
ARS
American
Rhinologic
Society
63rd Annual Meeting
September 8-9, 2017
Renaissance Chicago Downtown Hotel
Chicago, Illinois
american-rhinologic.org

The ARS Welcomes Our 63rd Annual Meeting Guest Countries: India, Kenya, Tanzania, Uganda

JOHN M. DELGAUDIO, MD, FARS

Presidential Welcome

It is my pleasure to welcome you to Chicago and the 63rd annual meeting of the American Rhinologic Society. We are following up a very successful Spring meeting and Summer Sinus Symposium with an excellent fall program. Richard Orlandi, M.D., FARS, the President-Elect of the ARS and Program Chair for the meeting, and the program committee have put together a fantastic scientific program that features the best submitted abstracts from across the world, in addition to timely and relevant panels. I would like to thank Dr. Orlandi and the program committee for their hard work.

I would like to welcome and thank all the members of the ARS for your support. For those of you that are not yet members, I encourage you to join the ARS and experience all the educational content that our society has to offer. A special welcome to our international guests that have travelled from across the globe to be with us. Please take advantage of our newly revised international membership program, which offers a lower membership fee and full benefits of membership, including the International Forum of Allergy and Rhinology, Case of the Month, the Scope it Out podcasts, and much more. Become part of the society that leads the world in Rhinologic education and care.

I would like to thank our many corporate sponsors that support the ARS and this meeting. Without these partnerships it would be impossible for us to offer such high-quality meetings to our members. Please visit our corporate sponsors in the exhibit hall and express your appreciation for their support.

As my year as President of the ARS comes to a close, I would like to thank everyone who made this such a memorable year. As I mentioned in my spring address, the job of president is made easier by the dedicated staff, leadership, and members of the society. Thank you to the administrative staff of Wendi Perez, Susan Arias, and Bridget McCurdy. You are the glue that holds this Society together. Thank you to all the Committee Chairs and committee members for their hard work and dedication to the ARS. Their work continues to move the ARS in a positive direction. And thanks to the leadership for their counsel and dedication to the society.

It is my pleasure to have served as the President of the American Rhinologic Society for the past year. I am truly grateful for this honor.

Have a great meeting and enjoy Chicago.

John M. DelGaudio, MD, FARS
President, American Rhinologic Society

RICHARD ORLANDI, MD, FARS

President-Elect Welcome

Welcome to Chicago for the American Rhinologic Society's Fall Meeting. As your President-Elect, I'm honored to serve as the Program Chair for this 2017 meeting. This one and a half day conference will showcase the latest in Rhinologic and Skull Base clinical care, discovery and innovation. We're especially honored by the attendance of our colleagues from guest countries India, Kenya, Uganda, and Tanzania.

The Program Committee has reviewed over 200 abstract submissions for the meeting and we are very excited to share with you the very best of these competitive scientific presentations. We owe the Program Committee a huge debt of gratitude for their tireless work in ensuring the finest possible meeting content. Their names are listed later in the program book. Please join with me in thanking them for the fine work done on our behalf.

The David W. Kennedy Lectureship has provided us with opportunities to hear from impressive and impactful leaders in our field and this year will be a strong continuation of that tradition. Timothy L. Smith, MD, MPH will address us as the 13th Annual Kennedy Lecture, "Outcomes in the Management of Chronic Rhinosinusitis: Past, Present, and Future."

Panels provide an opportunity for us to discuss important areas in our field. Twelve panels spread throughout the meeting will explore new knowledge, provide meaningful dialogue on controversial topics, share experience and wisdom, and put in context the latest advances in our field:

- CRS Endotypes: How Can They Impact My Practice
- Appropriateness Criteria for Sinus Surgery: Knowing When Enough is Enough
- Choosing the Extent of Frontal Sinus Surgery
- The Evolution of Industry Relationships
- Evidence-Based Postoperative Care
- The Nose in Obstructive Sleep Apnea
- Challenges in Rhinology: An International Perspective
- Extramural Funding: How I Did It
- Minimally Invasive Skull Base Surgery - Assessment of the Evidence
- Advances in Understanding Nasal Polyps
- ARS Advocacy: What's on Your Radar Screen?
- Maximizing Rhinology Care in the Office

Podium presentations at this year's meeting will reveal cutting edge advances in the following areas:

- basic science and clinical approaches to the pathophysiology of chronic rhinosinusitis,
- patient reported outcomes
- CRS and cystic fibrosis
- new and emerging treatments for rhinologic disease, including drug eluting materials and topical therapies
- olfaction
- skull base disease

The Film FESStival will entertain us as our colleagues compete for the most impressive rhinology footage. A large number of high quality posters will also provide rich and wide-ranging educational content. I encourage you to join with your colleagues on Friday night to view these posters and meet their authors during an evening reception. This reception will also honor our international colleagues and our Kennedy lecturers, past and present.

I'm confident that this year's Fall Meeting will provide all otolaryngologists interested in the field of Rhinology and Skull Base Surgery valuable content that will enhance our knowledge and will impact the care of our patients. If you happen to not be a member of the ARS, please join us to gain all of the advantages from membership that you can!

I look forward to seeing you at our meeting here in Chicago, as well as next year's COSM meeting in Maryland and our Summer Sinus Symposium in Seattle!

Richard Orlandi, MD, FARS
Program Chair

COSM 2018
April 19-20, 2018
Gaylord National Resort and Convention Center
National Harbor, MD

7th Annual Summer Sinus Symposium
July 12-14, 2018
The Westin Seattle
Seattle, WA

ARS 64th Annual Meeting
10/5-6/18
Atlanta, GA

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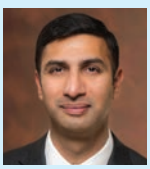

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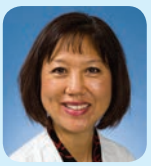

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ARS Mission Statement

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.

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See pg 118 for details.

