic
Rhinosinusitis
Andrew Foreman, M.D.

8:41 AM

Activation of Ciliary Beat Frequency in
Primary Murine Nasal Epithelial
Cultures by the CFTR Potentiator,
Quercetin
Bradford Woodworth, M.D.

8:47 AM

The Role of Hepatocyte Growth
Factor/C-met in Chronic Rhinosinusitis
with Polyps
Murugappan Ramanathan, M.D.

8:53 PM

Discussion and Q&A

9:03 AM

Presidential Address
James Stankiewicz, MD

**Moderators: Alexander Chiu, M.D./
Brent Senior, M.D.**

9:10 AM

Decreased Regulatory T-cells in
Sinonasal Mucosa and Circulating
blood in Patients with Chronic
Rhinosinusitis with Nasal Polyposis
Amanda Munoz, M.D.

9:16 AM

Post Surgical Outcomes of Endoscopic
Sinus Surgery, Done for Chronic
Rhinosinusitis Associated with Biofilms
Deepti Singhal, M.D.

9:22 AM

Honey: Histological Effect on
Respiratory Mucosa
Shaun Kilty, M.D.

9:28 AM

Discussion and Q&A

Moderator: Richard Orlandi, M.D.

9:38 AM

Masters in Rhinology - How I Do It:
Skull Base Tumors-Tips and Technique
Roy Casiano, M.D.

9:53 AM

Discussion

9:59 AM

Break with Exhibitors (Manchester D-I)

**Moderators: Rodney Schlosser,
M.D./ Roy Casiano, M.D.**

10:20 AM

Perioperative Continuous
Cerebrospinal Fluid Pressure
Monitoring in Patients with
Spontaneous Cerebrospinal Fluid
Leaks: Presentation of a Novel
Technique
Douglas Reh, M.D.

10:26 AM

Post-operative Healing in Endoscopic Repair of Skull Base Defects: A Comparison of Three Graft Materials
Kara Prickett, M.D.

10:32 AM

Endoscopic Intracranial Resection: Case Series and Design and Employment of a Perioperative Management Protocol
Evan Ransom, M.D.

10:38 AM

Discussion and Q&A

Moderators: Berrylin J Ferguson, M.D.

10:48 AM

Orbital Involvement in Invasive Fungal Sinusitis: Review of Outcomes and Recommendation of a Treatment Paradigm
Lindsey Arviso, M.D.

10:54 AM

Increased Prevalence of Staphylococcus aureus in Allergic Fungal Rhinosinusitis Versus Other Subsets of Chronic Rhinosinusitis with Nasal Polyps
David Clark, M.D.

11:00 AM

Update to Severity Classification for Chronic Rhinosinusitis
Troy Woodard, M.D.

11:06 AM

Discussion and Q&A

11:16 AM

Moderator: Joseph Jacobs, M.D.
Managing Refractory Sinusitis Surgical and Medical Considerations Panel

Panelists:

Michael Chandler, M.D.
*Clinical Assistant Professor of Medicine, The Mount Sinai School of Medicine
New York, NY*

Martin Desrosiers, MD, FRCSC

*Clinical Associate Professor
Department of Otolaryngology-Head and Neck Surgery; Université de Montréal and McGill Universities; Montréal, Quebec, Canada*

Amber Luong, MD, PhD

Assistant Professor of Otorhinolaryngology-Head and Neck Surgery; University of Texas Health Science Center at Houston; Assistant

Professor of Immunology at UT MD Anderson Cancer Center

12:00 PM

Business Meeting/Award Presentation

12:00 PM

Break with Exhibitors (Manchester D-I)

Moderators: Neil Bhattacharyya, M.D./ Timothy Smith, M.D.

1:00 PM

Presence of Dendritic Cells Expressing pro-Th2 Costimulatory Molecules is Increased in Patients with Allergic Fungal Sinusitis and Chronic Rhinosinusitis Without Nasal Polyps
Brendan O'Connell

1:06 PM

Targeting TGF-beta 1 Receptors Modulates Adherent Junctions in Chronic Rhinosinusitis (CRS)
Ramin Naim, M.D.

1:12 PM

Effect of Dilute Baby Shampoo on Nasal Mucociliary Clearance in Healthy Subjects
Seth Isaacs, M.D.

1:18 PM

Discussion and Q&A

Moderators: John DelGaudio, M.D./ Patricia Maeso, M.D.

1:28 PM

Endonasal Laser Tissue Welding: First Human Experience
Benjamin Bleier, M.D.

1:34 PM

Fracture of Bony Lamellae Within the Frontal Recess Following Balloon Catheter Dilatation
Ayesha Khalid, M.D.

1:40 PM

Characterizing Methicillin-Resistant Staphylococcus Aureus Infections in a Tertiary Rhinology Practice
Victoria Epstein, M.D.

1:46 PM

Discussion and Q&A

Moderators: Joseph Jacobs, M.D. / Marvin Fried, M.D.

1:56 PM

Post Sinus Surgery Nasal Irrigation:

What are the Real Risks of Contamination?

John Lee, M.D.

2:02 PM

Endoscopic Sinus Surgery in the Adult Cystic Fibrosis Patient: Effect on Lung Function, Intravenous Antibiotic Use, and Hospitalization
Oswaldo Henriquez, M.D.

2:08 PM

Safety, Feasibility, and Tolerability of In-office Balloon Sinus Dilation
Ford Albritton, IV, M.D.

2:14 PM

Discussion and Q&A

Moderator: Stilianos Kountakis, M.D.

2:24 PM

5th Annual David W. Kennedy Lectureship
The Frontal Sinus
Peter John Wormald, M.D.

2:50 PM

Break with Exhibitors (Manchester D-1)

*Moderators: Troy Woodard, M.D./
Todd Kingdom, M.D.*

3:10 PM

Nicotine Induces Resistance to Chemotherapy in Nasopharyngeal Cancers
Tianjie Shen, M.D.

3:16 PM

Video-Based Assessment of Operative Competency in Endoscopic Sinus Surgery (ESS)
Kulsoom Laeeq, M.D.

3:22 PM

Safety and Effectiveness of Balloon Catheter Sinus Ostia Dilation in the Pediatric Population: A Multicenter 52 week Analysis.
Hassan Ramadan, M.D.

3:28 PM

Discussion and Q&A

**Moderators: Peter Hwang, M.D./
Martin Citardi, M.D.**

3:38 PM

Endoscopic Coblator-Assisted Management of Encephaloceles: A Prospective Study
Nicholas Smith, M.D.

3:44 PM

Endoscopic Anterior Skull Base Surgery: Intra-Operative Considerations of the Crista Galli and Post-Operative Outcomes
John Lee, M.D.

3:50 PM

Spontaneous CSF Leaks: Delineating Predictive Factors for Success
Rahul Seth, M.D.

3:56 PM

Discussion and Q&A

**Moderators: Hassan Ramadan, M.D./
Peter Catalano, M.D.**

4:06 PM

Radiographic Examination of Anatomic Relationships of the Posterior Ethmoid Artery
Oswaldo Henriquez, M.D.

4:12 PM

Topical Epinephrine is Safe in Endoscopic Sinus Surgery
Richard Orlandi, M.D.

4:18 PM

The Role of Stenotrophomonas Maltophilia in Refractory Chronic Rhinosinusitis
David Grindler, M.D.

4:24 PM

Discussion and Q&A

Moderator: Michael Setzen, M.D.

4:34 PM

Masters in Rhinology - How I Do It: Endoscopic Modified Lothrop Procedure, Tips and Techniques
Peter John Wormald, M.D.

Posters:

Characterization of Bacterial Microbiota in Post-Surgical Maxillary Sinus of Chronic Rhinosinusitis (CRS) Patients Using Molecular 16S rRNA Gene-Based Analyses
Cindy Liu, M.D.

Complementary and Alternative Medicine for Chronic Rhinosinusitis: A Review of the Literature
Rajanya Petersson, M.D.

Computed Tomography Evaluation of Nasal Valve Changes with 2- and 3-mm Spreader Grafts
David Archibald, M.D.

Controversies in Management of Intracranial Angiofibroma: A Literature Review and Personal Experience
Mohsen Naraghi, M.D.

Ectopic Pituitary Adenoma with Apoplexy Presenting as Clival Mass
Pamela Mudd, M.D.

Endoscopic Resection of Schneiderian Papillomas with Inferior Turbinate Preservation
Kimberley Rutherford, M.D.

Endoscopic Sphenoid Balloon Sinuplasty
B. Todd Schaeffer, M.D.

Extended Inferior Turbinate Reduction in the Narrow Nose
Andrew Lerrick, M.D.

Gender and the Presentation of Chronic Rhinosinusitis
David Lin, M.D.

Glomangioma of the Nasal Septum
Daniel Monin, M.D.

Inadequate health insurance cost coverage a major factor in discontinuation of subcutaneous immunotherapy for Allergic Rhinitis
Ravi Surender Vaswani, M.D., Yi-Chun Carol Liu, M.D., Leena Parikh, M.D.

Local Nasal Immunotherapy For Allergic Rhinitis: A Systematic Review
Stephen McDonald, FRCS

Management of Sinusitis and Graft Preservation After Sinus Lift Procedure
Ashutosh Kacker, M.D.

Massive Cerebral Infarction after Embolization for Nasopharyngeal Angiofibroma
Mohsen Naraghi, M.D.

Maxillary Pneumocele: A Case Presentation With Progressive Symptoms
Mohsen Naraghi, M.D.

Modulation of Ambient Air Pollution-Induced Nasal Epithelial Inflammation by Protein Kinase C- subtype in Humans
Do-Yeon Cho, M.D.

Olfactory Dysfunction in Allergic Fungal Sinusitis
Carl Philpott, M.D.

Orbital Extension of Nasopharyngeal Angiofibroma
Mohsen Naraghi, M.D.

Perioperative Continuous Cerebrospinal Fluid Pressure Monitoring in Patients with Spontaneous Cerebrospinal Fluid leaks: Presentation of a Novel Technique
Douglas Reh, M.D.

Positive Fungal Cultures in Allergic and Non-Allergic Fungal Sinusitis
Christopher Melroy, M.D.

Practical Reduction of the Bulky Inferior Turbinate
Andrew Lerrick, M.D.

Role of Radiographic Imaging in the Preoperative Evaluation of Adults Undergoing Septoplasty for Nasal Obstruction
Bruce Tan, M.D.

Spontaneous CSF Fistula with Encephalocele Presenting as Severe Obstructive Sleep Apnea
Sivakumar Chinnadurai, M.D.

Surgical Anatomy of the Sphenoid Sinus, Internal Carotid Artery and Distances to Critical Structures
Stephanie Joe, M.D.

Unilateral Epistaxis in a Middle Aged Man: A Rare Presentation of Pyogenic Granuloma
Jason Champagne, M.D.

Unrecognized Odontogenic Maxillary Sinusitis - A Cause of Endoscopic Sinus Surgery Failure
Anthony Longhini, BS

Zygomaticomaxillary Mucocele with Concomitant Frontoethmoid Mucocele Presenting Four Decades after Facial Trauma
Benjamin Powell, M.D.

Officers



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Business/ACCME

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.

Educational Objectives

This activity will consist of presentations from abstracts selected by the program committee through a blinded review process. Panel discussions will be held based on prior participant feedback. The specific objectives are as follows:

- 1 Discuss the newest cutting edge information on the medical management of patients with rhinosinusitis and skull base lesions.
- 2 List the newest techniques in the surgical management of patients with rhinosinusitis.
- 3 Cite current research in the pathogenesis and pathophysiology of chronic rhinosinusitis.
- 4 Describe the surgical techniques used to reconstruct skull base defects.
- 5 Discuss how to manage patients with olfactory disorders.

Goal

The goal of this activity is to improve competence surgically and medically and to greater the knowledge of techniques, outcomes and basic science.

Outcomes

1. The practitioner should be able to choose appropriate therapy for the different subtypes of chronic rhinosinusitis.
2. The practitioner should be able to incorporate surgical techniques to manage patients with anterior skull base defects.

Target Audience

Otolaryngologists, Head and Neck Surgeons, Allergists, Rhinologists, Residents in Training and interested Allied Health professionals. 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.

Purpose

The American Rhinologic Society's mission is to serve, represent and advance the science and ethical practice of rhinology leading to the improvement in professional competence, performance and ultimately patient outcomes.

Accreditation

Physicians

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

AMA PRA Statement

ARS designates this educational activity for a maximum of 8 AMA PRA Category 1 Credit(s)[™]. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Conflict of Interest Policy

The “Conflict of Interest Disclosure Policy” of the American Rhinologic Society requires that faculty participating in any CME activity disclose to the audience any relationship(s) with a pharmaceutical or equipment company. Any presenter whose disclosed relationship prove to create a conflict with regard to their contribution to the activity, or who refuses to provide all their conflict of interest information will not be permitted to present.

The American Rhinologic Society also requires that faculty participating in any CME activity disclose to the audience when discussing any unlabeled or investigational use of any commercial product, or device, not yet approved for use in the United States.

All faculty participating in a CME activity and/or any person in a position to control the content of a CME activity must complete a conflict of interest (COI) form in its entirety.

These will be reviewed by the CME Committee Chair and the committee members.

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Murray Kopelow, MD, MS, FRCPC

Date of Decision November 30, 2007

Expiration of Term November 2011

Oral Presentations

7:00 AM

Breakfast Symposium
Point of Service in Rhinology

Moderator - Brent Senior, M.D.

8:00 AM

Welcome & Opening Remarks

James Stankiewicz, M.D.

8:07 AM

TNF-alpha Inhibits Olfactory Regeneration in a Transgenic Model of Chronic Rhinosinusitis-Associated Olfactory Loss

Justin Turner, M.D., Kai-Li Liang, M.D., Lindsey May, BS, Andrew Lane, M.D. Baltimore, MD

Introduction:

Olfactory loss is debilitating symptom of chronic rhinosinusitis (CRS). While olfactory sensory neurons (OSNs) are normally regenerated constantly in the olfactory epithelium (OE), a transgenic model of CRS-associated olfactory loss (IOI mouse) demonstrates that inflammation causes widespread OSN loss without progenitor cells proliferation. In this study, we further examine whether the inflammatory cytokine tumor necrosis factor-alpha (TNF-a) inhibits olfactory regeneration.

Methods:

40 IOI mice underwent either unilateral bullectomy or sham surgery and then were induced to express TNF-a in the OE for 1 week. After sacrifice, the mice were assessed histologically and with BrdU staining to determine the effect of TNF-a on olfactory regeneration.

Results:

In the absence of TNF-a, bullectomy was associated with death of OSNs, followed by robust proliferation of neural progenitors and regrowth of the OE. At 12 days post-bullectomy, OE thickness on the operated side had recovered to approximately 80% of the unoperated side. In mice in which TNF-a expression was induced, significantly reduced proliferation was observed, associated with failure of normal reconstitution of OE thickness.

Conclusion:

The mechanism of olfactory dysfunction in CRS remains incompletely understood. Previous studies with a transgenic mouse model suggested that inflammation inhibits progenitor cell proliferation and olfactory regeneration. Here, the role of the CRS-associated cytokine, TNF- α , was investigated using surgical ablation of the olfactory bulb to stimulate synchronous OSN turnover. We find that TNF- α expression prevents normal OE recovery, supporting the role of suppressed olfactory regeneration in the pathophysiology of CRS-associated olfactory loss.

8:13 AM

The Efficacy of a Novel Chitosan Gel on Hemostasis and Wound Healing Following Endoscopic Sinus Surgery

*Rowan Valentine, M.D., Theo Athanasiadis, M.D., Simon Robinson, M.D., Peter-John Wormald, M.D.
Adelaide, SA*

Introduction:

Postoperative bleeding and adhesion formation are the 2 most common complications following endoscopic sinus surgery (ESS). Continued bleeding risks airway compromise from the inhalation of blood clots and from the aspiration of blood stained vomitus. Additionally adhesion formation is the most common reason for patients requiring revision surgery. This study aims to determine the efficacy of a novel chitosan/dextran gel (CD gel) on hemostasis and wound healing following ESS.