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Go to ***ARS.CmeCertificateOnline.com*** and click on "ARS 63rd Annual Meeting" link. On the site, you will be asked to evaluate the overall conference. A certificate will be made available for you to print. Questions? Email Certificate@AmedcoEmail.com

Business/ACCME

Continuing Education

Accreditation Statement

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

Credit Designation Statement

The ARS designates this live activity for a maximum of 11.25 *AMA PRA Category 1 Credits™.* Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Learning Objectives from Practice Gaps

At the conclusion of this meeting participants will be able to:

1. Understand the potential pathophysiologic bases of chronic rhinosinusitis
2. Appreciate the impact of rhinologic conditions on quality of life.
3. Develop a better understanding of evidence-based treatment of rhinologic disorders

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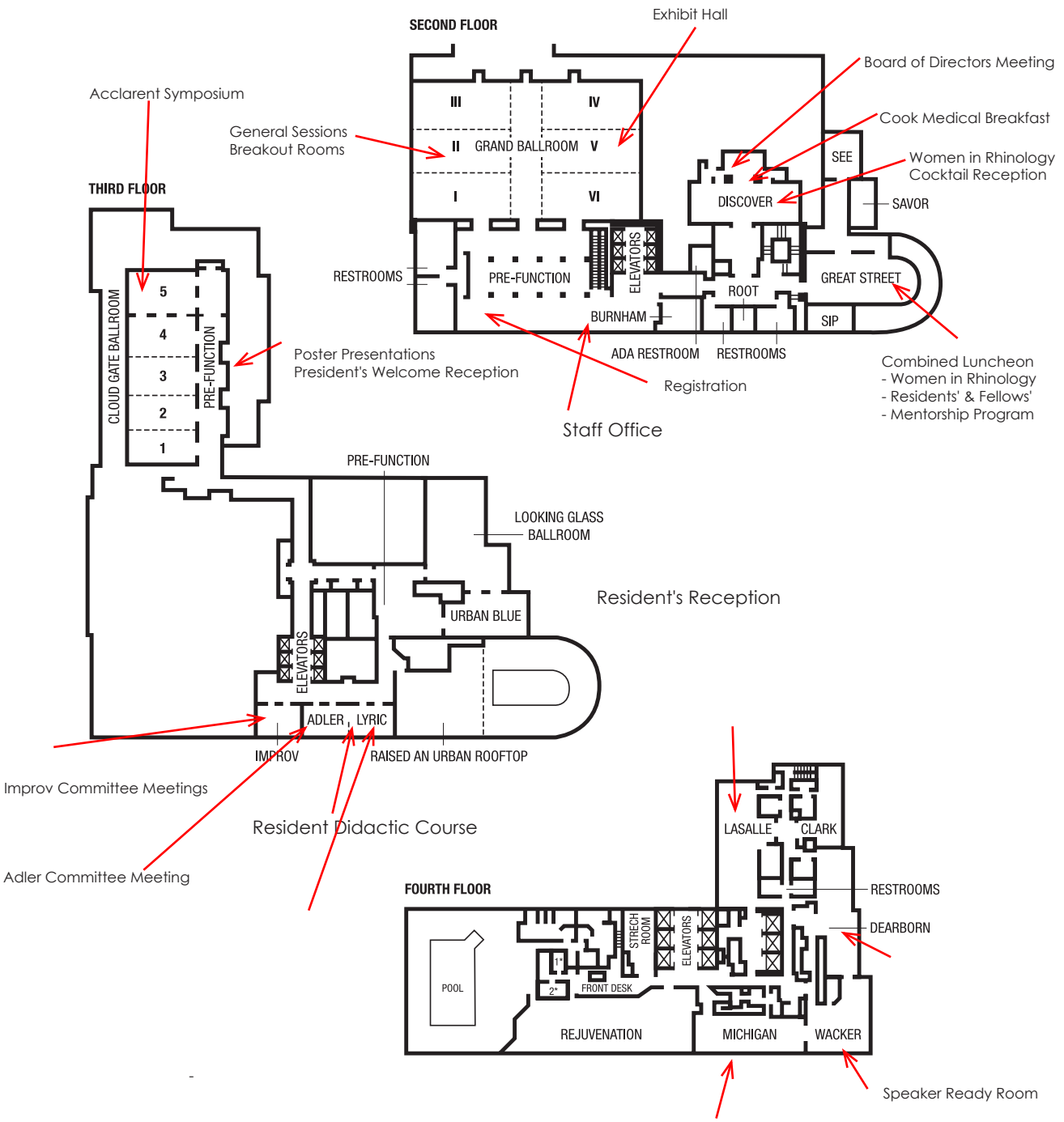

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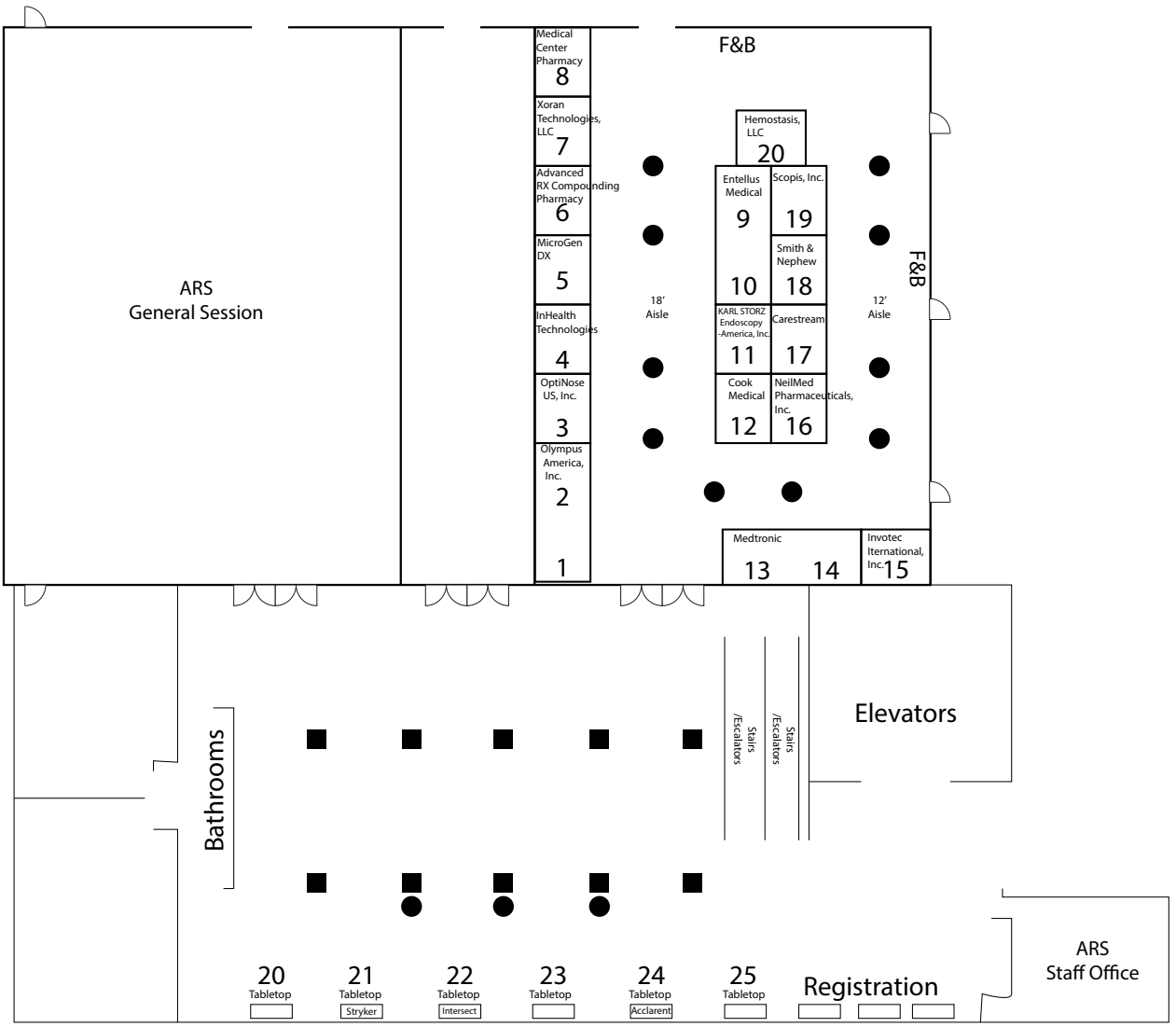
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General Session
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Advanced RX Compounding Pharmacy 6
MicroGen DX 5
InHealth Technologies 4
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18' Aisle
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PROGRAM AT A GLANCE

Friday, September 8, 2017 - Grand Ballroom 1-3 (Live International Webstreaming)

(Supported by the Pan American Association)

12:55 PM
Welcome
John DelGaudio, MD, FARS;
Richard Orlandi, MD, FARS

1:00 PM
Panel: CRS Endotypes: How Can They Impact My Practice?
Moderator: Spencer Payne, MD, FARS
Panelists: Joseph Han, MD, FARS; Devyani Lal, MD, FARS; Amber Luong, MD, PhD, FARS; Elina Toskala, MD, FARS

Top Abstracts - Treatment

Moderator: Stella Lee, MD;
Do Yeon Cho, MD

1:40pm
Activity of Bacteriophages in Removing Biofilms of Pseudomonas Aeruginosa Isolates from Chronic Rhinosinusitis Patients
Stephanie Fong, MBBS

1:47pm
The In Vitro Mucolytic Effect of Xylitol and Dornase Alfa on Chronic Rinosinusitis Mucus
Tim Hardcastle, BMSc (Hons)

1:54pm
Industry Relationships are Associated with Performing a Greater Number of Sinus Balloon Dilation Procedures
Jean Anderson Eloy, MD

2:01pm
Bone Mineral Density in Recalcitrant Chronic Rhinosinusitis Patients on Long-term Intranasal Budesonide via Mucosal Atomization Device: A Cross-sectional Study
Jamil Manji, MSc

2:08pm
Discussion

Top Abstracts - Understanding CRS I

Moderators: Benjamin Bleier, MD, FARS;
Bradley Goldstein, MD, PhD

2:15pm
Increased Il-13 Expression is Independently Associated with Neo-osteogenesis in Chronic Rhinosinusitis
Sathish Paramasivan, MBBS

2:22pm
Solitary Chemosensory Cells are the Epithelial Source of Interleukin-25 in Chronic Sinusitis with Nasal Polyps
Michael A. Kohanski, MD, PhD

2:29pm
Characterization of Tertiary Lymphoid Organs in Chronic Rhinosinusitis
Sathish Paramasivan, MBBS

2:36pm
Non-invasive Quantitative Liquid Biopsy for Chronic Rhinosinusitis with Nasal Polyps Using Mucus Derived Exosomal Proteomics
Sarina K. Mueller, MD

2:43pm
Discussion

2:50pm
Presidential Address
John DelGaudio, MD, FARS

3:10pm
Break with Exhibitors
3:30pm
Panel: Appropriateness Criteria for Sinus Surgery: Knowing When Enough is Enough
Moderator: Jeremiah A. Alt, MD, PhD, FARS
Panelists: Claire Hopkins, MD;
Richard Douglas, MD; Todd Kingdom, MD, FARS; Richard Lebowitz, MD, FARS

Top Abstracts - Understanding CRS II

Moderators: Henry P. Barham, MD;
Murray Ramanathan, Jr., MD, FARS

4:20pm
Investigating the Minimal Clinically Important Difference for SNOT-22 Symptom Domains in Patients Electing Sinus Surgery for Chronic Rhinosinusitis
Naweed I. Chowdhury, MD