Methods:

A randomized controlled trial was performed involving 40 patients undergoing ESS for chronic rhinosinusitis (CRS). Immediately following surgery a baseline Boezaart Surgical Field Grading Scale was taken. Computer randomisation was performed one side to either receive CD gel, or no treatment (control). Boezaart bleeding scores were then calculated for each side every two minutes. Patient's endoscopic features of wound healing were assessed at 2, 6 and 12 weeks after surgery.

Results:

CD gel achieved rapid hemostasis with the mean time to hemostasis 2 mins (95% CI 2-4mins) compared to 10 mins (95% CI 6-14) for the control. There was significantly less adhesions at all time points with CD gel vs control, 2 vs 18 at 2 weeks ($P<0.001$), 3 vs 16 at 6 weeks ($P<0.001$) and 2 vs 12 at 3 months ($P<0.001$). There was no significant difference between CD gel and control with respect to crusting, mucosal oedema, infection or granulation tissue formation.

Conclusion:

CD gel is rapidly hemostatic immediately following ESS and prevents adhesion formation, addressing 2 of the most common complications of sinus surgery.

8:19 AM

Efficacy of an Antibiotic Eluting Chitosan Glycerophosphate Implant in the Setting of Acute Bacterial Sinusitis: A Rabbit Model

Benjamin Bleier, M.D., Jennifer Kofonow, Nazish Hashmi, Noam Cohen, M.D., Ph.D Philadelphia, PA

Introduction:

Chitosan Glycerophosphate (CGP) is a mucoadhesive polymer which can be used as a drug eluting sinonasal implant. The purpose of this study is to assess the potential for CGP as an antibiotic impregnated implant in a rabbit model of acute bacterial sinusitis.

Methods:

IACUC approved study of acute bacterial sinusitis in 12 New Zealand White Rabbits using either *P. aeruginosa* (n=6) or *S. aureus* (n=6). CGP impregnated with 50mg of either gentamicin or vancomycin was bilaterally implanted in 2 rabbits in each group, respectively. The sinuses were irrigated with saline for 4 days and the lavage was collected for colony forming unit (CFU) determination. Within each group, the CFU log reduction in the lavage was compared that of rabbits receiving saline alone (n=2) or a daily 80mcg/mL gentamicin or vancomycin irrigation (n=2) and analyzed using a Student's t-test.

Within the *S. aureus* group, the CFU log reduction using CGP+Vancomycin(-2.57 ± 0.21) was greater than Vancomycin irrigation(-1.66 ± 0.5 , $p=NS$), and significantly greater than saline alone(2.46 ± 0.97 ; $p=0.018$). Within the *P. aeruginosa* group, the CFU log reduction using the CGP+Gentamicin(-4.62 ± 0.74) was greater than Gentamicin irrigation(-4.09 ± 0.70) and saline alone(-1.90 ± 0.90) however the results were not significant. In all rabbits receiving the CGP+Antibiotic implant, no viable bacteria were present in the lavage by day 4.

Conclusions:

Placement of a single antibiotic impregnated CGP implant in the setting of an acute gram positive or gram negative bacterial sinusitis resulted in a greater log reduction of CFU than daily antibiotic irrigation and lead to complete sterilization of the lavage within 4 days.

8:25 AM

Discussion & Audience Response Questions

8:35AM

Characterisation of Bacterial and Fungal Biofilms in Chronic Rhinosinusitis

Andrew Foreman, M.D., Alkis Psaltis, M.D., Lorwai Tan, M.D., Peter-John Wormald, M.D. Woodville, SA

Background:

Conclusive evidence now exists that biofilms are present on the mucosa of Chronic Rhinosinusitis (CRS) patients and it is postulated that they may play a role in the aetiopathogenesis of this chronic inflammatory disorder. Less is known about the species constituting these biofilms.

Objective:

The aim of this study was to develop a Fluorescence in situ Hybridisation (FISH) protocol for the determination and characterisation of bacterial and fungal biofilms in CRS.

Method:

50 CRS patients and 10 controls were recruited for the study. Bacterial FISH probes for *S. aureus*, *H. influenza* and *P. aeruginosa* and a universal fungal probe were applied to sinus mucosal specimens, undergoing a standard hybridisation protocol. The slides were then analysed for biofilm presence using Confocal Scanning Laser Microscopy (CSLM).

Results:

36/50 (72%) of CRS patients had biofilms present in contrast to 0/10 Controls. *S. aureus* was the most common biofilm-forming organism identified in our population, present in 25/50 (50%) of the CRS patients. 11/50 (22%) of CRS patients had characteristic fungal biofilms present on their sinus mucosa. Conclusion: This is the largest study investigating biofilms in CRS patients and provides further evidence for a role for biofilms in CRS. It has validated mucosal tissue cryopreservation for delayed biofilm analysis. The importance of *S. aureus* biofilms has been highlighted, with this species being the most common biofilm-forming organism in our CRS patients. Furthermore, using a strict definition, fungal biofilms were identified for the first time in CRS patients.

8:41 AM

Activation of Ciliary Beat Frequency in Primary Murine Nasal Epithelial Cultures by the CFTR Potentiator, Quercetin

Bradford Woodworth, M.D., Shaoyan Zhang, Ph.D., Eric Sorscher, M.D., Steven Rowe
Birmingham, AL

Introduction:

Quercetin is recognized as a potent activator of CFTR. Although the mechanism of action is incompletely understood, our prior studies indicate that quercetin works in a fashion independent of cAMP signaling. The present study investigates whether quercetin is an activator of stimulated ciliary beat frequency (CBF), an additional component of the mucociliary apparatus relevant to sinonasal physiology.

Methods:

Well-characterized primary murine nasal septal epithelial (MNSE) cultures were utilized in the current study. Transgenic CFTR-/CFTR- (knockout) MNSE cultures were also investigated to rule out a CFTR dependent mechanism. Select cells were incubated with myristoylated PKI (14-22) amide, a specific protein kinase A inhibitor, to evaluate for a cAMP-dependent mechanism. CBF was analyzed with high speed digital imaging and the Sisson Ammons Video Analysis system following apical exposure and compared to controls.

Results:

CBF (expressed as fold-change over baseline) was significantly increased when quercetin was applied to the apical surface [1.65+/-0.13 vs. 1.23+/-0.05 (control), $p=0.014$]. CFTR knockout cultures exposed to quercetin developed an increase in CBF (1.69+/-0.08) similar to wild type indicating a CFTR independent mechanism. PKI (14-22) amide resulted in minimal suppression of quercetin-stimulated CBF (1.50+/-0.05; $p=0.35$).

Conclusion:

Quercetin works as an activator of stimulated CBF independent of CFTR airway surface liquid modulation and the cAMP-dependent signaling pathway. The MNSE culture model provides a means by which the mechanisms underlying quercetin can be better understood in the future, including analysis of CFTR biochemistry, single channel gating, and cell signaling pathways following administration of the compound or related potentiators.

8:47 AM

The Role of Hepatocyte Growth Factor/C-met in Chronic Rhinosinusitis With Polyps

*Murugappan Ramanathan, M.D., Douglas Reh, M.D., Yadong Wang, BS, Andrew Lane, M.D.
Baltimore, MD*

Background:

Hepatocyte growth factor (HGF) is a growth factor thought to attenuate Th2-driven eosinophilic airway inflammatory responses. Increased expression of HGF and its receptor c-Met in nasal polyps suggests a role in disease pathogenesis. The effect of HGF on human sinonasal epithelial cell (SNEC) responses to Th2 inflammatory cytokines in chronic rhinosinusitis with polyps (CRSwNP) has not been explored. Methods: SNECs isolated from patients with and without CRSwNP were grown in cell culture at the air-liquid interface. The Th2 cytokine IL-13 was applied for 24 hours in the presence or absence of HGF. Eotaxin-3 and c-Met expression was assessed using real-time PCR, immunohistochemistry, and flow cytometry.

Results:

SNECs obtained from both CRSwNP and control subjects demonstrated markedly increased expression of eotaxin-3 after exposure to IL-13. HGF significantly blocked IL-13-induced expression of eotaxin-3 in control SNECs, but not in SNECs derived from CRSwNP subjects. Despite the lack of responsiveness to HGF, CRSwNP SNECs displayed increased c-Met mRNA levels after IL-13 exposure, as compared to controls.

Conclusion:

SNECs are active participants in sinonasal mucosal immunity, expressing inflammatory mediators in response to potential pathogens and endogenous cytokines. While Th2 cytokines can elicit expression of pro-eosinophilic mediators by SNECs, HGF appears to have a down-regulating effect on this response. In patients with CRSwNP, SNECs are resistant to this attenuation, demonstrating continued IL-13-induced eotaxin-3 expression despite HGF treatment. Abnormalities in the regulation of epithelial cell responses to endogenous cytokines and growth factors may contribute to the persistent eosinophilic inflammatory state in CRSwNP.

8:53 AM

Discussion & Audience Response Questions

9:03 AM

Presidential Address

James Stankiewicz, M.D.

9:10 AM

Decreased Regulatory T-cells in Sinonasal Mucosa and Circulating Blood in Patients with Chronic Rhinosinusitis with Nasal Polyposis

*Amanda Munoz, M.D., Peter Hwang, M.D., Do-Yeon Cho, M.D., Kari Nadeau, M.D., Ph.D
Stanford, CA*

Introduction:

Regulatory T-cells (Treg) downregulate immune responses by secreting inhibitory cytokines. A deficiency of Treg has been associated with allergic asthma, but the role of Treg in chronic rhinosinusitis (CRS) and chronic rhinosinusitis with nasal polyposis (CRSwNP) is not fully understood. This study characterized hematologic and tissue prevalence of Treg in patients with CRS and CRSwNP compared to controls.

Methods:

Sinus mucosa was collected from 17 patients undergoing endoscopic sinus surgery (4 control, 7 CRS, 6 CRSwNP). Paraffin sections were immunohistochemically double-stained for CD3 (T-cell surface marker) and FOXP3 (Treg transcription factor). The number of CD3+/FOXP3+ cells per high power field (hpf) were counted in two fields for each subject. Peripheral blood mononuclear cells were analyzed by flow cytometry in 19 patients (5 controls, 6 CRS, 8 CRSwNP) The percentage of PMBC that were Treg was recorded (marked by CD4+/CD25high/CD127low). The average number of CD3+/FOXP3+ cells/hpf and the percentage of PMBC that were Treg were compared between the three study groups.

Results:

Results: The mean number of CD3+/FOXP3+ Treg per hpf was significantly lower in CRSwNP as compared to CRS (20.6 vs. 7.0, $p < 0.02$). The mean percentage of PBMC that were Treg was also significantly lower in CRSwNP as compared to both control and CRS subjects (3.62% CRSwNP, 4.69% CRS, 4.84% Control, $p < 0.05$).

Conclusions:

Reduced numbers of Treg are present in both the local tissue and circulating blood in CRSwNP. This may indicate a systemic derangement of the immune response and may offer potential treatment targets in the future.

9:16 AM

Post Surgical Outcomes of Endoscopic Sinus Surgery, done for chronic Rhinosinusitis associated with Biofilms

Deepti Singhal, M.D., Alkis Psaltis, M.D., Andrew Foreman, M.D., Peter Wormald, M.D.
South Australia

Background:

While biofilms have been implicated in the pathogenesis of CRS there is little evidence that their presence or absence have any effect on the outcomes of Endoscopic Sinus Surgery (ESS). This study has been designed to address this question. Methods: A prospective, blinded study of 51 patients undergoing ESS for CRS was conducted. Preoperatively patients assessed their symptoms on a 10 point Visual Analogue Scale and completed Quality of life (QOL) measures (Sino-Nasal Outcome-Test-20 & Global severity of CRS). Their sino-nasal mucosa was graded (Kennedy-Lund scale), and CT scans assessed (Lund-McKay scale). Per-operatively, swabs were taken of all patients for evaluation of possible pus/bacteria/fungus. Random sino-nasal tissue samples were assessed for biofilm presence using Confocal Scanning Laser Microscopy. At each post-operative visit, patients reassessed their sinus symptoms and completed QOL measures. Post-surgical state of their sino-nasal mucosa was graded endoscopically.

Results:

Bacterial biofilms were found in 36 (70%) of the 51 CRS patients. Patients with biofilms presented with significantly worse pre-operative radiology & nasendoscopy scores ($p=0.0002$ & 0.0037 respectively). After a mean follow-up period of 12 months post-surgery, biofilm positive patients had statistically worse sinus symptoms (VAS: $p=0.0486$) and worse nasendoscopy scores ($p=0.0279$). They also required extra post-operative visits & multiple antibiotic treatments deviating from the standard post-operative care required by biofilm negative patients.

Conclusion:

This study showed that patients with biofilms showed evidence of more severe disease pre-operatively and persistence of worse post-operative symptoms, ongoing mucosal inflammation & infections. This study thus strengthens evidence towards the role that biofilms may play in recalcitrant CRS.

9:22 AM

Honey: Histological Effect on Respiratory Mucosa

Shaun Kilty, M.D., Dakheelallah AlMutairi, M.D., Melanie Duval, M.D., Joseph De Nanassy, M.D.
Ottawa, ON CANADA

Introduction:

Chronic rhinosinusitis (CRS) is an inflammatory disease in which bacteria are commonly implicated often in the form of a biofilm. Honey has been demonstrated invitro at our institution to be an effective treatment against two common CRS pathogens both in the planktonic and biofilm forms. The purpose of this study was to determine if the application of honey to respiratory epithelium would result in histological evidence of epithelial injury.

Methods:

Using a rabbit animal model, a nonrandomized controlled trial of four treatment regimes was performed with two rabbits in each group. The left nasal cavity received a honey solution

once daily while the right nasal cavity was not treated. Groups one to three were treated for 3, 7, and 14 consecutive days respectively, and euthanized the morning following the last treatment. Group 4 was treated for 14 consecutive days followed by a 14 day washout period and then euthanized the following morning. The nasal respiratory mucosa was immediately harvested after euthanasia. Respiratory mucosa was examined by light microscopy for histologic change of the treated mucosa in comparison to the control side.

Results:

Cilia were not measured quantitatively but were equally present on the treated and untreated mucosa. There was no histologic evidence of inflammation nor was there epithelial injury or morphologic change of the epithelium.

Conclusions:

The application of a honey solution to rabbit nasal respiratory mucosa over different treatment intervals did not demonstrate evidence of histological epithelial injury.

9:28 AM

Discussion & Audience Response Questions

9:38 AM

Masters in Rhinology

How I do It: Skull Base Tumors - Tips and Techniques

Roy Casiano, M.D.

9:53 AM

Discussion

9:59 AM

Break with Exhibitors

10:20 AM

Perioperative Continuous Cerebrospinal Fluid Pressure Monitoring in Patients with Spontaneous cerebrospinal Fluid Leaks: Presentation of a Novel Technique

*Douglas Reh, M.D., Gary Gallia, M.D., Ph.D, David Solomon, M.D., Ph.D, Abhay Moghekar, MBBS
Baltimore, MD*

Background:

Studies have evaluated cerebrospinal fluid (CSF) pressure elevations as a potential etiology in patients with spontaneous CSF leaks. A few of these studies have utilized direct measurements of CSF pressure using either lumbar punctures or simple pressure transducers over short time periods. There are multiple limitations with these techniques including positional and diurnal variation, inadequate duration of measurement, and insufficient analysis of waveforms. We propose a novel technique for more accurate measurement of preoperative and postoperative CSF pressure in patients with spontaneous CSF leaks.