4:27pm
Bitter and Sweet Taste Tests are Predictive of Disease Status in Chronic Rhinosinusitis
Alan D. Workman, BA

4:34pm
Staphylococcus Aureus Impairment of Sinus Epithelial Regeneration and Repair is Greater in CRSwNP than Controls
Fabiana CP Valera, MD, PhD

4:41pm
Does Greater Antibiotic Use Prior to ESS in CRS Influence Outcomes?
Vijay R. Ramakrishnan, MD, FARS

4:48pm
Discussion

4:55pm
Business Meeting

5:00pm
Panel: Film FESStival

5:40pm
Closing Remarks

5:45pm
Presidential Welcome and Poster Reception

PROGRAM AT A GLANCE

Saturday, September 9, 2017 - Grand Ballroom 1-3 (Live International Webstreaming)

(Supported by the Pan American Association)

7:55AM
Welcome
Richard Orlandi, MD, FARS

8:00am
Panel: Choosing the Extent of Frontal Sinus Surgery
Moderator: Adam DeConde, MD
Panelists: Martin Citardi, MD, FARS; Zara Patel, MD, FARS; Alkis Psaltis, MD; Jeffrey Suh, MD

8:45am
The 13th Annual Kennedy Lecture -
"Outcomes in the Management of Chronic Rhinosinusitis: Past, Present, and Future"
Timothy Smith, MD, MPH, FARS

9:25am
Break with the Exhibitors

9:45am
Panel: The Evolution of Industry Relationships
Moderators: Jivianne Lee, MD, FARS; Eric Holbrook, MD, FARS
Panelists: Scott Carpenter; Lisa Earnhardt; Stacey Gray, MD, FARS; Peter Hwang, MD, FARS; Peter-John Wormald, MD

10:30am
Panel: Evidence-Based Postoperative Care
Moderator: Luke Rudmik, MD, FARS
Panelists: Ralph Metson, MD, FARS; Steve Pletcher, MD; Zachary Soler, MD; Adam Zanation, MD

11:15am
Panel: The Nose in Obstructive Sleep Apnea
Moderator: Brian W. Rotenberg, MD, MPH, FARS
Panelists: Andrew Goldberg, MD, FARS; Jeb Justice, MD; Ray Sacks, MD, FARS

12:00pm
Lunch with Exhibitors

12:00pm (Combined Luncheon)
Women in Rhinology Luncheon
Mentorship Program Luncheon
Resident's and Fellows Luncheon

Saturday, September 9, 2017 - Breakout Room 1, Grand Ballroom 1 - Chairperson: David Poetker, MD, FARS

12:57pm
Welcome

Rhinosinusitis and Cystic Fibrosis

Moderators: Thomas Higgins, MD, FARS; Erin O'Brien, MD, FARS

1:00pm
Pulmonary Aspiration of Sinus Secretions in Patients with Cystic Fibrosis
Jacob Nelson, MD

1:07pm
Timing and Frequency of Sinus Surgery are Associated with Lung Transplant Outcomes in Cystic Fibrosis Patients
Tracy Cheng, AB

1:14pm
Sinus and Lung Cultures in Lung Transplant Patients with Cystic Fibrosis: Do Sinus Bacteria Infect the Allograft?
Kevin J. Choi, MD, MS

1:21pm
Effect of Endoscopic Sinus Surgery on Clinical Outcomes in Cystic Fibrosis
Anali Dadgostar, MD

1:28pm
Pseudomonal Sinusitis is Associated with Higher Rejection Rates After Lung Transplantation for Cystic Fibrosis
Adam L. Honeybrook, MBBS
Tracy Cheng, MD

1:35pm
Discussion

Patient Reported Outcome Measures

Moderators: Jose Gurrola II, MD; Joshua Levy, MD, MPH

1:42pm
Factor Analysis of the Questionnaire of Olfactory Disorders in Patients with Chronic Rhinosinusitis
Jose L. Mattos, MD, MPH

1:49pm
A Validated Model for the 22-item Sinonasal Outcome Test Subdomain Structure in Chronic Rhinosinusitis
Allen L. Feng, MD

1:56pm
A Pilot Comparison Between Care-giver and Patient Perceived Quality of Life in Chronic Rhinosinusitis
Katherine N. Adams, BS

2:03pm
SNOT-22 Based Clusters Associate with Endotypic and Prognostic Features in Chronic Rhinosinusitis without Nasal Polyposis Patients
Devyani Lal, MD, FARS

2:10pm
The 22-item Sinonasal Outcome Test Accurately Identifies Patient-reported Control of Chronic Rhinosinusitis Symptomatology
Katie M. Phillips, MD

2:17pm
Discussion

2:24pm
Panel: Challenges in Rhinology: An International Perspective
Moderator: Samer Fakhri, MD, FARS

3:00pm
Break with Exhibitors

Comparing Endoscopic Techniques

Moderators: Gretchen Oakley, MD; Marc Zacharek, MD, FARS

3:20pm
Outcomes and Complications of Balloon and Conventional Endoscopic Sinus Surgery
Mohamad Chaaban, MD, FARS

3:27pm
Equivalence in Outcomes Between Draf 2b Versus Draf 3 Frontal Sinusotomy for Refractory Chronic Rhinosinusitis
Vishal S. Patel, BS

3:34pm
Outcomes of the Endoscopic Modified Lothrop Procedure (Draf 3) Discriminated by SNOT-22 Scoring, Stent Use, and Cystic Fibrosis
Liang-Chun Shih, MD

3:41pm
Patient-reported Outcomes / Quality Of Life Outcomes In Studies Of Sinonasal and Skull Base Malignancy: A Look Into Quality Of Methodology And Clinical Relevance
Dana L. Crosby, MD

3:48pm
The Upper Blepharoplasty Approach to the Frontal Sinus: A Cadaveric Feasibility Study
Oliver Y. Chin, MD