Methods:

Patients with CSF rhinorrhea or otorrhea had a lumbar catheter placed for 24 hour continuous spinal fluid pressure (CSFP) recording prior to and 72 hours after their surgical repair. The CSFP transducer was leveled whenever patient head elevation was adjusted. ECG, impedance plethysmography and oxygen saturation were analyzed and correlated with CSF pressure. We calculated mean CSF pressure as well as the pulse waveform amplitude.

Results:

One half of patients had significant oxygen desaturations associated with elevated CSFP. Pulse waveform amplitudes could average 31 mm Hg over several minutes in patients with mean CSFP under 10 mm Hg for over 20 hours of recording.

Conclusion:

Perioperative CSFP monitoring provides continuous data including mean and transient elevations in CSF pressure that can be correlated to other measurements such as oxygen saturation. This data may more accurately identify those CSF leak patients with elevated CSF pressure as well as correlate

these elevations to prognostic clinical information that may improve treatment and outcome after their surgical repair.

10:26 AM

Post-operative Healing in Endoscopic Repair of Skull Base Defects: A Comparison of Three Graft Materials

*Kara Prickett, M.D., Sarah Wise, M.D., John DelGaudio, M.D.
Atlanta, GA*

Introduction:

Multiple techniques for endoscopic cerebrospinal fluid (CSF) leak repair have been described. As new graft materials become available, it is important to evaluate their post-operative healing characteristics.

Objective:

To compare time to graft mucosalization, graft success, and postoperative crusting in patients undergoing endoscopic CSF leak repair with acellular dermis, collagen matrices, and sinonasal mucosal grafts.

Methods:

Retrospective review of sequential patients undergoing endoscopic CSF leak repair in a tertiary rhinology practice. This study specifically evaluates time to graft and donor site healing in the short-term postoperative period.

Results:

Thirty-seven patients underwent 40 endoscopic CSF leak repairs. Seventeen repairs were performed with sinonasal mucosal grafts, 10 with acellular dermis, and 13 with collagen matrices. There was a significant difference in mean time to graft mucosalization across materials ($p < 0.001$). Acellular dermis grafts took significantly longer to mucosalize (11.7 weeks) versus both collagen matrices (6.6 weeks) and mucosa (4.9 weeks). Graft crusting was more prolonged with acellular dermis (9.4 weeks) versus collagen matrices (5.1 weeks), ($p = 0.04$). Graft crusting was not a significant factor for sinonasal mucosal grafts. Donor site crusting in the mucos-

al group had a mean duration of 6.5 weeks. Overall success was 100%. Two patients had partial graft loss; no patients had CSF leak recurrence during follow-up.

Conclusions:

Mucosal grafts, acellular dermis, and collagen matrices have similar success rates in endoscopic repair of CSF leak. Acellular dermis grafts have longer time to mucosalization and longer duration of graft crusting than mucosal or collagen matrix grafts.

10:32 AM

Endoscopic Intracranial Resection: Case Series and Design and Employment of a Perioperative Management Protocol

*Evan Ransom, M.D., John Lee, M.D., James Palmer, M.D., Alexander Chiu, M.D.
Philadelphia, PA*

Introduction:

Extended endonasal approaches revolutionized the treatment of paranasal sinus and skull base neoplasms. Purely endoscopic resections of intracranial pathology remain rare and challenging. Addition of intracranial work significantly alters the perioperative risk profile and proactive management of complications is key to proceeding safely. We present a detailed review of purely endoscopic transnasal intracranial resections and the design and implication of a perioperative management protocol with specific reference to skull base and neuroanatomy.

Methods:

Retrospective review of all patients undergoing endoscopic skull base approaches for neoplasm at Penn between 2005 and May, 2009. Selection of cases involving intracranial resection for detailed review. Analysis of outcome and complications by approach. Design and prospective employment of a perioperative management protocol.

Results:

Fifteen patients underwent purely endoscopic intracranial resection. Thirteen tumors were malignant. Approaches included 12 transcribifrom, two transplanum-transtuberculum, and one transclival. Two major (CSF leak, electrolyte derangement) and four minor complications occurred. Mean follow-up was 15 months, and 13/15 patients are free of disease. One patient died of recurrence; one patient is alive with disease. The perioperative management protocol designed from these data resulted in decreased use of lumbar drainage and increased use of nasoseptal flap reconstruction. This protocol is now employed in all cases.

Conclusions:

Purely endoscopic intracranial anterior skull base surgery is both feasible and safe when a complete understanding of the disease, surgery, and perioperative management is achieved. Indications for these procedures continue to expand. Future work will include quality of life measures, neurocognitive results, and cost effectiveness analysis.

10:38 AM

Discussion & Audience Response Questions

10:48 AM

Orbital Involvement in Invasive Fungal Sinusitis: Review of Outcomes and Recommendation of a Treatment Paradigm

*Lindsey Arviso, M.D., Sarah Wise, M.D., John DelGaudio, M.D.
Atlanta, GA*

Introduction:

Orbital Involvement in Invasive Fungal Sinusitis: Review of Outcomes and Recommendation of a Treatment Paradigm
Introduction Invasive fungal sinusitis (IFS) is a life threatening infection of immunocompromised patients. Aggressive disease or delayed treatment may result in extrasinus extension and increased morbidity. We review the incidence of orbital

involvement in IFS, treatment options for the orbit, and outcomes with respect to orbital function.

Methods:

A 14-year retrospective review of IFS patients from a single institution was performed (January 1995 to March 2009). The study group was analyzed for orbital invasion with IFS. Data was reviewed for orbital symptoms at presentation, procedures performed to address the orbit, and functional outcomes.

Results:

Sixty-nine IFS patients were reviewed. 28 patients (41%) had orbital involvement. Symptoms on presentation included visual loss, ophthalmoplegia, periorbital pain, periorbital/orbital cellulitis, and proptosis. Twenty-four (86%) underwent endoscopic sinus surgery for minimal orbital debridement of grossly involved tissue, 8 (28%) had intraorbital antifungal irrigation catheters placed, and 11 (39%) required orbital exenteration. Of those who retained their orbit (17), 9 (32%) survived with globe preservation, 7 with a functional globe, and 2 retained a nonfunctional globe but were spared the cosmetic defect of exenteration. The overall mortality rate for patients with orbital involvement of IFS was 39% (11 patients).

Conclusions:

Orbital involvement causes significant morbidity in IFS. Conservative rather than radical debridement of periorbital tissue with adjunctive administration of systemic and local antifungals can slow disease progression to allow recovery of immune function and maintain a functional globe.

10:54 AM

Increased Prevalence of *Staphylococcus aureus* in Allergic Fungal Rhinosinusitis Versus Other Subsets of Chronic Rhinosinusitis with Nasal Polyps

*David Clark, M.D., Samer Fakhri, M.D., Martin Citardi, M.D., Ashley Wenaas, BS
Houston, TX*

Background:

The pathogenesis of allergic fungal rhinosinusitis (AFRS) is thought to represent an immunological reaction to fungal antigens. Recent studies have implicated superantigen and non-IgE mediated mechanisms in the development of AFRS.

Objective:

To assess the prevalence of *Staphylococcus aureus* in AFRS versus other subsets of chronic rhinosinusitis with polyps (non-AFRS). Methods Retrospective review of 41 patients with AFRS and 91 patients with chronic rhinosinusitis with nasal polyps (CRSwNP, also termed non-AFRS). AFRS was diagnosed based on a minimum of 4 of 5 Bent and Kuhn criteria. Bacterial cultures, fungal cultures, and total serum IgE at presentation were analyzed for each group.

Results:

Staphylococcus aureus was significantly more prevalent in the AFRS group compared with the non-AFRS group (46% versus 17%, $p = 0.006$). There was a higher association between fungus and *S. aureus* presence in the AFRS versus the non-AFRS group (25% vs. 2%, $p = 0.001$). Patients with positive cultures for *S. aureus* had a higher (but not statistically significant) serum IgE level compared to patients with negative cultures (1089 versus 579, $p = 0.14$).

Conclusion:

Staphylococcus aureus was more prevalent in patients with AFRS versus patients with other subsets of CRSwNP. In addition, the simultaneous presence of both *S. aureus* and fungus were found to be more prevalent in the AFRS group. These results support a potential role for *S. aureus* in the pathogenesis of AFRS.

11:00 AM

Update to Severity Classification for Chronic Rhinosinusitis
Troy Woodard, M.D., Jason Champagne, M.D., Stilianos
Kountakis, M.D.
Augusta, GA

Introduction:

A chronic rhinosinusitis (CRS) severity classification system has been previously proposed by correlating objective and subjective clinical parameters with basic science parameters. The purpose of this study is to revisit the severity classification system and confirm previous findings through the use of an expanded patient cohort.

Methods:

Analysis of prospectively collected data was performed in patients undergoing endoscopic sinus surgery (ESS) for CRS. All patients completed a preoperative Sino-Nasal Outcome Test (SNOT)-20 and underwent objective grading via the Lund-Kennedy nasal endoscopy and the Lund Mackay CT scan scoring systems. Tissue eosinophilia was determined by pathologic examination.

Results:

Two hundred eighty-one consecutive patients underwent ESS for CRS between 2003-2008 and had completed medical records. The presence of polyps was associated with higher SNOT-20, endoscopy scores, and CT scores. This trend was also seen in patients with either tissue eosinophilia >5 / high power field (HPF) or asthma. Polyps were found in 81.4% of patients with tissue eosinophilia > 5 /HPF and in 29.5% of patients with ≤ 5 eosinophils/HPF. Patients with both polyps and high tissue eosinophilia had more severe clinical findings than patients with polyps, but without tissue eosinophilia. Similarly, in patients without polyps, high tissue eosinophilia resulted in more severe disease than in the absence of tissue eosinophilia.

Conclusion:

We confirm the previously proposed hierarchical severity classification system for CRS: Eosinophilic chronic hyperplastic rhinosinusitis: polyps with tissue eosinophilia, Non-eosinophilic chronic hyperplastic rhinosinusitis: polyps without tissue

eosinophilia, Eosinophilic chronic rhinosinusitis: tissue eosinophilia without polyps , Non-eosinophilic chronic rhinosinusitis: no polyps and no tissue eosinophilia.

11:06 AM

Discussion & Audience Response Questions

11:16 AM

Managing Refractory Sinusitis Surgical and Medical Considerations - Panel

Moderator: Joseph Jacobs, MD

Panelists: Michael Chandler, MD (New York, NY),

Martin Desrosiers, M.D., FRCSC (Montreal, Quebec, Canada)

Jan Gosepath, M.D. (Germany),

Amber Luong, M.D. (Houston, TX)

12:00 PM

Business Meeting

Award Presentation

Break with Exhibitors

1:00 PM

Presence of Dendritic Cells Expressing Pro-Th2 Costimulatory Molecules is Increased in Patients With Allergic Fungal Sinusitis and Chronic Rhinosinusitis Without Nasal Polyps

Brendan O'Connell, Jennifer Mulligan, Ph.D, Carl Atkinson,

Ph.D, Rodney Schlosser, M.D.

Charleston, SC

Introduction:

Patients with allergic fungal sinusitis (AFS) display a Th2 immune response in the sinus mucosa, though the mechanism by which this occurs remains unclear. Dendritic cells (DC) are antigen presenting cells that regulate both innate and adaptive immunity. Previous studies by our lab identified increased numbers of DC in the mucosa of patients with AFS

compared to normal controls. In the current study, the presence of mature DC capable of stimulating Th2 immune responses in the sinus mucosa was examined.

Methods:

Sinonasal and inferior turbinate specimens were collected from patients with AFS (n=7), chronic rhinosinusitis without nasal polyps (CRSsNP) (n=3) and nondiseased patients undergoing cerebrospinal fluid leak repair or pituitary tumor resection (n=8). Tissue samples were stained immunohistochemically for the costimulatory molecules, CD80 (B7.1) and CD86 (B7.2), known stimulators of Th2 immune responses expressed by mature DC.

Results:

Analysis of sinus tissue samples from patients with AFS demonstrated increased numbers of cells staining positive for CD80 and CD86 compared to normal controls. Patients with CRSsNP also demonstrated increased numbers of mature DC, but where less than AFS. In all groups, mature DC were localized primarily in the subepithelial stroma. Turbinate specimens revealed low levels of CD80 and CD86 staining that were similar among all groups.

Conclusions:

Patients with AFS and to a lesser extent CRSsNP, displayed increased presence of mature DC capable of stimulating Th2 immune responses. DC may play a role in the modulation of elevated Th2 immune responses observed in patients with AFS.

1:06 PM

Targeting TGF-beta 1 Receptors Modulates Adherent Junctions in Chronic Rhinosinusitis (CRS)

*Ramin Naim, M.D., Katharine Elliott, M.D., Jan Gosepath, M.D., Karl Hormann, M.D.
Wiesbaden*

Introduction:

Various Factors Such as Atopy, Microbial Agents, Fungal Infection, and Anatomic Variants are assumed to be involved in the formation of the polypoid chronic rhinosinusitis (pCRS). A further contributing factor, in the formation of pCRS, is beta-catenin. However, the extent of the hyperproliferation of the nasal mucosa is likely linked to the induction of TGF-beta1. This study examines the interaction of these cytokines in the formation of pCRS with a view to devising a possible therapeutic strategy.

Method:

Cultured pCRS specimens from eosinophilic and non-eosinophilic pCRS were incubated with TGF-beta1 antisense, and levels of beta-catenin were determined after 48 hours using ELISA, Western blot, and immunohistochemistry. Normal mucosa of the inferior nasal turbinate served as control.

Results:

A strong decrease of beta-catenin was observed in both eosinophilic and non-eosinophilic pCRS specimens. The results were not dependant on the eosinophilic infiltration; however, length of the incubation and TGF-beta1 oligonucleotides influenced the outcome.

Conclusion:

TGF-beta1 appears to play a pivotal role in eosinophilic and non-eosinophilic pCRS. The decrease of TGF-beta1 also influenced levels of beta-catenin. This observation suggests that establishing a clinical therapeutic strategy should primary aim at TGF-beta1.

1:12 PM

Effect of Dilute Baby Shampoo on Nasal Mucociliary Clearance in Healthy Subjects

*Seth Isaacs, M.D. , Martin Citardi, M.D., Amber Luong, M.D.,
Chad Whited, M.D., Samer Fakhri, M.D.
Houston, TX*

Introduction.

Biofilm formation has been implicated as an etiologic factor in the development of chronic rhinosinusitis (CRS). Nasal irrigation with dilute baby shampoo has been proposed as an anti-biofilm treatment for CRS patients. The effect of dilute baby shampoo on normal sinonasal mucosal function is unknown.

Methods.

Mucociliary clearance time (MCT), as measured by the time in minutes for a subject to detect a sweet taste after the application of a saccharin granules at the anterior part of the inferior turbinate, was performed before and after nasal irrigation with 50 cc of 1% baby shampoo (Johnson & Johnson, New Brunswick, NJ) in 27 patients.

Results:

Mean MCTs before and after irrigation were 12.09 (+/- 4.83) and 15.45 (+/- 7.71) minutes, respectively. The mean difference, 3.37 minutes, was statistically significant ($p=0.031$). Pre- and post MCTs for each subject were not correlated ($r=0.324$; $p=0.100$).

Conclusion:

Nasal irrigations with dilute baby shampoo increase MCT in healthy subjects. The impact of such interventions in CRS patients warrants further investigation.

1:18 PM

Discussion & Audience Response Questions

1:28 PM

Endonasal Laser Tissue Welding: First Human Experience

Benjamin Bleier, M.D., Alexander Chiu, M.D., Noam Cohen, M.D., Ph.D., James Palmer, M.D., Philadelphia, PA

Introduction:

Laser Tissue Welding (LTW) is a method of creating an instant sutureless wound closure using a chromophore doped biologic solder. The purpose of this study was to assess the technical feasibility and outcomes and of endoscopic LTW in human sinonasal mucosa.