3:55pm
Discussion

Pathophysiology of CRS

Moderator: Anne Getz, MD; Michael Platt, MD

4:02pm
Air Pollutants May be Modifiable Environmental Risk Factors in Chronic Rhinosinusitis Disease Progression
Leila J. Mady, MD, PhD, MPH

4:09pm
Characterization of a Rapid, Novel Cysteine Protease-induced Murine Model of Chronic Rhinosinusitis
Nyall R. London, MD, PhD

4:16pm
Submucosal Gland Mucus Strand Velocity is Decreased in Chronic Rhinosinusitis
Kiranya E. Tipirneni, MD

4:23pm
Loss of Function Trpv1 Snp (rs8065080) is Associated with Chronic Rhinosinusitis
Erin Romero, BA

4:30pm
Trends in Sinusitis Research: A Systematic Review of Extramural Funding
Joshua M. Levy, MD

4:37pm
Discussion

4:45pm
Panel: Extramural Funding: How I Did It
Moderator: Noam Cohen, MD, PhD, FARS
Panelists: Andrew Lane, MD, FARS; Vijay Ramakrishnan, MD, FARS; Timothy Smith, MD, MPH, FARS; Bradley Woodworth, MD, FARS

5:25pm
Closing Remarks & Adjourn

PROGRAM AT A GLANCE

Saturday, September 9, 2017 - Breakout Room 2, Grand Ballroom 2
Chairperson: Eugenia Vining, MD, (Live International Webstreaming)

12:57pm
Welcome

Examining Outcomes I
Moderators: Kenneth Rodriguez, MD; John Schneider, MD

1:00pm
Management of Rhinosinusitis in Immunocompromised Patients: Predictors, Treatment Trends, and Outcomes
Sanjeet Rangarajan, MD

1:07pm
Similar Outcomes for Unilateral and Bilateral Chronic Rhinosinusitis without Nasal Polyposis After Endoscopic Sinus Surgery
Daniel M. Beswick, MD

1:14pm
Association of Socioeconomic Status, Race and Insurance Status with Chronic Rhinosinusitis Patient-reported Outcome Measures
Katie M. Phillips, MD

1:21pm
Correlation of Exhaled Nasal Nitric Oxide to Sinus CT and Sinonasal Outcome Test Scores: A Prospective Study
Jeremie D. Oliver, BA, BS

1:28pm
Self-reported Anxiety and Depression are Unchanged After Functional Endoscopic Sinus Surgery for Chronic Rhinosinusitis
Theodore A. Schuman, MD

1:35pm - Discussion

Skull Base Surgery
Moderators: Edward McCoul, MD, MPH, FARS; Lee Zimmer, MD

1:42pm
Prospective Trans-frontal Sheep Model of Skull Base Reconstruction Using Vascularized Mucosa
Sarina K. Mueller, MD

1:49pm
Porcine Small Intestine Submucosa Graft Promotes Improved Remucosalization at Sites of Upper Airway Tissue Remodeling
Jayakar Nayak, MD, PhD

1:56pm
Raman Spectroscopy for Inverted Papillomas: Distinguishing Friend from Foe
Marco A. Mascarella, MD

2:03pm
Significance of Human Papillomavirus Positivity in Sinonasal Squamous Cell Carcinoma
Suat Kilic, BA

2:10pm
Esthesioneuroblastoma Short and Long-Term Outcomes: Analysis From the National Cancer Database
Ryan M. Carey, MD

2:17pm - Discussion

2:24pm
Panel: Minimally Invasive Skull Base Surgery - Assessment of the Evidence
Moderator: Eric Wang, MD, FARS
Panelists: Nithin Adappa, MD, FARS; Jean Anderson Eloy, MD; Raj Sindwani, MD, FARS

3:00pm
Break with Exhibitors

Optimizing Surgical Outcomes
Moderators: Charles Ebert, MD, FARS; Oswaldo Henriquez, MD

3:20pm
Risk Stratification for Postoperative Venous Thromboembolism After Endoscopic Sinus Surgery
Daniel M. Beswick, MD

3:27pm
A Systematic Review of Sinonasal Debridement Ver[illegible]idement for the Post[illegible]e of Patients Undergoing En[illegible]oscopic Sinus Surgery
Sharon Tzelnick, MD

3:34pm
Preoperative Acute Purulent Sinusitis, Chronic Sinusitis or Concominant Endoscopic Sinusotomy May Not be Associated with the Development of Post-Operative Meningitis in Endoscopic Endonasal Skull Base Surgery (EESS)
Chester F. Griffiths, MD

3:41pm
Total Intravenous Anesthesia with Propofol Versus Inhaled Anesthesia For Endoscopic Sinus Surgery: A Meta-analysis Of Randomized Controlled Trials
Nadeem R. Kolia, MD

3:48pm
Antibiotic Use in Functional Endoscopic Sinus Surgery: A Survey of the American Rhinologic Society
Christina H. Fang, MD

3:55pm- Discussion

Microenvironments
Moderators: Philip Chen, MD; Anthony Del Signore, MD

4:02pm
Heterogeneity of Human Sinonasal Eithelial Basal Cells
Syed Khalil, PhD

4:09pm
Altered Immunoglobulin D Humoral and B Cell Immunity in Patients with Chronic Rhinosinusitis
Jin-Young Min, MD

4:16pm
The Effect of Medical Treatment on the Bacterial Microbiome in Patients with Chronic Rhinosinusitis: A Randomized Trial.
Ravi Jain, MD

4:23pm
Mechanisms of Response to Intranasal Administration of Lactococcous Lactis W136 Probiotic in Refractory CRS
Martin Y. Desrosiers, MD, FRCSC

4:30pm
Bacterial Microbiome Changes in Chronic Rhinosinusitis Patients from Baseline to Clinical Exacerbations
Uma S. Ramaswamy, MD