Methods:

Prospective, IRB approved study of 10 patients undergoing endoscopic LTW using an albumin and hyaluronic acid based solder for repair of mucosal injuries. Data was collected on patient demographics, total lasing time, and volume of solder used. Wounds were prospectively followed by endoscopic exam and scored on a 0-2 scale by three blinded observers (BSB, JNP, AGC) for inflammation, thermal injury, and edema. Results were compared to control wounds using a Student's t-test.

Results:

10 patients (7 male, 3 female; average age 50, range 33-71) underwent endoscopic LTW. Total lasing time was 11 ± 11 min requiring 0.96 ± 0.83 mL of solder per patient. Patients were followed for an average of 72 days (range 12-138) and no complications were noted. Solder persisted for up to 26 days and there was no significant difference between the lased and control wounds with regards to inflammation (0.87 ± 0.72 vs. 1.31 ± 0.87), thermal injury (0.06 ± 0.25 vs. 0.12 ± 0.34), or edema scores (1.13 ± 0.81 vs. 1.44 ± 0.73).

Conclusions:

Endoscopic Laser Tissue Welding is a technically feasible and rapid method of wound closure in sinonasal mucosa which does not result in any significant thermal or inflammatory sequelae.

1:34 PM

Fracture of Bony Lamellae Within the Frontal Recess Following Balloon Catheter Dilatation

*Ayesha Khalid, M.D., Timothy Smith, M.D., Jess Mace, MPh, Nathan Sautter, M.D.
Portland, OR*

Background:

The precise manner in which balloon catheter dilatation (BCD) alters the dimensions of the frontal recess is not well characterized. The purpose of this investigation was to determine whether BCD within the frontal recess is associated with reproducible patterns of fracture in bony lamellae, to characterize changes between pre- and post-intervention measurements of the frontal recess, and to compare the degree of change seen with endoscopic Draf I dissection.

Methods:

Eight cadaver heads underwent pre- and post-intervention endoscopic visualization and computed tomography (CT) of the frontal recess. Frontal recesses were assigned for either BCD or Draf I dissection. CT scans were evaluated by two reviewers (principal investigator and neuroradiologist).

Results:

Inter-rater reliability was strong for all measures ($r > 0.779, p < 0.001$). The sagittal and coronal dimensions of the frontal recess increased significantly following BCD and Draf I dissection ($p < 0.028$). Significantly less change was noted in average coronal dimensions of the frontal recess following BCD compared to Draf I dissection (0.9 ± 0.5 mm versus 2.6 ± 0.6 mm; $p < 0.018$). Mean change in the sagittal dimension was significantly less following BCD compared to Draf I dissection (1.0 ± 0.8 mm versus 4.0 ± 1.2 mm, $p < 0.018$). The anterior face of the ethmoid bulla was the most frequently fractured lamella following BCD (56%).

Conclusion:

The sagittal and coronal dimensions of the frontal recess increased significantly following BCD and Draf I dissection. A significantly greater change in dimensions of the frontal recess is observed following Draf I dissection compared to BCD. No orbital or skull base injury was noted with either technique.

1:40 PM

Characterizing Methicillin-Resistant Staphylococcus aureus Infections in a Tertiary Rhinology Practice

*Victoria Epstein, M.D., Barbara Przybyszewski, BS, Anne Hutchinson, BA, Donald Lanza, M.D.
St. Petersburg, FL.*

Introduction:

Methicillin-Resistant Staphylococcus aureus (MRSA) is an increasing source of morbidity and patient concern. The aims of this study are to determine the prevalence of MRSA in paranasal sinus cultures from a tertiary outpatient rhinology practice, to characterize its clinical behavior as "invasive" or "non-invasive", and to report antibiotic susceptibility patterns.

Methods:

Patients with sinus cultures obtained in 2007 were retrospectively identified and their medical records evaluated. Antibiotic susceptibility profiles of MRSA were determined and compared to a standardized community health system (CHS) antibiogram for the year 2006. Chi square statistical analysis was performed.

Results:

307 patients had endoscopically directed cultures of purulent sinonasal material. 43% (47/109) of patients with Staphylococcus aureus had MRSA positive cultures, in comparison to 64% in the CHS setting ($p < 0.001$). The prevalence of MRSA in the rhinologic cultured patients was 15.3%. Over 90% of MRSA isolates were considered susceptible to clarithromycin, erythromycin, linezolid, tetracycline or trimethoprim/sulfamethoxazole. Treatment of symptomatic MRSA patients was based on antibiotic susceptibility obtained from endoscopically directed cultures. None of the rhinologic patients with MRSA positive cultures exhibited clinically "invasive" infection.

Conclusions:

In the outpatient rhinologic setting, *Staphylococcus aureus* was less likely to be MRSA when compared to *Staphylococcus aureus* in CHS cultures. Sinus MRSA is typically sensitive to several oral agents and it is not typically associated with invasive characteristics in relatively immunocompetent hosts. Further work is needed to differentiate variants of MRSA and their behavior in sinus related disease.

1:46 PM

Discussion & Audience Response Questions

1:56 PM

Post Sinus Surgery Nasal Irrigation: What are the Real Risks of Contamination?

John Lee, M.D., Jayakar Nayak, M.D., Laurel Doghramji, RN, Alexander Chiu, M.D. Philadelphia, PA

Background:

Saline nasal irrigation has become one of the most effective and important aspects of post-operative care following endoscopic sinus surgery. Our institution has previously demonstrated that irrigation bottles have a risk of bacterial contamination during this post-operative period. However, the clinical significance of this contamination including the risks to the actual irrigation fluid has yet to be determined.

Objective:

To identify the risks of contamination of both the nasal irrigation bottle and fluid following endoscopic sinus surgery.

Methods:

This was a prospective study of consecutive patients undergoing endoscopic sinus surgery for chronic sinusitis. All patients were given nasal irrigation bottles with detailed cleaning instructions pre-operatively. Nasal irrigation bottles were collected and cultured at 1 and 2 weeks post-operatively. During

the same visit, 5ml of sterile normal saline was mixed into the irrigation bottle and then cultured separately. All patients received a two week course of antibiotics as part of our regular post-operative regimen. Pre- and post-operative SNOT-22 scores were collected during the patient visits.

Results:

A total of 20 patients agreed to participate in the study. At 1 week post-operatively, 50% of the bottles had positive cultures with 40% of the irrigation samples testing positive for bacteria. At two weeks, the contamination in the irrigation bottle and fluid decreased to 26.7% and 20% respectively. The most common bacteria cultured was pseudomonas aeruginosa . Across all patients, there was a statistically significant improvement in the pre-operative SNOT-22 score at 1 and 2 weeks post-operatively. However, contamination of the irrigation bottle or fluid did not adversely affect SNOT-22 outcomes.

Conclusion:

Despite detailed cleaning instructions, there is a relatively high risk of bacterial contamination in nasal irrigation bottles and fluid following endoscopic sinus surgery. Although these risks did not translate into worse SNOT-22 scores, these results may provide corroborative support for the routine administration of post-operative antibiotics to prevent early re-infection.

2:02 PM

Endoscopic Sinus Surgery in the Adult Cystic Fibrosis Patient: Effect on Lung Function, Intravenous Antibiotic Use, and Hospitalization

*Oswaldo Henriquez, M.D., Sarah Wise, M.D.,
John Delgaudio, M.D., Arlene Stecenko, M.D.
Atlanta, GA*

Background:

Studies of endoscopic sinus surgery (ESS) in pediatric cystic fibrosis (CF) have not demonstrated significant improvement in lung function postoperatively. Adult CF patients have not been examined for ESS effect on pulmonary health.

Objectives:

To ascertain ESS impact in adult CF through objective parameters of: pulmonary function tests (PFTs), intravenous (IV) antibiotic therapy and inpatient hospital days.

Methods:

Retrospective review of adult CF patients (> 18 year old) undergoing ESS from 2006-2009 in a tertiary care hospital. Twelve-month preoperative and 12 month postoperative PFTs, IV antibiotic courses, total days of IV antibiotics, and inpatient hospital days were assessed.

Results:

Twenty-two adult CF patients underwent ESS; 15 patients had adequate data for evaluation. No significant difference was found between mean preoperative and postoperative FEV1 (76.1 vs. 76.0) or FVC (61.2 vs. 59.9), or between best preoperative and postoperative FEV1 (67.4 vs. 67.1) or FVC (84.2 vs. 83.0), (paired samples t-test, $p > 0.05$). Number of IV antibiotic courses and total number of IV antibiotic days did not differ between the preoperative and postoperative periods (Wilcoxon signed rank test, $p > 0.05$). However, number of inpatient hospital days was significantly lower in the 1-year postoperative period (36.7) versus the 1-year preoperative period (59.1), (Wilcoxon signed rank test, $Z = -2.20$, $p = 0.028$).

Conclusion:

This preliminary study of ESS in adult CF patients indicates significant reduction in inpatient hospital days in the postoperative period. However, there is no evidence that ESS improved lung function or the need for IV antibiotics.

2:08 PM

Safety, Feasibility, and Tolerability of In-Office Balloon Sinus Dilation

*Ford Albritton, IV, M.D., Michael Sillers, M.D., Roy Casiano, M.D., Jacob Johnson, M.D.
Dallas, TX*

Introduction:

Balloon Sinus Dilation (BSD) tools are increasingly used in Endoscopic Sinus Surgery (ESS). Because BSD tools cause less tissue trauma, bleeding, and patient discomfort, incorporating their use in the office setting would be attractive in this era of cost containment. We look at patient safety, tolerability, and technical feasibility of ESS with BSD in the office setting.

Study Design:

IRB approved, prospective, multicenter (10) trial.

Methods:

27 patients requiring ESS for standard indications were offered option of treatment in an office setting under local anesthesia. BSD tools were used in all cases. Ability to access and dilate the sinus, adverse events, procedure tolerability and pain levels were assessed. Patients were followed at 1, 4, and 24 weeks (endoscopic exam and sinus symptom inventories), with CT at 24 weeks.

Results:

Revision and primary cases were evenly represented. Procedure was aborted in 1 patient due to intolerance, and in 3 patients due to inability to access. On a pain scale of 0 (none) to 5 (intense), 69.2% rated pain as 0, 1, or 2; 3.8% rated pain at 5. SNOT-20 and RSDI measures showed statistically significant ($p < 0.0001$) improvement at follow-up. CT Lund- MacKay scoring improved -2.93 at 24 weeks ($p = 0.001$). At follow-up, 89% (24/27) indicated they would have the procedure again, 3 were "not sure".

Conclusion:

Performance of ESS with BSD in the office is feasible, well tolerated, and safe. In an era of healthcare cost containment, in-office ESS with BSD offers a safe and reliable option.

2:14 PM

Discussion & Audience Response Questions

2:24 PM

5th Annual David W. Kennedy Lectureship The Frontal Sinus

Peter John Wormald, M.D.

2:50 PM

Break with Exhibitors

3:10 PM

Nicotine Induces Resistance to Chemotherapy in Nasopharyngeal Cancers

*Tianjie Shen, M.D., Wei Le, M.D., Peter Hwang, M.D., Daya Upadhyay, M.D.
Stanford, CA*

Introduction:

Epidemiologic and clinical data implicate that continued smoking causes progression of cancer growth and resistance to therapy in patients with cancer. The carcinogens possess ability to block apoptosis, an important mechanism in the development of tumors and resistance to chemotherapy. We previously demonstrated that nicotine enhance growth and proliferation in lung cancer. However, the effects nicotine, a tobacco carcinogen that inhibits apoptosis in nasopharyngeal cancer (NPC) has not been studied before. In this study, we sought to determine the effects of nicotine on chemotherapy-induced apoptosis in human nasopharyngeal carcinoma.

Method:

Primary human nasopharyngeal carcinoma cells were grown per protocol, treated with combination chemotherapy, and the apoptosis was assessed by TUNEL and DNA Fragmentation assays. The regulation of Mitogen Activated Protein Kinase (MAPK) and Akt signal transduction pathway was examined by using Western blott, RTqPCR, RCR array and immunofluorescent staining assays.

Results:

Combination chemotherapy with cisplatin (35ÅfÅ□M) plus etoposide (20ÅfÅ□M) caused significantly increase in NPC apoptosis as compare to single agent alone, while, nicotine, in

part, inhibited chemotherapy-induced apoptosis in NPC. Further, nicotine induced activation of Akt and MAPK pathways, while, inhibition of MAPK using U0126 and Akt by phosphatidylinositol 3-kinase inhibitor, LY294002, in part, blocked the antiapoptotic effects of nicotine against cisplatin and etoposide-induced apoptosis in NPC.

Conclusion:

Nicotine inhibits chemotherapy-induced apoptosis in nasopharyngeal carcinoma via the Akt and MAPK mediated signaling pathways. We speculate that nicotine may play a role in oncogenesis and resistance to cancer therapy in nasopharyngeal carcinoma.

3:16 PM

Video-based Assessment of Operative Competency in Endoscopic Sinus Surgery (ESS)

*Kulsoom Laeeq, M.D., Dougals Reh, M.D., Andrew Lane, M.D., Nasir Bhatti, M.D.
Baltimore, MD*

Background:

Accreditation Council for Graduate Medical Education (ACGME) requires that residency programs must have an effective plan for assessing their residents' performance in the six core competencies. The purpose of our study was to 1) assess feasibility and 2) construct validity of the video-based assessment of Endoscopic Sinus Surgery skills. Study Design A prospective observational study .

Methods

Five junior residents (PGY 1-3), 6 senior residents (PGY 4, 5) and 3 attendings (Rhinology faculty) were videotaped as they performed ESS on cadavers in the lab. Four other faculty members watched the recorded videotapes and rated performance using global and checklist assessment tools for ESS. Evaluators were blinded to the identity of the performers. Rating was made feasible by allowing the raters to fast-forward through the tapes where appropriate. Feasibility was measured by comparing the time taken to score the procedure

on video to that in the lab. Construct validity was calculated by comparing the total scores and score on each item of the instrument. For all statistical purposes $p < 0.05$ was considered significant.

Results:

Our results showed construct validity with experts performing better than the senior residents and senior residents performing better than junior residents. The time taken to evaluate the surgeon on video was less than that in the laboratory.

Conclusion:

The use of videotapes combined with the objective assessment tool is a feasible and valid method for assessment of technical skills. It has implications for programs since it will increase the faculty buy-in and reduce the potential bias.

3:22 PM

Safety and Effectiveness of Balloon Catheter Sinus Ostia Dilation in the Pediatric Population: a multicenter 52 week analysis

*Hassan Ramadan, M.D., Kevin McLaughlin, M.D., Gary Josephson, M.D., Frank Rimell, M.D.
Morgantown, VA*

Objectives:

Balloon catheter dilation of obstructed sinuses for chronic rhinosinusitis (CRS) has been found to be successful in adults. The safety and feasibility of balloon catheter dilation in children has been recently established. The purpose of this study was to further study the safety and effectiveness of this technology in CRS in children.

Methods:

A prospective, multi-center, non-randomized evaluation was conducted in pediatric patients diagnosed with CRS. Thirty-two patients aged 2-11 were enrolled at 5 sites. Patients were seen at follow-up visits at 1, 12, 24, and 52 weeks post-op. Safety was assessed by rate of adverse events. Effectiveness was assessed through measurement of patient sinus symp-

toms. Parent/guardians completed the SN-5 Questionnaire for all patients.

Results:

Twenty-one children completed their 52 weeks follow up. No device related adverse events were reported. SN-5 score improved from a mean of 4.5 at baseline to a mean of 2.4 at 52 weeks (a change of -2.1). Twelve (57%) children had a significant improvement of their SN-5 (> -1.5), 6 (29%) had moderate improvement ($>-1.0 <-1.5$), 3 (14%) had mild improvement ($>-0.5 <-1.0$), and none of the children had any worsening of their symptoms.

Conclusions:

Balloon catheter dilation of the sinus ostia in children was safe and effective at one year follow up in this group of children. Further studies comparing balloon dilation to other modalities of treatment in children are needed to determine its efficacy in the treatment of CRS in children.

3:28 PM

Discussion & Audience Response Questions

3:38 PM

Endoscopic Coblator-Assisted Management of Encephaloceles: A Prospective Study

*Nicholas Smith, M.D., Kristen Riley, M.D.,
Bradford Woodworth, M.D.
Birmingham, AL*

Introduction:

Numerous studies have demonstrated the efficacy and safety of endoscopic management of CSF rhinorrhea, encephaloceles, and anterior skull base defects. Techniques have evolved as new instrumentation has developed, but typically involve meticulous bipolar cautery to decrease the potential for intracranial bleeding. The present study evaluates radiofrequency coblation as a new tool in transnasal endoscopic management of encephaloceles.

Methods:

A prospective study involving 11 patients with 13 encephaloceles (12 spontaneous, 1 traumatic) reduced with coblation compared to a cohort of 7 encephaloceles (5 spontaneous, 1 traumatic, 1 congenital) reduced with standard bipolar cautery. Main outcome measures included duration of encephalocele removal and bleeding events. Bleeding encountered during removal was considered a minor event unless more than one attempt at cauterization was required. Other data collected included standard demographics, encephalocele size, and complications.

Results:

Average duration of coblation-assisted encephalocele removal was 21.5 minutes compared to 65.1 minutes with standard bipolar cautery ($p=0.013$). Minor bleeding was encountered during removal with coblation in 9 of 13 encephaloceles (21 events). One episode of major bleeding occurred in the coblation group when an anterior ethmoid artery was encountered during removal. Encephaloceles reduced with bipolar cautery alone had minor bleeding events in 5 of 7 patients with no major events recorded. Encephaloceles were slightly larger in the coblation group (20.3 mm) compared to bipolar (17.3 mm) ($p=0.626$).

Conclusions:

Radiofrequency coblation greatly increases intraoperative speed during encephalocele removal with similar hemostasis when compared to bipolar cautery alone and represents a useful instrument in the management of encephaloceles.

3:44 PM

Endoscopic Anterior Skull Base Surgery: Intra-Operative Considerations of the Crista Galli and Post-Operative Outcomes

*John Lee, M.D., Evan Ransom, John Lee, M.D.,
Alexander Chiu, M.D.
Philadelphia, PA*

Background:

In the realm of endoscopic skull base surgery, obtaining adequate dural and intracranial access is often limited anteriorly by the anatomical boundary of the crista galli.

Objectives:

1) To measure the anatomical dimensions of the crista galli in a consecutive series of patients undergoing purely endoscopic intracranial surgery for anterior skull base tumors. 2) To review our management, outcomes and complications of patients who underwent the endoscopic transcribriform approach.

Methods:

This was a retrospective chart review of consecutive patients who underwent endoscopic transcribriform surgery for sinonasal and skull base lesions with dural involvement and/or intracranial extension. Measurements of the crista galli were made from sagittal reconstructions of the pre-operative CT scans.

Results:

A total of twelve patients were identified and treated by the senior author at the University of Pennsylvania. 11 patients (91.7%) had malignant etiologies with only one patient having a benign skull base tumor. Complete resection with dural margins was accomplished in all patients. The average post-operative ICU stay was 1.4 days while the average hospital stay was 3.8 days. There were no post-operative complications. The average crista galli dimension was 12.7mm (anterior-posterior) and 12.9 mm (cranial-caudal dimension). Drilling of the crista galli to obtain adequate dural access was required in 4 patients (33.3%).

Conclusion:

Endoscopic transcribriform surgery can be performed with relatively low morbidity in the management of anterior skull base

tumors. Knowledge of the dimensions of the crista galli is important in pre-operative planning for both instrumentation and access.

3:50 PM

Spontaneous CSF Leaks: Delineating Predictive Factors for Success

*Rahul Seth, M.D., Karthik Rajasekaran, BS, Amber Luong, M.D., Pete Batra, M.D.
Cleveland, OH*

Background:

Spontaneous cerebrospinal fluid (CSF) leaks represent a significant challenge due to frequent association of elevated intracranial pressure (ICP) resulting in high risk of surgical failure.

Objective:

The objective of this study was to review the management strategy for spontaneous leaks and identify risk factors for failure.

Methods:

Retrospective chart review was performed from 1999 to 2009 at a tertiary-care medical center.

Results:

A total of 105 patients underwent CSF leak repair during this time period; 39 patients (37.1%) were treated for spontaneous CSF leaks. Mean age was 53.2 years and 33 patients were female (84.6%). Average BMI was 28.5. The most common sites were cribriform plate (51%), central sphenoid (21%), and sphenoid lateral pterygoid recess (18%). All patients underwent endoscopic repair utilizing image guidance with multi-layered closure in most cases. Acetazolamide was used in 12 patients, while 5 patients underwent ventriculoperitoneal shunting (VP). Five patients (12.8%) developed recurrent CSF leak with mean ICP of 25 cmH₂O, compared to 22.8 cmH₂O for those without recurrent leak. All underwent successful re-

repair with resolution of CSF leakage at mean follow-up of 4.5 years. Pearson likelihood ratio demonstrated pseudotumor cerebri diagnosis was associated with statistical higher risk of recurrence, while elevated BMI approached statistical significance. Age, leak site, ICP, and presence of encephalocele were not associated with recurrence.

Conclusion:

Management of spontaneous CSF leaks requires a comprehensive strategy after endoscopic closure. Close ICP monitoring, coupled with selective use of acetazolamide and VP shunting, may help decrease risk of failure.

3:56 PM

Discussion & Audience Response Questions

4:06 PM

Radiographic Examination of Anatomic Relationships of the Posterior Ethmoid Artery

*Oswaldo Henriquez, M.D., Jodi Zuckerman, M.D., Sarah Wise, M.D., Amanda Corey, M.D.
Atlanta, GA*

Background:

Anatomic relationships of the posterior ethmoid artery (PEA) are important for surgical safety in the sinuses and orbit. Previous cadaver studies have evaluated ethmoid artery position with respect to the lacrimal crest and optic foramen.

Objectives:

(1) To radiologically evaluate PEA relationship to the skull base, sphenoid face, sphenoid (Onodi) cells, and intra-orbital landmarks. (2) To determine the incidence of a middle ethmoid artery (MEA) and its impact on other orbital measurements.

Methods:

Retrospective review of 50 non-diseased thin slice axial CT scans with 3D reformations (100 sides). Measurements were taken on a neuroradiology workstation.

Results:

The PEA was within the bony skull base in 95% of sides. When located on a mesentery below the skull base, the mean

distance to the skull base was 4.5 mm. Sphenoethmoid cell incidence was 16%. In 100% of cases, when a sphenoethmoid cell was present, the PEA was located within it. Mean distance from PEA to sphenoid face was 7.29 mm (SD 3.18mm). Mean distance from lacrimal crest to anterior ethmoid artery (AEA) was 25.6 mm, AEA to PEA was 14.0 mm, and PEA to optic foramen was 6.79 mm. MEA was present in 20% of sides. MEA presence did not significantly alter the measurements of the lacrimal crest to AEA (25.57mm), the AEA to PEA (14.0mm), and the PEA to the optic foramen (6.79mm), ($p = NS$). Conclusion: This study provides important PEA anatomic measurements with respect to frequently encountered surrounding structures.

4:12 PM

Topical Epinephrine is Safe in Endoscopic Sinus Surgery

*Richard Orlandi, M.D., Smitha Warriar, M.D., Stephan Sato, RN
Salt Lake City, UT*

Introduction:

The safety of topical epinephrine (1:1000 concentration) has recently been called into question. No objective data has been presented examining this issue.

Methods:

We retrospectively reviewed all cases of endoscopic sinus surgery performed by the senior author performed between July 2000 and January 2008. Perioperative records were reviewed for use of topical 1:1000 epinephrine and for any intraoperative or postoperative complications related to its use.

Results:

Of 1162 total surgical procedures during this period, there were 810 endoscopic sinus surgery cases. Of these, topical 1:1000 epinephrine was used in 712 (88%). One case of these 712 (0.1%) developed transient intraoperative hypertension immediately following inadvertent submucosal injection of

concentrated epinephrine. This event was due to an erroneous switch with the 1% lidocaine/1:100,000 solution. This error occurred early in our institution's experience with concentrated topical epinephrine. Following implementation of additional preventative safeguards, no further errors or complications have occurred.

Conclusion:

Concentrated epinephrine has the potential for complications when used incorrectly. Nevertheless, with appropriate safeguards described herein, its topical use is safe for limiting bleeding during endoscopic sinus surgery.

4:18 PM

The Role of *Stenotrophomonas maltophilia* in Refractory Chronic Rhinosinusitis

*David Grindler, Pete Batra, M.D., Geraldine Hall, Ph.D
Cleveland, OH*

Background:

Stenotrophomonas maltophilia is a multi-drug resistant gram-negative bacillus that has been implicated in serious nosocomial infections. The organism has also been isolated from sinus cultures in refractory chronic rhinosinusitis (CRS).

Objective:

The objective of this study was to elucidate the implications of *S. maltophilia* positive cultures in CRS.

Methods:

Retrospective review was performed on 101 patients with refractory CRS with sinus cultures positive for *S. maltophilia* isolates over a 5-year period.

Results:

The mean age was 56.9 years with a female:male ratio of 1.1:1. Previous sinus surgery had been performed in 90.1% of patients. Greater than 97% of patients had prior antibiotic usage. The most common symptom was discolored nasal

drainage (76.2%) with endoscopic evidence of pus or crusting in 83.2%. Monotherapy with trimethoprim/ sulfamethoxazole (TMX) and quinolones was utilized in 40.6% and 25.7%, respectively. This resulted in clinical improvement in 70% of cases. Interestingly, 20.0% and 8.0% of samples exhibited resistance to TMX and quinolones, respectively. Repeat cultures were performed at the follow-up visit in 69 cases. Negative cultures were associated with clinical improvement in 71.4% of patients. In contrast, only 21.4% with persistent *S. maltophilia* positive cultures showed clinical improvement.

Conclusions:

The presence of *S. maltophilia* isolates on culture is associated with clinically relevant symptoms and endoscopic findings. Despite its multi-drug resistant nature, monotherapy with TMX and quinolones appears to be effective in clinical improvement. Patients with negative cultures on repeat endoscopy were more likely to obtain symptom relief than patients with ongoing *S. maltophilia* infection.

4:24 PM

Discussion & Audience Response Questions

4:34 PM

Masters in Rhinology

How I Do It: Endoscopic Modified Lothrop Procedure, Tips and Techniques

Peter John Wormald, M.D.

Poster Presentations

#101 Characterization of Bacterial Microbiota in Post-Surgical Maxillary Sinus of Chronic Rhinosinusitis (CRS) Patients Using Molecular 16S rRNA Gene-Based Analyses

*Cindy Liu, M.D., Paul Keim, Ph.D., Andrew Lane, M.D.
Flagstaff, AZ*

Introduction:

Despite the prevalence of chronic rhinosinusitis (CRS), evidenced-based antimicrobial use in CRS remains challenging because the microbial communities (i.e., microbiota) of the paranasal sinus remain unknown. In this preliminary study, we applied 16S ribosomal RNA (rRNA) gene-based pyrosequencing and community ecological analysis to assess the maxillary sinus bacterial microbiota.

Methods:

Lavage and swab samples were collected from post-surgical maxillary sinuses. All samples were collected under endoscopic guidance and underwent complete cell lysis and DNA extraction. Bacterial load was quantified using broad-coverage 16S quantitative PCR, followed by PCR amplification using barcoded 16S fusion primers. Pyrosequencing was performed on the 454® platform using the XLR Titanium chemistry.

Pyrosequencing data were processed, quality-checked, and taxonomically classified. Rarefaction, diversity, and bacterial community ecological analyses were also performed. Results: A total of 23 unique bacterial families were detected, with a range of 3-11 unique bacterial families in each sample.

Pseudomonaceae was the most abundant bacterial family, followed by Staphylococcaceae, Enterobacteriaceae, Corynebacteriaceae, and Streptococcaceae. A wide range in bacterial phylotype richness and diversity and in microbiota compositions was found in the CRS sinus.

Conclusion:

Here, we performed the first 16S rRNA gene-based pyrosequencing characterization of maxillary sinus microbiota. We found a high level of inter-patient heterogeneity, but we also observed that patients appear to fall into two groups: single dominant phylotype and multiple dominant phylotypes, with the latter observed in nasal polyposis (NP) patients on oral steroid therapy, as compared to non-treated NP patients.

#102 Complementary and Alternative Medicine for Chronic Rhinosinusitis: A Review of the Literature

*Rajanya Petersson, M.D., Kyle Burkhamer, David Archibald, M.D., Oren Friedman, M.D.
Rochester, MN*

Introduction:

Chronic rhinosinusitis (CRS) affects approximately 14% of the U.S. population. Conventional treatments include nasal irrigations, steroid nasal sprays, systemic steroids, antibiotics, and surgery, with limited lasting efficacy in CRS. As such, CRS patients may turn to complementary and alternative medicine (CAM) therapies. This study aims to review the use of CAM among CRS patients and identify potential effective CAM therapies for CRS.

Methods:

A systematic review of the English language literature. Inclusion criteria: in vivo human studies, reviews, surveys, and case reports/series. Exclusion criteria: animal trials and in vitro studies.

Results:

Review of survey studies show that up to 65% of patients with rhinologic complaints use CAM, which ranges from herbal therapy, exercise, dietary management, chiropractic care, and acupuncture. Although there are several randomized, controlled trials (RCT) for CAM in acute rhinosinusitis, RCT data for CAM in CRS is scant. Bromelains and BNO-101 have been shown to be promising for the treatment of CRS through RCT's. Other studies suggest potential therapies (e.g. homeopathic therapies, cod liver oil, Manuka honey) that need further evaluation.

Conclusions:

Chronic rhinosinusitis is a frustrating disease process with no "cure." Although several studies show CAM use among rhinology patients, including those suffering from CRS, few RCTs have been performed with such therapies in CRS patients. We believe CAM deserves attention in regards to CRS, as a significant proportion of patients will turn to these therapies. With limited efficacy of conventional therapies in CRS, there may be an increasing role for CAM in this disease process.

#103 Computed Tomography Evaluation of Nasal Valve Changes with 2- and 3-mm Spreader Grafts

*David Archibald, M.D., Rizwan Siwani, M.D., John Pallanch, M.D., Oren Friedman, M.D.
Rochester, MN*

Introduction:

Nasal obstruction at the level of the internal nasal valve can be treated by a variety of surgical techniques and approaches. The use of spreader grafts has been widely debated as to whether this technique is truly capable of widening the nasal valve and relieving nasal obstruction. The purposes of this study are to show that the nasal airway truly is widened with the insertion of spreader grafts and to compare the effectiveness of 2-mm and 3-mm wide spreader grafts in increasing nasal valve area and volume, using computed tomography (CT).

Methods:

Two sets of silastic spreader grafts, 2-mm then 3-mm wide, were inserted into 4 cadavers. Postoperative CT scans were obtained after the placement of each spreader graft. Changes in volume and area were calculated by using packaged software.

Results:

The mean increase in nasal volume and surface area in subjects that received 2-mm spreader grafts and then subsequent 3-mm spreader grafts was .73 cm³ (sd = .53 mm³) and 13.47 mm² (sd = 11.9 mm²), respectively. A paired t-test statistical analysis demonstrated a significant increase in volume ($p = 0.006$) and surface area ($p = 0.015$) with the 3-mm grafts.