4:37pm - Discussion

4:45pm
Panel: Advances in Understanding Nasal Polyps
Moderator: Stephanie Joe, MD, FARS
Panelists: Stella Lee, MD; Jayant Pinto, MD; Rodney Schlosser, MD, FARS

5:25pm - Closing Remarks and Adjourn

Saturday, September 9, 2017 - Breakout Room 3, Grand Ballroom 3 - Chairperson: Douglas Reh, MD, FARS

12:57pm
Welcome

1:00pm
Panel: ARS Advocacy: What's on Your Radar Screen?
Moderator: Seth Brown, MD, FARS
Panelists: Pete Batra, MD, FARS; Pete Manes, MD, FARS; Brent Senior, MD, FARS; Michael Setzen, MD, FARS

Examining Outcomes II

Moderators: Jonathan Ting, MD; Bozena B. Wrobel, MD, FARS

1:35pm
Asthma Onset Pattern and Patient Outcomes in a Chronic Rhinosinusitis (CRS) Population
Christopher Jones, BS

1:42pm
The Impact of Asthma on the Cost Effectiveness of Surgery for Chronic Rhinosinusitis with Nasal Polyps
George A. Scangas, MD

1:49pm
Outcomes After Complete Endoscopic Sinus Surgery and Aspirin Desensitization in Aspirin Exacerbated Respiratory Disease
Viran Ranasinghe, MD

1:56pm
L-methionine and the Cftr Potentiator, Ivacaftor, Abrogate Pseudomonas Aeruginosa Biofilm Mass
Do-Yeon Cho, MD

2:03pm
The Effect of Topical Treatments for CRS on the Sinonasal Epithelial Barrier
Mahnaz Ramezanpour, PhD

2:10pm
Discussion

Olfactory Implications

Moderators: Karen Fong, MD, FARS; Ian Humphreys, DO

2:17pm
Regulation of Olfactory Regeneration by Acute Inflammation and Nf-kb
Andrew P. Lane, MD, FARS

2:24pm
Association of Alterations in Smell and Taste with Depression Among Older Adults
Kevin Hur, MD

2:31pm
Olfactory Dysfunction Predicts Subsequent Dementia in Older US Adults
Dara R. Adams, MD

2:38pm
Olfactory Dysfunction and Cognition Among Older Adults in The United States
Janet S. Choi, MD, PhD

2:45pm
Olfactory Loss in Chronic Rhinosinusitis is Associated with Neuronal JNK Activation
Andrew Victores, MD

2:52pm
Discussion

3:00pm
Break with Exhibitors

Drug Eluting Stents and Topical Therapy

Moderators: Holly Boyer, MD; Adam Folbe, MD, FARS

3:20pm
Preclinical Therapeutic Efficacy of the Ciprofloxacin-eluting Sinus Stent for Pseudomonas Aeruginosa Sinusitis
Do-Yeon Cho, MD

3:27pm
A Comparative Study if Two Drug-eluting Stent for the Treatment of Chronic Sinusitis with Polyposis
Hussam Tallab, MD

3:34pm
Safety and Efficacy of a Bioabsorbable Fluticasone Propionate-eluting Sinus Dressing in Postoperative Management of Endoscopic Sinus Surgery a Randomized Clinical Trial
Gwijde Adriaensen, MD

3:41pm
Corticosteroid-eluting Implants Placed In-office as an Alternative to Revision Surgery in Patients with Recurrent Sinus Obstruction due to Polyposis: A Meta-analysis
J. Pablo Stolovitzky, MD, FARS

3:48pm
The Safety and Efficacy of Colloidal Silver in Recalcitrant Chronic Rhinosinusitis: A Randomized Controlled Trial
Mian Li Ooi, MD

3:55pm
Discussion

4:02pm
Panel: Maximizing Rhinology Care in the Office
Moderator: Greg Davis, MD, MPH, FARS
Panelists: Marc Dubin, MD, FARS; Michael Sillers, MD, FARS; Sarah Wise, MD, FARS

Empty Noses and Full Ears

Moderators: Jayakar Nayak, MD, PhD; J. Pablo Stolovitzky, MD, FARS

4:42pm
Prevalence of Eustachian Tube Dysfunction in Patients with Chronic Rhinosinusitis
Navarat Tangbumrungthamm MD

4:49pm
Eustachian Tube Dysfunction Symptoms in Patients Treated in a Tertiary Rhinology Clinic
Michael J. Marino, MD

4:56pm
Is Empty Nose Syndrome a Geographical Problem?
Jamil Manji, MSc

5:03pm
Examine the Abnormal Nasal Aerodynamics in Empty Nose Syndrome
Chengyu Li, PhD

5:10pm
The Functional and Psychological Burden of Empty Nose Syndrome
Jamil Manji, MSc

5:17pm
Discussion

5:25pm
Closing Remarks and Adjourn

PROGRAM ABSTRACTS

FRIDAY, SEPTEMBER 8, 2017
General Session
Grand Ballroom 1-3
(Live International Webcast)
(Supported by the Pan American Association)

12:55 PM
Welcome
John DelGaudio, MD, FARS – ARS President
Richard Orlandi, MD, FARS – President-Elect/Program Chair

1:00 PM
Panel: CRS Endotypes: How Can They Impact My Practice?
Moderator: Spencer Payne, MD, FARS
Panelists: Joseph Han, MD, FARS; Devyani Lal, MD, FARS; Amber Luong, MD, PhD, FARS; Elina Toskala, MD, FARS

Top Abstracts – Treatment
Moderators: Stella Lee, MD; Do Yeon, Cho, MD

1:40 PM
Activity of bacteriophages in removing biofilms of pseudomonas aeruginosa isolates from chronic rhinosinusitis patients
Stephanie Fong, MBBS
Amanda Drilling, PhD
Alkis Psaltis, MD FRACS PhD
Sarah Vreugde, MD PhD
Peter-John Wormald, MD FRACS
Woodville South, South Australia
Australia

COI: No Disclosure Reported

Introduction
Pseudomonas aeruginosa (PA) infections are prevalent amongst chronic rhinosinusitis (CRS) sufferers. Many PA strains form biofilms, leading to treatment failure. Lytic bacteriophages (phages) are viruses that infect, replicate within, and lyse bacteria, causing bacterial death.