Conclusions:

The use of 3-mm wide spreader grafts increases the nasal volume and area greater than 2-mm grafts as measured using CT imaging, an objective test that has been used to measure the nasal valve and airway.

#104 Controversies in Management of Intracranial Angiofibroma: A Literature Review and Personal Experience

*Moshen Naraghi, M.D., Shabnam Mortazavi, M.D.,
Yasir Andrabi
Tehran, Iran*

Objective:

Juvenile nasopharyngeal angiofibroma (JNA) is a benign but locally invasive tumor of the nasopharynx that is found primarily in the teenage male. Although surgery is the mainstay of treatment of these tumors, management of more aggressive tumors with extensive intracranial extension has been a matter of discussion. Our literature search was conducted with the key words of angiofibroma and intra cranial extension, to gain an overview of various options in the management of these lesions while we present our experience on of some extreme cases.

Methods:

151 patients were found to have angiofibroma with intracranial extension. Various approaches were employed in gaining access to these lesions, which included surgery, radiotherapy, chemotherapy or combination of these modalities.

Results:

Surgical approach was the sole treatment modality in 85 patients. Surgical excision of tumors was performed through various approaches ranging from minimally invasive endoscopic approaches to the most radical craniotomy approaches. 46 patients were managed by radiotherapy alone. 19 patients were treated by combined surgery and radiotherapy approach. 1 patient was managed by chemotherapy followed by radiotherapy

Conclusion:

There is a wide spectrum of intracranial extension of angiofibroma with different involvements and the approaches have been used differently by many surgeons so that it is difficult to compare the results of surgical reports of all of different series. Because. Applying various approaches also depends on the dura involvement or perforation, cavernous sinus involvement and feeding vessels of tumor. In addition to this, recurrence rates in all cases were obviously much higher for more extensive stages by any approach.

#105 Ectopic Pituitary Adenoma With Apoplexy Presenting as Dival Mass

*Pamela Mudd, M.D., Todd Kingdom, M.D., Kevin Lillehei, M.D.,
Bette DeMasters, M.D.
Denver, CO*

Summary:

Authors present a case report from a tertiary care facility of a 78 year old male presenting with apoplexy, found to have an ectopic pituitary neoplasm with necrosis and features of apoplexy isolated to the clivus.

Objectives:

1. Learn the unique embryology of the pituitary gland to appreciate development of ectopic focus of disease. 2. Add ectopic pituitary adenoma to your differential when approaching skull base tumors

Methods:

The authors present a case of a 78 year old male presenting to a tertiary care center with cranial nerve VI palsy and a clival mass. A combined otolaryngology-neurosurgical approach to the clivus through endoscopic trans-sphenoidal approach was performed for resection of the mass. Immunohistochemical stains and pathologic assessment confirm an ectopic pituitary adenoma with apoplexy.

Results:

Ectopic pituitary neoplasms have been described in the literature and most commonly occur within the sphenoid sinus or nasopharynx. Few case reports have described the rare entity of ectopic pituitary within the clivus. The unique embryology of the pituitary is described as it relates to this rare entity. In addition a review of the current literature is presented.

Conclusion:

Ectopic pituitary adenoma within the clivus is a rare clinical entity. As otolaryngology-neurosurgery combined approaches to the skull base increase, knowledge of both common and rarer pathology of the skull base must be appreciated.

#106 Endoscopic Resection of Schneiderian Papillomas with Inferior Turbinate Preservation

*Kimberly Rutherford, M.D., Seth Brown, M.D.
Farmington, CT*

Introduction:

Schneiderian papillomas are histologically benign, but locally aggressive lesions with high recurrence rates and a small risk of malignant conversion. Previous management techniques

involved a large en bloc surgical resection utilizing an external approach. This resulted in high surgical morbidity, including atrophic rhinitis.

Objectives:

The objectives of this study were to present and review the endoscopic surgical technique used to excise maxillary sinus papillomas with preservation of the inferior turbinate, evaluate patient characteristics that allow for successful excision, and examine the recurrence rates.

Methods:

A retrospective chart review of patients with the clinical and pathological diagnosis schneiderian papillomas of the maxillary sinus that were excised endoscopically with inferior turbinate preservation was conducted. Patient demographics, location and extent of the lesion, surgical techniques, and follow-up outcomes were evaluated.

Results:

Four patients with inverted or oncocytic schneiderian papillomas of the maxillary sinus that were endoscopically excised were identified. The average age was 68 years old and all were female. Extent of the lesions ranged from involvement of only the maxillary sinus to involvement of the maxillary and ethmoid sinuses with extension to nasal cavity, nasopharynx, and skull base. All lesions were excised using an endoscopic approach with preservation of the inferior turbinate. At a minimum of 1 year follow-up, all patients were free from recurrence.

Conclusions:

Endoscopic resection of schneiderian papillomas of the maxillary sinus with inferior turbinate preservation provides a minimally invasive surgical technique with decreased surgical morbidity, including atrophic rhinitis. Initial results with respect to recurrence rates are promising.

#107 Endoscopic Sphenoid Balloon Sinuplasty

*B. Todd Schaeffer, M.D.
Lake Success, NY*

This video describes and demonstrates how a non-radiation balloon sinuplasty is performed of the sphenoid sinuses. Using a light cable as the guide through a zero degree guide

catheter, the light cable is visualized inside the sphenoid sinus by trans-illuminating the sphenoid sinus. This is seen endoscopically and avoids the use of radiation guidance of a C-arm

#108 Extended Inferior Turbinate Reduction in the Narrow Nose

*Andrew Lerrick, M.D., Alexis Mandli, PA-C,
Chicago, IL*

Introduction:

Hypertrophic inferior turbinates contribute to nasal obstruction. In narrow passageways the turbinates occupy a disproportionately greater area. In this instance additional turbinate tissue must be removed to achieve a satisfactory airway. Anatomy: The nasal passageway directs a significant proportion of inspired air through its lower third. The narrow nose is particularly vulnerable to inferior septal deflections and step-off deformities. The distance between the septum and the entire medial aspect of the inferior turbinate is measured. Diagnostic Testing: Acoustic rhinometry measures nasal airway dimensions by emitting wide-band signals and digitally analyzing the reflected waves, providing a topographic display of the septal-turbinate relationship. Standardized values have determined the narrowest septal-turbinate distance to measure 4.5mm, occurring between 1.90-2.00cm from the nostril. Narrowing can be visualized using a 4.0mm rigid nasal endoscope. In extreme cases, a 2.7mm scope is utilized. Rhinomanometry measures nasal airflow. Endoscopy, rhinometry, and rhinomanometry should be performed in the natural and decongested states.

Methods:

Reduction can be achieved by a number of methods, including sub-mucosal debridement and full-thickness resection. Given comparable soft-tissue thickness, differential bone resection effectively compensates for pre-existing turbinate asymmetry. The septal contribution is determined by comparing the septal-turbinate distance with the total turbinate-to-turbinate distance. Septoplasty should precede turbinate resection, to allow variable turbinate reduction, if necessary.

Results:

Quantitative measurements can be obtained intra-operatively given the portability of rhinometry testing equipment. Data can

be compared to more modest turbinate reduction commonly performed in patients with typical nasal anatomy. Conclusion: Narrow nasal passageways require extended inferior turbinate reduction to compensate for external anatomic limitations. Rhinometry and rhinomanometry can prepare the surgeon for this necessity to optimize results.

#109 Gender and the Presentation of Chronic Rhinosinusitis

David Lin, Rakesh Chandra, M.D., David Conley, M.D., Robert Kern, M.D. Chicago, IL

Background:

The effect of gender on severity and phenotype of chronic rhinosinusitis (CRS) remains an area of investigation. This issue was studied in a sample drawn from a large university-based practice.

Methods:

The study population included 106 CRS patients (47F, 59M) prospectively enrolled into a allergy/sinus center database. Patients were stratified by gender and phenotype: CRS with nasal polyposis (CRSwNP) or CRS without nasal polyposis (CRSsNP). Data was collected regarding Lund-Mackay score, asthma status, and sensitivity to eight classes of aeroallergens.

Results:

The prevalence of CRSwNP phenotype was similar between genders (34-40%). CRSwNP patients had significantly greater Lund-Mackay score than those with CRSsNP ($p < 0.001$), but no gender differences were observed. Patients with CRSwNP were more likely to manifest asthma than those with CRSsNP, but this only reached statistical significance for males ($p = 0.0187$). Almost 50% of patients were atopic, and this did not differ by gender or phenotype. Among atopic patients, however, males with CRSwNP were sensitive to a greater number of aeroallergen classes than females (5.3 versus 2.6; $p = 0.04$).

Conclusions:

Gender did not influence the prevalence of CRSwNP phenotype or the radiologic severity of CRS in this series. Asthma and atopy may be more significant cofactors in males.

#110 Glomangioma of the Nasal Septum

Daniel Monin, M.D., Mayuri Desai, M.D., Rhoda Wynn, M.D.

Glomangiomas are benign vascular neoplasms that arise from the glomus body, a neurovascular structure that functions in thermal regulation. They are rare in the head and neck, with only 13 prior cases reported involving the nasal cavity or sinuses. We present a case of a glomangioma of the nasal septum. A 26-year-old woman with history of Neurofibromatosis Type I presented with a lesion on the nasal septum associated with discomfort, crusting, and epistaxis. Endoscopic excision of the mass was performed and at 5 months follow-up there was no evidence of recurrence. The clinical presentation, immunohistological features, differential diagnosis, and management of this tumor with a review of the literature are discussed. Complete excision is curative in most cases.

#111 Inadequate health insurance cost coverage a major factor in discontinuation of subcutaneous immunotherapy for Allergic Rhinitis

*Ravi Surender Vaswani, M.D., Yi-Chun Carol Liu, M.D.,
Leena Parikh, M.D.
Columbia, OH*

Background:

Despite proven efficacy and safety of subcutaneous immunotherapy, for allergic rhinitis many patients discontinue allergy injections prior to the recommended duration of 3-5 years, thereby not deriving full benefit.

Objective:

To examine the causes of premature discontinuation of subcutaneous immunotherapy.

Methods:

The data was collected on patients who stopped subcutaneous immunotherapy prior to the completion of prescribed duration. The patients were contacted via phone or letter to identify the reason for stopping allergy injections.

Results:

A total of 103 patients terminated subcutaneous immunotherapy prematurely. Sixty two percent were on maintenance dose and 38% were in escalation dose phase. Forty seven (45.6%)

were males and 56 (54.4%) were females. The reasons cited for early drop out were: inadequate insurance coverage (39.8%), inconvenience (16.5%), concurrent health problems (9.8%), patient-perceived ineffectiveness (5.8%), change of residence (1.9%) and trial of alternative medicine (1%). The remaining 25.2% did not provide any reason for withdrawing from receiving subcutaneous immunotherapy. Of these, only 3 patients had full insurance coverage for the allergy injections and the rest did not.

Conclusion:

Inadequate insurance reimbursement is a major contributing factor for premature discontinuation of subcutaneous immunotherapy in patients with allergic rhinitis. Subcutaneous immunotherapy has been shown to be an effective treatment of allergic rhinitis and improvement of health insurance benefits would allow for better utilization of this treatment option.

Poster #112 Local Nasal Immunotherapy For Allergic Rhinitis: A Systematic Review

*Stephen McDonald, FRCS
Bristol, UK*

Objective:

To systematically review the evidence for local nasal immunotherapy (LNIT) compared to placebo for allergic rhinitis, using outcome measures of symptom scores, medication used, and adverse events.

Methods:

The review was carried out according to Cochrane Review methodology. Randomised controlled trials were sought through a systematic search of major online databases (Medline, EMBASE, Cochrane CENTRAL, CINAHL, AMED).

Results:

12 studies were included. Of these, 8 in total contributed to meta-analysis. There was a significant reduction in symptoms for participants taking LNIT in studies presenting ordinal data (Risk Reduction = 0.23, 95% confidence interval (CI) 0.15 to 0.36; $p < 0.00001$). In studies presenting continuous data, there was an overall trend towards reduced symptoms for LNIT (standardised mean difference (SMD) -0.42, 95%CI -1.07 to 0.24; $p = 0.22$). For seasonal allergens, the reduction in

seasonal symptoms was significant (SMD -1.56, 95%CI -2.61 to -0.51; $p = 0.004$) following LNIT. Use of medication was reduced in those taking immunotherapy (SMD -0.61, 95%CI -1.04 to -0.18]; $p = 0.006$). There was a non-significant increase in mild adverse events in the treatment group, and no serious adverse events.

Conclusions:

LNIT is a safe treatment that significantly reduces symptoms and medication requirements in allergic rhinitis. Despite heterogeneity, findings are consistent across the majority of studies. Further research is needed to establish the ideal dose and treatment duration, and to compare efficacy and ease of use with other methods of immunotherapy application (sublingual and injection routes).

#113 Management of Sinusitis and Graft Preservation after Sinus Lift Procedure

*Ashutos Kacker, M.D., Caroline Yoon, M.D., Deya Jourdy, M.D.
New York, NY*

Introduction:

Oral rehabilitation with the sinus lift procedure has been highly popularized. However, the complication of sinusitis following this procedure and the relationship of sinus lift graft preservation has not been thoroughly evaluated. The objective of this paper is to examine sinusitis management following sinus lifting and to identify factors that necessitate graft removal.

Methods:

Retrospective chart review. The study population consists of a case series of 9 patients referred to a single otolaryngologist with a history of a sinus lift procedure. All patients presented for treatment between August 2005 to May 2009.

Retrospective chart review was performed to examine demographic data, history, treatment, and postoperative management.

Results:

All patients were initially treated medically by their oral surgeon without improvement. Additionally, every patients required endoscopic sinus surgery with maxillary antrotomies. The sinus lift graft material was left intact in all patients except two that had extrusion to the cheeks associated with facial

cellulitis, demanding graft removal and debridement. Mean follow-up was 10 months with full resolution of symptoms in the entire study group.

Conclusions:

Sinusitis refractory to medical management after sinus lifting should be evaluated by an otolaryngologist and will likely require surgical intervention. Graft removal is indicated when graft extrusion or migration into the soft tissues of the face occurs. Otherwise patients who develop sinusitis following sinus lift can be safely managed by sinus surgery with graft preservation.

#114 Massive Cerebral Infarction after Embolization for Nasopharyngeal Angiofibroma

*Moshen Naraghi, M.D., Shabnam Mortazavi, M.D.,
Masoud Boroojerdi, M.D.
Tehran, Iran*

Introduction:

Juvenile nasopharyngeal angiofibroma (JNA) is a relatively rare, histologically benign non-encapsulated vascular tumor that can be extended even beyond the skull base due to its aggressive behavior. Surgical excision preceded by embolization to provide less bloody field during operation is an option in surgical resection of JNA. Embolization depends on the patient's angiography to specify supplying arteries of the tumor. There are rare complications following the embolization, most of them are the result of thromboembolic events. In this article we present a rare and severe complication of embolization.

Case report:

A 52 year-old JNA patient with history of multiple surgical excisions, the last procedure preceded by preoperative embolization was referred to our center with left sided blindness despite large residual tumor. Cranial nerves examination showed III, IV, V, VI paralysis. Based on the patient's angiography it was revealed that a left middle cerebral artery infarction occurred due to embolization.

Conclusion:

Prevention of potentially hazardous complications following the preoperative embolization needs an accurate angiography and use of appropriate embolic agents by expert interventional radiologist.

#115 Maxillary Pneumocele: A Case Presentation with Progressive Symptoms

*Moshen Naraghi, M.D., Yasir Andrabi, M.D., Sbabnam Mortazavi
Tehran, Iran*

Introduction:

Maxillary pneumoceles are rare conditions characterized by pathological expansion of paranasal sinuses with thinning of the bony walls and displaces adjacent structures. These lesions may remain asymptomatic over long periods and rarely present with classic signs. We present a very rare case of maxillary pneumocele presenting with a progressing cascade of symptoms.