Aim
To assess the activity of a phage cocktail in eradicating biofilms of ex vivo PA isolates from CRS patients.

Methods
47 PA isolates from CRS patients with and without cystic fibrosis (CF) across three continents were typed using multi-locus sequence typing (MLST). Antibiotic resistance was assessed using minimum inhibitory concentration assays. Biofilms grown in vitro were treated with a cocktail of four phages (CT-PA). Biofilm biomass was measured after 24 and 48 hours, using a crystal violet assay. Phage titrations were performed to confirm replication of the phages. A linear mixed effects model was applied to assess the effects of treatment, time, CF status, and multidrug resistance on the biomass of the biofilm.

Results
The isolates included 44 MLST strain types and 11 multidrug resistant isolates. CT-PA treatment significantly reduced biofilm biomass, at both 24 and 48 hours post-treatment ($p<0.0001$), regardless of CF status or multidrug resistance. Biomass was decreased by a median of 76% at 48 hours. Decrease in biofilm was accompanied by a rise in phage titres for all except one strain.

Conclusion
A single dose of phages is able to significantly reduce biofilms formed in vitro by a range of PA isolates from CRS patients. This represents an exciting potential targeted treatment for PA biofilm infections and multidrug resistant bacteria.

1:47 PM
The in vitro mucolytic effect of xylitol and dornase alfa on chronic rhinosinusitis mucus
Tim Hardcastle, BMSc(Hons)
Ravi Jain, PhD
Fiona Radcliff, PhD
Sharon Waldvogel-Thurlow, Ms
Melissa Zoing, Ms
Kristi Biswas, PhD
Auckland, Auckland
New Zealand

COI: No Disclosure Reported

Background
The over-production and stagnation of purulent mucus impair mucociliary clearance and exacerbate the symptoms of chronic rhinosinusitis. There is a clinical need for effective topical mucolytic agents to facilitate removal of mucus and improve postoperative outcomes.

Methods
The effects of xylitol (5%) and dornase alfa (1mg/mL) on mucus and mucus crusts were investigated. Viscoelasticity and viscosity of wet mucus derived from 30 CRS patients was measured with a plate rheometer. Post-operative dried mucus crust dissolution was measured by examining peripheral transparency, central-transparency, and border definition of treated crust samples from 17 CRS patients.

Results
Xylitol and dornase alfa reduced wet mucus viscoelasticity at a frequency of 0.1 Hz significantly more than the saline control. Treatments also produced significantly lower viscosities than saline at a shear rate of 10 and 100s-1. Xylitol and dornase alfa significantly decreased mucus crust border definition relative to saline.

Conclusions
Xylitol and dornase alfa may be efficacious mucolytics, encouraging the breakdown of postoperative mucus

crusts and the reduction of viscoelasticity and viscosity of wet mucus. In vivo study is required to evaluate the potential of these agents in treating recalcitrant chronic rhinosinusitis.

1:54 PM
Industry relationships are associated with performing a greater number of sinus balloon dilation procedures
Jean Anderson Eloy, MD
Peter Svider, MD
Michael Bobian, BS
Richard Harvey, MD, FARS
Stacey Grey, MD, FARS
Adam Folbe, MD, FARS
Newark, NJ
USA

COI: No Disclosure Reported

Introduction
Industry outreach promotes awareness of novel technologies. However, concerns have been raised that such relationships may also unduly impact medical decision-making. Our objective was to evaluate industry relationships among practitioners who frequently employ balloon dilation (BD), characterizing whether there is any association between financial relationships and BD utilization.

Methods
Provider utilization data (FY-2014) was accessed for individuals billing BD procedures to Medicare, the largest healthcare payor in the U.S. The names of individuals included in these datasets were cross-referenced with the Centers for Medicare and Medicaid Services Open Payment site to determine the extent of industry relationships during this same year. Individuals included in this analysis were organized by those with “significant” ($1,000-$10,000) and “major” (>$10,000) industry relationships. Practice setting, training, and experience were also evaluated.

Results
Of 302 otolaryngologists who billed enough BDs for inclusion in this dataset, 99.3% were in private practice, 89.7% were board certified; 8.3% had facial plastic and reconstructive fellowship training and 1.3% had rhinology fellowship training. There was a significant increase in BDs performed with increasing BD-company financial contributions (ANOVA, p = 0.0003). Individuals without “significant” relationships with BD companies billed fewer BDs than those with at least “significant” (>$1,000) relationships (57.0±4.3 v 87.7±10.0, p = 0.001).

Conclusion
There is an association between receiving money from industry and the frequency with which otolaryngologists employ BD. While this analysis demonstrates an association, these results in no way imply causation. Further analysis exploring the reasons for this association may be necessary.

2:01 PM
Bone mineral density in recalcitrant chronic rhinosinusitis patients on long-term intranasal budesonide via mucosal atomization device: A cross-sectional study
Jamil Manji, MSc
Gurkaran Singh, BSc
Luis Macias-Valle, MD
Andres Finkelstein, MD
Christopher Okpaleke, MD
Amin Javer, MD FRCSC FARS
Melbourne, VIC
Australia

COI: No Disclosure Reportee

Background
Recent evidence suggests that the long-term use of intranasal budesonide for chronic rhinosinusitis (CRS) is associated with hypothalamic-pituitary-adrenal axis suppression and raised intraocular pressure. Given these systemic sequelae, we sought to determine if the long-term use of topical nasal budesonide delivered via the mucosal atomization device (MAD) may also have an impact on bone density (BMD).