Method:

A 10 year old boy presented with progressive left maxillary pain from 9 months. It had a typical cascade beginning with the numbness of the left upper lip, then anesthesia of the canine teeth with gum around it, and finally the center of pain was deep orbit. He also experienced two episodes of severe orbital pain with barotrauma during descent in travels to the mountainous regions. The parents also had noted swelling of the left cheek since two years ago.

Result:

The patient underwent functional endoscopic sinus surgery based on the presumed etiology of occlusion of the maxillary sinus ostium by one-way valve. There was significant improvement of symptoms after surgery. Conclusion: Maxillary sinus is the least affected sinus by pneumoceles. Most pneumoceles remain asymptomatic over long periods and are not diagnosed until there is an external deformity or the displacement of adjacent structures causing symptoms. Treatment is based on relieving one-way valve mechanism as we reported in our case of maxillary pneumocele.

#116 Modulation of Ambient Air Pollution-Induced Nasal Epithelial Inflammation by Protein Kinase C- subtype in Humans

*Do-Yeon Cho, M.D., Wei Le, M.D., Daya Upadhyay, M.D.,
Peter Hwang, M.D.
Stanford, CA*

Introduction:

Air pollution particulate matter (PM) is the sum of all solid and liquid particles suspended in air, many of which are hazardous. An exposure to PM is known to induce inflammatory responses in the airways which can enhance symptomatic presentations of acute or chronic rhinosinusitis (RS). Although the etiology of RS is multi-factorial, ambient air pollution particulates play a critical role in mediating airway inflammation. However, precise molecular mechanisms underlying these effects have not been identified. In this study, we sought to determine whether the differential regulation of Protein Kinase C (PKC)-subtypes modulate PM-induced airway inflammation.

Methods:

Primary human nasal epithelial cells were cultured as per protocol and exposed to ultra-fine PM (< 2.5 μ M). The effect of activation of PKC subtypes on the release of PM-induced inflammatory mediators was examined by using RTqPCR, PCR-array and immunofluorescent staining assays.

Results: We demonstrate that PM caused activation of various cytokines and chemokines in primary human nasal epithelium, and induced differential activation of PKC subtypes gamma, epsilon, eta and zeta. Modulations of PKCs blocked the effects of PM on in the nasal epithelium suggesting that the differential regulation of PKCs mediate PM-induced inflammation in the nasal epithelium.

Conclusion:

Air pollution may enhance sinonasal inflammation. Selective modulation of PKC-subtypes may be used as potential targets for therapeutic intervention.

#117 Olfactory Dysfunction in Allergic Fungal Sinusitis

Carl Philpott, M.D., Leo Lai, Gina Zheng, Amin Javer, M.D. Canada

Background:

Allergic fungal sinusitis is a chronic disease which requires sustained medical therapy following endoscopic sinus surgery. However patients appear to complain of olfactory dysfunction in spite of apparent control of their disease based on endoscopic assessment of their sinus cavities.

Objective:

Patients with allergic fungal sinusitis often complain of hyposmia even when their mucosal disease in the sinus cavities is well controlled. This study aims to correlate subjective reporting of olfactory function with endoscopic staging and performance on the Sniffin' Sticks test.

Methods:

60 patients with allergic fungal sinusitis seen in a tertiary rhinology clinic were recruited to undergo olfactory testing following routine endoscopic follow up.

Results:

There was a significant correlation between patients' performance on the Sniffin' Sticks and endoscopic staging and with their reported olfactory ability ($p < 0.001$).

Conclusion:

All patients with significant sinonasal inflammatory disease should receive evaluation with olfactory testing and be treated on their merit.

#118 Orbital Extension of Nasopharyngeal Angiofibroma

*Moshen Naraghi, M.D., Shabnam Mortazavi
Tehran, Iran*

Introduction:

Juvenile nasopharyngeal angiofibroma (JNA) is a most common benign tumor of the nasopharynx that is found primarily in the young male. JNA has a well defined boundary, so its extension to the orbit causes pushing of the orbital contents without a true infiltration. There have been different approaches to gain access to the orbital extension of these lesions. To date, there has been no review study to evaluate management of orbital extension of JNA. So we present a review of literature and our experience.

Methods:

A literature search was conducted with the key words of angiofibroma and orbital extension, in Medline to gain an overview of various options in the management of these lesions.

Results:

Twenty six patients were found to have angiofibroma with

orbital extension. All of them had various levels of ophthalmic disturbances from proptosis to blindness other than typical JNA symptoms such as epistaxis and nasal obstruction. Various approaches were employed in gaining access to these lesions, which included surgery, radiotherapy, chemotherapy or combination of these modalities. Nineteen patients were managed by surgical approach alone. Which included endoscopic surgery, facial translocation, fronto-temporal craniotomy, orbitozygomatic osteotomy and medial maxillotomy. Three patients were treated by combined surgery and radiotherapy. One patient was managed by chemotherapy followed by radiotherapy. Gamma knife surgery following the radical craniotomy was performed for 1 patient.

Conclusion:

The principle method of management of orbital involvement of JNA remains surgery. Selection of a surgical approach is determined by surgeon factors, tumor factors and the other sites of JNA extension accompanied with orbital involvement. Despite the relative effectiveness of radiotherapy to treat advanced and recurrent tumors, it is associated with side effects in young patients and potential effects on vision. So most authors reserve it for far advanced cases with limitation of surgery.

#119 Positive Fungal Cultures in Allergic and Non-Allergic Fungal Sinusitis

*Christopher Melroy, M.D., Charles Ebert, Jr. M.D.,
Jared Intaphan, M.D., Frederick Kuhn, M.D.
Savannah, GA*

Introduction:

Cultures taken from purulent sinus secretions in patients with chronic rhinosinusitis (CRS) often grow fungi. The purpose of this study is to report the isolates of fungal cultures in a large patient population and do determine if these isolates differ in patients with and without allergic fungal sinusitis (AFS).

Methods:

Retrospective review of 10 years of 723 positive fungal cultures in 231 patients with CRS. Fungal genus and species, the number of positive cultures per patient, and location of the samples were recorded. Patients were stratified into those with AFS and without AFS. The frequencies of fungal genus between groups were analyzed with chi-squared analysis.

Results:

723 positive fungal cultures were identified in 231 patients. The most common encountered genera in order were *Aspergillus* followed by *Curvularia*, *Penicillium*, *Alternaria*, *Bipolaris* and *Fusarium*. Each patient averaged 3.4 positive cultures. The most common location of positive culture was the maxillary sinus. AFS was identified in 42. Those with AFS had significantly more positive cultures ($P = 0.01$) averaging 5.2 (CI: 3.4, 7.1) per patient compared to those without AFS 2.5 (CI: 1.8, 3.2) positive cultures. Chi-squared analysis revealed a significant difference in the frequency of *Aspergillus* occurring in those with AFS compared to those without ($P = <0.05$). However, there was no significant difference in the occurrence of the other most commonly encountered genera in those with or without AFS.

Conclusion:

A variety of fungal genera are found in purulent sinus secretions in patients with CRS. This study reports the frequency of these fungi and suggests that *Aspergillus* plays a more significant role in AFS vs. non-AFS patients.

#120 Practical Reduction of the Bulky Inferior Turbinate

*Andrew Lerrick, M.D., Alexis Mandli, PA-C
Chicago, IL*

Introduction:

Inferior turbinate bones vary in size and shape. Most turbinates are pedunculated and easily permit partial resection using either a "submucosal" or "en-bloc" technique. One anatomic variant is the bulky turbinate, which, due to developmental, traumatic, or disease conditions, becomes hypertrophic from base to apex. In this instance, turbinate reduction utilizing both techniques is effective.

Background:

The medial aspect of the pedunculated turbinate is bulbous, the neck is narrow, and the base widens slightly to anchor it to the lateral nasal wall. Turbinates with this profile easily permit medialization and lateralization maneuvers. The bulky turbinate is diffusely hypertrophic, having a bulbous medial contour, wide neck, and broad base. This structure is far less amenable to manipulation and requires significant bone reduction to change its contour. Methods: "Submucosal resection" is more difficult

to perform on the bulky turbinate. In the absence of a narrow neck, flap elevation is tedious, bleeding increases, and the flaps more apt to tear. Extensive bone debridement causes more bleeding, necessitating additional cautery. With "en-bloc" resection, after medialization a straight clamp is applied along the length of the inferior turbinate to demarcate the desired amount of bone and soft-tissue to be removed. The pedunculated turbinate is amenable to these maneuvers, whereas the bulky turbinate is not. Crimping and cutting the bone, debriding bone fragments, and achieving hemostasis is more difficult with the bulky turbinate. Thermal damage is greater and more bone is exposed to intra-nasal pathogens. Our method combines a modified version of both techniques. Without requiring in-fracturing, a narrow clamp is insinuated on each side of the anterior aspect of the turbinate. Following compression and release, bipolar cautery is applied, the bone is cut, and the clamp repositioned further posteriorly. The steps are repeated until the median segment had been removed. Submucosal flaps are elevated from the open medial aspect, the bone debrided to achieve the necessary reduction, and the flaps are repositioned and thermally sealed to the underlying turbinate remnant to avoid bone exposure.

Conclusion:

Using the combined techniques of "submucosal resection" and "en-bloc" resection effective reduction of bulky inferior turbinate bones can be achieved while minimizing progressive post-operative bone loss.

#121 Role of Radiographic Imaging in the Preoperative Evaluation of Adults Undergoing Septoplasty for Nasal Obstruction

*Bruce Tan, M.D., Marc Dubin, M.D.
Chicago, IL*

Background:

The septoplasty for correcting nasal septal deviation in patients suffering primarily from nasal obstruction is a commonly performed surgery in clinical practice. CT scan imaging is not a routine diagnostic modality in the pre-operative evaluation of these patients.

Methods:

A retrospective review was performed evaluating the computed

tomography (CT) findings in adults undergoing septoplasty for nasal obstruction. Patients undergoing septoplasty in conjunction with functional endoscopic sinus surgery (FESS) for generalized chronic sinusitis or those who received a septoplasty for endoscopic access were specifically excluded. Radiographic findings, patient demographic information, presenting symptoms and pre-operative endoscopic findings were captured.

Results:

Forty-two patients were included in the study after failing medical therapy for nasal obstruction. Concurrent radiographic pathology was present in 37 patients (82 %). Sixteen had evidence of mild sinusitis that responded to medical therapy. Ten had (22%) concha bullosa of sufficient size to require surgical reduction. Ten had mucoceles (22%).

Conclusions:

Preoperative CT evaluation of patients undergoing septoplasty for nasal obstruction adds valuable information that can affect surgical planning. However, careful endoscopic evaluation can predict the presence of a substantial number of these radiographic findings.

#122 Spontaneous CSF Fistula with Encephalocele Presenting as Severe Obstructive Sleep Apnea

*Sivakumar Chinnadurai, M.D., Matthew Carlson, M.D.,
John Pallanch, M.D.
Rochester, MN*

Background:

There is mounting evidence to suggest that a large percent of patients with spontaneous CSF leaks (SCSFL) represent a variant of Idiopathic Intracranial Hypertension (IIH) sharing identical patient demographics and similar symptoms. One popular theory suggests that chronically elevated pulsatile CSF pressures may erode already thin regions of the skull base leading to encephalocele formation and eventual CSF "release valving". We present a case of a 32-year-old morbidly obese female who presented with refractory sleep apnea and was found to have a large, obstructing encephalocele and a CSF fistula.

Methods:

Case report and review of the literature Results: A morbidly

obese 32-year-old female presented for evaluation of long-standing symptoms of nasal obstruction. On interview the patient complained of increased daytime somnolence, 3 years of intermittent clear unilateral rhinorrhea and a 3-month history of progressive anosmia. Radiologic evaluation revealed an empty sella and a 6cm encephalocele breaching the left cribriform and lateral lamella. This occluded the nasopharynx and displaced the soft palate anteroinferiorly. Following endoscopic treatment of the encephalocele and skull base defect, the CSF rhinorrhea ceased, and the patient's obstructive sleep apnea improved greatly.

Conclusion:

Patients at risk for SCSFL can be identified by certain historical and radiologic indicators. These patients may be subject to uncommon sequelae such as obstructive encephalocele in our patient.

#123 Surgical Anatomy of the Sphenoid Sinus, Internal Carotid Artery and Distances to Critical Structures

*Stephanie Joe, M.D., Ryan Vaughn, M.D.,
G. Michael Lemole, M.D.
Chicago, IL*

Introduction:

The objective of this study was to analyze the relationship between the pneumatization pattern of the sphenoid sinus, configuration of the internal carotid artery (ICA) as well as distance between the sphenoid sinus ostia and the height from the hard palate to the sphenoid ostia.

Methods:

Measurements between sinonasal and skull base structures were taken using the navigation planning station and computed tomography angiographic images reconstructed in three planes. The pneumatization pattern of the sphenoid sinus was determined. The configuration of the ICA anatomy was described using the distance between carotid siphon as well as the height of carotid columns from the inferior most flexion to the siphon. The sphenoidal inter-ostial distance was taken from the medial aspect and the height from hard palate was measured from the inferior aspect of the ostia.

Results:

Twenty-seven cases were reviewed. The average inter-ostial distance was 12.04 mm (SD 5.6 mm). The average height from the hard palate to the sphenoid ostium was 34.3 mm (SD 4.9 mm) on the right and 34.6 (SD 7.2 mm) on the left. The average inter-carotid distance at the siphon was 16.7 mm (SD 3.2 mm) and the average length of the carotid columns was 15.2 mm (SD 4.6 mm). The pneumatization pattern of the sphenoid sinus was sellar in 44%, post-sellar in 52% and pre-sellar in 4%.

Conclusions:

Knowledge of the relationships between critical anatomic structures can be used by endoscopic skull base surgeons to recognize challenging anatomy and define a safe operative plan.

#124 Turbinate Reduction Utilizing Acoustic Rhinometry

*Andrew Lerrick, M.D., Alexis Mandli, PA-C
Chicago, IL*

Introduction:

Turbinate size can vary as a result of physiologic effects and disease. Acoustic rhinometry measures nasal airway dimensions, providing a topographic display of the septal-turbinate relationship. A better understanding of intra-nasal anatomy, prior to surgical intervention, assists the surgeon in performing turbinate reduction with greater accuracy.

Methods:

Acoustic rhinometry provides quantitative measurements by emitting wide-band noise and digitally analyzing the incident and reflected waves. Pre-operative intra-nasal dimensions are optimally obtained in the pre-medicated, congested, and decongested states to determine the baseline, soft tissue, and bony contributions to nasal airway obstruction, respectively. Allergic and non-allergic stimuli can be inhaled to trigger nasal congestion. Injection of a vasoconstrictive agent determines the maximal potential pre-operative nasal airway, which is limited by persistent bony barriers. Comparison can be made between the three physiologic conditions and standardized norms of intra-nasal anatomy. Ideally, the septum is midline and does not contribute to nasal obstruction. Turbinate-to-turbinate cross-sectional measurements can account for septal deflections.

Results:

Possessing knowledge of the contribution made by each turbinate to nasal obstruction, selective removal of soft-tissue and bony resection of hypertrophic turbinates can be achieved. Intra-operative rhinometric measurements can be obtained to calculate the extent of turbinate reduction to achieve the desired result. Optimally, equal distances are established between the septum and the inferior and middle turbinates at the respective level of each.

Conclusion:

Acoustic rhinometry provides data to gauge the degree to which turbinate reduction is necessary to establish an adequate, symmetric nasal airway.

#125 Unilateral Epistaxis in a Middle Aged Man: A Rare Presentation of Pyogenic Granuloma

*Jason Champagne, M.D., Troy Woodard, M.D.,
Stilianos Kountakis, M.D.
Augusta, GA*

Introduction:

Pyogenic granuloma most commonly involves oral mucosa but is also found on the skin or in the nasal cavity, especially the nasal septum. A disease classically described in children and young females, it is rarely found in men. We present a unique case of a large (5x8cm) unilateral nasal tumor, pyogenic granuloma, arising from the middle turbinate in a middle-aged man.

Methods:

Case report. High-resolution endoscopic, computed tomography (CT), and magnetic resonance (MR) images as well as histologic photomicrographs provide excellent characterization and visualization of the lesion.

Results:

A 42 year-old man presented with a two-month history of worsening nasal congestion, intermittent left-sided epistaxis, and throbbing, retro-orbital pain. Previous medical therapy with topical steroids and nasal saline did not relieve his symptoms. Nasal endoscopy revealed a highly vascularized, left-sided mass filling the middle meatus and extending into the nasopharynx. CT and MR images demonstrated a left-sided expansile, soft tissue mass causing medial displacement of the

middle turbinate and lateral displacement of the medial maxillary sinus wall. Endoscopic excision after embolization revealed significant tissue fibrosis with the source of the lesion being the basal lamella of the left middle turbinate. Pyogenic granuloma was reported on final pathologic diagnosis. Postoperative endoscopic examination showed no evidence of residual tumor, and the patient reported resolution of his symptoms.

Conclusion:

Pyogenic granuloma rarely presents in the male population, especially emanating from the middle meatus. This disease process should always be considered in one's differential diagnosis when a vascular nasal mass is encountered.

#126 Unrecognized Odontogenic Maxillary Sinusitis - A Cause of Endoscopic Sinus Surgery Failure

*Anthony Longhini, BS, Berrylin Ferguson, M.D.
Pittsburgh, PA*

Background:

Endoscopic sinus surgery (ESS) is reported to improve symptoms in approximately 85% of patients. Reasons for failure include misdiagnosis, technical inadequacies, underlying severe hyperplastic disease, biofilm and immunodeficiency. We are unaware of literature citing unrecognized dental etiology as a reason for failure to improve with sinus surgery. Aim: To characterize clinical and radiographic findings in patients who fail to improve with ESS because of unrecognized dental etiology.

Design:

Prospective enrollment of patients with odontogenic maxillary sinusitis with prior endoscopic sinus surgery. Patients: 5 adults with odontogenic maxillary sinusitis and unsuccessful ESS. Intervention: Demographics, and clinical aspects including duration of illness, prior sinus surgeries and therapies and radiographic data were assessed.

Results:

5 adults underwent an average of 2.6 ESSs with persistence of disease and symptoms until their dental infection was treated. Duration of symptoms ranged from 1 to 15 years. In 4 of 5 patients, the periapical abscess was not noted on the CT

report. Three of 5 patients had been seen by their dentists and told they had no dental pathology. With treatment of the dental abscess, symptoms in all patients resolved.

Conclusion:

Unrecognized periapical abscess is a cause of ESS failure and frequently the radiographic report will fail to note the periapical infection. Dentists are unable to recognize periapical abscesses reliably with dental x rays and exam. In patients with CT maxillary sinus disease, the teeth should be specifically examined.

#126 Zygomaticomaxillary Mucocele with Concomitant Frontoethmoid Mucocele Presenting Four Decades after Facial Trauma

*Benjamin Powell, M.D., Patrick Munson, M.D.,
John Pallanch, M.D.
Rochester, MN*

Paranasal sinus mucocèles are most frequently found involving the frontal sinuses, but are also often found involving the ethmoid, maxillary, and more rarely, the sphenoid sinuses. Involvement of the zygomatic bone by a mucocele is extremely rare, with only one reported case in humans found in the literature. This presentation shows the imaging and video footage of a 49 year old male who was found to have concurrent zygomaticomaxillary and frontal sinus expansile mucoèles. He presented with facial pain and headache, with no history of sinusitis, but facial trauma to the area several decades previously. A transmaxillary endoscopic approach to the zygomatic mucocele was undertaken. The extensive frontoethmoid mucocele was approached with combined transnasal endoscopic sinus surgery and frontal sinus trephination. Pre and post operative radiographic images as well as intraoperative video footage and imaging will be utilized to discuss the presentation, evaluation, and treatment of this common lesion in a rare location.

Dr. Maurice H. Cottle Honor Award

For Outstanding Clinical and Laboratory Investigation in Rhinology

First Place Gold Medal Winners

1978

The Nasal Cycle in the Laboratory Animal

Winston M. Campbell, MD, Mayo Clinic, Rochester, MN

Eugene B. Kern, MD, Mayo Clinic, Rochester, MN

1979

The Physiologic Regulation of Nasal Airway Resistance During Hypoxia and Hypercapnia

T.V. McCaffrey, MD, Mayo Clinic, Rochester, MN

Eugene B. Kern, M.D., Mayo Clinic, Rochester, MN

1980 (Two Awards Given)

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

Bernard C. Sarnat, MD, Los Angeles, CA

Abbee Selman, DDS, Los Angeles, CA

Sleep Disturbances Secondary to Nasal Obstruction

Kerry D. Olsen, MD, Mayo Clinic, Rochester, MN

Eugene B. Kern, MD, Mayo Clinic, Rochester, MN

Phillip R. Westbrook, MD, Mayo Clinic, Rochester, MN

1984

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

Borje Drettner, MD, Sweden

Bo Wihlelnisson, MD, Sweden

1987

Eustachian Tube and Nasal Function During Pregnancy - A Prosepective Study

Craig S. Derkay, MD, Pittsburgh, PA

1988

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

Jonathan Ferguson, MD, Mayo Clinic, Rochester, MN

1990

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

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

1991

Ultrastructural Changes in the Olfactory Epithelium in Alzheimer's Disease

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

1992

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

Steven Kushnick, MD, New York, NY

1993

Mucociliary Functionin Endothelins 1, 2 & 3

Finn Ambie, MD, Mayo Clinic, Rochester, MN

1996

Capsacin's Effect on Rat Nasal Mucosa Substance P Release

Frederick A. Kuhn, MD, Savannah, GA

1999

Subacute Effects of Ozone-Exposure on Cultivated Human Respiratory Mucosa

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

2000

Capsacin's Effect on Trigenonal Nuciens Substance P Release

Frederick A. Kuhn, MD, Savannah, GA

2002

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

Alan H. Shikani, MD, David J. Fink, Ph.D., Afshin Sohrabi, M.H.S., Phong Phan, BS, Anna Polotsky, MD, David S. Hungerford, MD, Carmelita G. Frondoza, Ph.D, San Diego, CA

2004

Composition Of Hyaluronan Affects Wound Healing In The Rabbit Maxillary Sinus

Matthew Proctor, M.D., Kery Proctor, M.D., Xian Zheng Shu, PhD., L.D. McGill, DVM, PhD., Glenn D. Prestwich, PhD., Richard R. Orlandi, M.D.

2005

Acoustic Rhinometry Predicts Tolerance of Nasal Continuous Positive Airway Pressure (nCPAP): A Pilot Study.

Luc G. Morris, MD, Jennifer Setlur, BS, Omar E. Burschtin, MD, David L. Steward, MD, Joseph B. Jacobs, MD, Kelvin C. Lee, MD

2006

Reversal of Chronic Rhinosinusitis Associated Sinonasal Ciliary Dysfunction

Bei Chen, MD, Marcelo B. Antunes, MD, Steven Eau Claire, James Plamer, MD, Alexander Chiu, MD, David W. Kennedy, MD, Noam Cohen, MD, Ph.D.

2007

Reversible Olfactory Loss Due to Inflammation in a Transgenic Mouse Model

Andrew Lane, M.D., Justin Turner, M.D., Lindsey May, BS, Randall Reed, PhD.

Golden Head Mirror Honor Award For Meritorious Teaching in Rhinology

The Golden Head Mirror Honor Award was first given by Dr. Maurice Cottle to colleagues who were chosen because of “Meritorious Teaching in Rhinology”. The first pair of Golden Head Mirror Cuff Links was given by Dr. Cottle to Dr. George Fisher in 1948.

A

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

B

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

C

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

D

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

F

George W. Facer, US
Anthony Faills, US*
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Amos D. Friend, US*

G

Irwin E. Ganor, US
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H

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Richard B. Hadley, US*
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Edward W. Harris, US*
Raymond L. Hilsinger, US*
Kenneth H. Hinderer, US*
Leland R. House, US
Sandy Hoffman, US
Egbert Huizing, The Netherlands

J

Gerald F. Joseph, US
Joseph B. Jacobs, MD

K

Alvin Katz, US
 David Kennedy, US
 Eugene Kern, US
 John Kirchner, US
 Daniel D. Klaff, US*
 Zvonimir Krajina, Croatia
 Frederick A. Kuhn, US

L

Clifford F. Lake, US*
 Donald Lanza, US
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 Walter E.E. Loch, US*
 W. Kaye Lochlin, US
 Fausto Lopez-Infante,
 Mexico
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 Roberto Neveus-Pinto,
 Brazil
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O

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 Sydney L. Stevens, US*
 Fred Stucker, US
 Giorgio Sulsenti, Italy
 Edward A. Swartz, US

T

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

W

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

** Deceased*

New Investigator Award — (CORE)

2009

Novel Flavonoid Compounds for Cystic Fibrosis Chronic Rhinosinusitis

Bradford Woodworth, MD

Mucin expression in Paranasal Respiratory Epithelium Cell Culture

David Poetker, MD

2008

The Role of Epithelial Cells in Chronic Rhinosinusitis with Nasal Polyps

Bradley Otto, MD

2007

Regulatory T Cells in Chronic Rhinosinusitis

Jayant Pinto, MD

2006

Efficacy of Topical Lactoferrin and Antibiotics in an Animal Model of Sinusitis

Alexander Chiu, MD

2005

Surfactant Proteins A and D In Chronic Sinusitis

Rodney J. Schlosser, MD

2004

Assessment of Bacterial Biofilms in Sinusitis

James N. Palmer, M.D.

2002

Characterization of Eosinophil Peroxidase-Induced Tissue Damage in Sinonasal Polyposis and Chronic Rhinosinusitis

Martin J. Citardi, MD

Influence of Estrogen on Maturation of Olfactory Neurons

Karen J. Fong, MD

2001

Apoptosis in the Aging Olfactory Mucosa

David B. Conley, MD

Clinical Science Research Award

2007 (COSM)

Demonstration of Biofilms in Chronic Sinusitis Using Light Microscopy

A. Bhatki, M.D., A. Goldberg, M.D., M. Gangar, M.D., G. Hradek, M.S.

2006 (COSM)

Impact of Depression on Disease-Specific Symptoms and Quality of Life in Patients with Chronic Rhinosinusitis

Rebecca Bransted, MD

Basic Science Research Award

2009 (Annual Meeting)

(Production of this abstract book was completed prior to the selection of the awardees)

2008 (Annual Meeting)

Interleukin 1 Receptor-like 1 Gene is Associated with Chronic Rhinosinusitis

Roberto Castano, MD, Yohan osse, MD, Leandra Mfunu, MD, Martin Desrosiers, MD

2008 (Annual Meeting)

Olfactory Function and Disease Severity in Chronic Rhinosinusitis

Jamie Litvack, MD, Jess Mace, MPH, Kenneth James, PhD, Timothy Smith, MD

2008 (COSM)

Reversible Loss of Neuronal Marker Protein Expression in a Transgenic Mouse Model for Sinusitis-associated Olfactory Dysfunction

Justin Turner, MD, PHD, Lindsey May, BS, Randall Reed, PhD., Andrew Lane, MD

2007 (COSM)

Methods for Removing Bacterial Biofilms: In Vitro Study Using Clinical Chronic Rhinosinusitis Specimens

Martin Desrosiers, M.D., M. Myntti, Ph.D., G. James, Ph.D.

2006 (COSM)

Chronic Rhinosinusitis with Nasal Polyps is Associated with Decreased Expression of Epithelial Interleukin 22 Receptor

Murugappan Ramanathan, Jr., MD

2005

Altered Expression Of Genes Associated With Innate Immunity In Recalcitrant Rhinosinusitis With Polyps.

Andrew P. Lane, M.D.

2004

Superantigens and Chronic Sinusitis II: Analysis of T Cell Receptor VB Domain in Nasal Polyps

David B. Conley, MD, Anju Tripathi, MD, Kristin A. Seiberling, MD, Leslie C. Grammar, MD, Robert C. Kern, MD

2003

Nitric Oxide and Collagen Expression in Allergic Upper Airway Disease

Marc A. Tewfik, CSc, Julio F. Bernardes, MD, Jichaun Shan, MD, Michelle Robinson, BSc, Saul Frenkiel, MD, David H. Eidelman, MD

2000

An Animal Model for Allergic Fungal Sinusitis

Felicia Grisham, MD

Histologic Study of the Superior Turbinate

Donald Leopold, MD

International Research Award

2009

(Production of this abstract book was completed prior to the selection of the awardees)

2008

Development of a Low Cost Endoscopic Sinus Surgical Trainer

*Randy M. Leung, MD, Jerry M. Leung, MD, Adam Dubrowski, PhD, Ian Witterick, MD
Toronto, Canada*

2006

Effectiveness of Topical Antibiotics on Staphylococcus Aureus Biofilm in Vitro

Martin Desrosiers, MD, Zohra Bendouah, Msc., Jean Barbeau, Ph.D

A Sheep Model for the Study of Biofilms in Rhinosinusitis

Kien R. Ha, MBBS, Alkis J. Psaltis, MBBS, Lorwai Tan, Ph.D, Peter John Wormald, MD

2005

Brain Perfusion SPECT Findings in Patients with Posttraumatic Anosmia and Comparison with Radiological Imaging

Mohammad Eftekhari, Majid Assadi, Majid Kazemi, Mohsen Naraghi, Jalal Mehdizadeh, Mohsen Saghari, Alireza Mojtahedi, Mohammad Sadeghi-Hasamabadi, Armagan Fard-Esfahani, Babak Fallahi, Davood Beiki

2004

Development of A Rhinovirus Study Model Using Organ Culture of Turbinate Mucosa

Yong Ju Jang, M.D., Si Hyeong Lee, M.D., Hyon-Ja Kwon, MSc, Yoo-Sam Chung, M.D., Bong-Jae Lee, M.D.

2003

Nitric Oxide and Collagen Expression in Allergic Upper Airway Disease

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

2002

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

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

Resident/Fellows in Training Travel Grant

2009

(Production of this abstract book was completed prior to the selection of the awardees)

2008

Management of Sinonasal Malignant Neoplasms: Defining the Role of Endoscopy

Amber Luong, MD

CT Scan Severity Correlates with Improvement in Quality of Life Outcomes after Endoscopic Sinus Surgery in Patients with Chronic Rhinosinusitis and Asthma

Patricia Maeso, MD

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COSM 2010

April 28-May 2, 2010
Bally's, Las Vegas, NV

Abstract Submission
Deadline: 10/31/2009

Manuscript Submission
Deadline: 4/1/2010

56th Annual Meeting

September 25, 2010
Boston, MA

Abstract Submission
Deadline: 5/21/2010

Manuscript Submission
Deadline: 8/28/2010

COSM 2011

April 28-May 1, 2011
Sheraton Chicago
Hotel & Towers
Chicago, IL

57th Annual Meeting

September 10, 2011
San Francisco, CA

COSM 2012

April 18-22, 2012
Manchester Grand Hyatt
San Diego, CA

58th Annual Meeting

(Location: TBD)

COSM 2013

April 10-14, 2013
JW Marriott Grande Lakes
Orlando, FL

59th Annual Meeting

(Location: TBD)

Questions?

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