Methods
A cross-sectional study was performed at a tertiary rhinology centre. CRS patients who had previously undergone sinus surgery and were receiving treatment with intranasal budesonide via MAD for at least 12 months were recruited. BMD was measured by dual energy x-ray absorptiometry (DXA). The WHO classification of T-scores for osteopenia and osteoporosis were used. Findings were compared to national BMD reference data. Pearson correlation analysis was performed using an a=0.05 to determine significance.

Results
One hundred seventy-three patients were included (N=173, 89 females) with an average age of 55.7 years (SD 12.4). The average duration of budesonide use was 17.5 months (SD 4.3). No significant correlation was found between BMD and concomitant treatment with inhaled steroids, itraconazole, or average annual rate of prednisone rescue. T-scores of the femur, spine and hip were significantly correlated with age and body mass index. Prevalence of osteoporosis among women (11%) and men (9.5%) aged =50 years in this cohort was comparable to the national prevalence of 15.8% and 6.8%, respectively.

Conclusion
The risk of developing osteoporosis for recalcitrant CRS patients using long-term intranasal budesonide via MAD is similar to baseline risk for the general population.

PROGRAM ABSTRACTS

2:08 PM
Discussion

Top Abstracts – Understanding CRS I
Moderators: Benjamin Bleier, MD, FARS; Bradly Goldstein, MD, PhD

2:15 PM
Increased Il-13 expression is independently associated with neo-osteogenesis in chronic rhinosinusitis
Sathish Paramasivan, MBBS
Sakiko Oue, MBBS
Mahnaz Ramezanpour, PhD
Alkis Psaltis, MD, PhD
Peter-John Wormald, MD, FRACS
Sarah Vreugde, MD
Woodville, South Australia
Australia

COI: No Disclosure Reported

Aims
Neo-osteogenesis has been observed in patients with chronic rhinosinusitis (CRS), especially in recalcitrant disease. The interplay between chronic inflammation, cytokine/growth factor expression, and neo-osteogenesis is poorly understood. This study aims to identify gene expression changes associated with CT- scan evident neo-osteogenesis.

Methods
Sinonasal bone and mucosal tissue was harvested from CRS patients with and without CT-scan evident neo-osteogenesis (CRSwNeO+ and CRSwNeO- respectively), and control patients. Histology and flow cytometry was carried out to define immune cell types. Gene expression of 46 genes with a role in chronic inflammation and bone remodelling was analyzed using a microfluidic qRT-PCR assay. Immunohistochemistry was performed to determine IL-13 localization within tissue. IL-13 functional assay was conducted to assess its effect on bone mineralisation.

Results
Forty-seven samples (19 CRSwNeO+, 19 CRSwNeO-, 9 controls) were analysed, showing a manifest up-regulation in CRSwNeO+ of Interleukin 13 (IL-13, 284.97 fold, $P < 0.05$). Immunohistochemistry showed abundant IL-13 expression within CRSwNeO+ tissue and in osteoblasts lining the bone. Functional assays demonstrate IL-13 induced bone mineralisation in a dose-dependent manner. Tumour Necrosis Factor alpha (TNFa), Colony Stimulating Factor 3 (CSF3), Collagen type V alpha (COL5A1) and Alkaline Phosphatase (ALP) were also up-regulated in CRSwNeO+ patients. Expression of these genes was independently correlated to presence of neo-osteogenesis.
Conclusion
Our data indicates that neo-osteogenesis is associated with increased expression of IL-13 and of specific pro-inflammatory markers suggesting that IL-13 and inflammation could contribute to neo-osteogenesis in CRS. IL-13 may be a novel therapeutic target to reduce neo-osteogenesis amongst the CRS population.

2:22 PM
Solitary chemosensory cells are the epithelial source of interleukin-25 in chronic sinusitis with nasal polyps
Michael Kohanski, MD, PhD
Alan Workman, BA
David Kennedy, MD, FARS
Nithin Adappa, MD, FARS
James Palmer, MD, FARS
Noam Cohen, MD, PhD, FARS
Philadelphia, PA
USA

COI: No Disclosure Reported

Background
Chronic Rhinosinusitis with Nasal Polyps (CRSwNP) is characterized by Th-2 biased inflammation. IL-25 has recently been implicated as an early signal for a Th-2 response, however, the source of IL-25 in CRSwNP remains elusive. Here we demonstrate that a discrete cell type, the solitary chemosensory cell (SCC), is the predominant source of IL-25 in the sinonasal epithelium.

Methods
Immunofluorescence for SCCs and IL-25 were used to interrogate tissue as well as sinonasal epithelial cultures derived from polyp and turbinate tissue from patients with CRSwNP. Mucus was collected during acute inflammatory exacerbations from patients with CRSwNP or CRS and IL-25 levels determined by Enzyme Linked Immuno-Sorbent Assay (ELISA). Lastly, sinonasal epithelial cultures derived from polyp and turbinate tissue were stimulated with IL-13 and analyzed for SCC proliferation and IL-25 production.

Results
IL-25 was significantly elevated in polyp compared to matching turbinate tissue. Cultured polyp but not turbinate tissue responded to IL-13 stimulation with an increase in SCCs and IL-25 secretion with IL-25 co-localizing with SCCs by confocal microscopy. Furthermore, IL-25 was secreted onto the apical surface of sinonasal epithelial cultures but not into the basolateral media. Lastly, IL-25 was detectable in the mucus from CRSwNP at significantly higher levels than CRS patients.

Discussion
Here we demonstrate that SCCs are the predominant source of sinonasal epithelial IL-25 which is apically secreted and can be detected in mucus of patients with CRSwNP. Our results suggest that SCC proliferation with subsequent IL-25 secretion may be an early event in the Th-2 inflammatory cascade.

2:29 PM
Characterization of tertiary lymphoid organs in chronic rhinosinusitis
Sathish Paramasivan, MBBS
Aden Lau, MBiB, BSc
Alkis Psaltis, MD, PhD
Peter-John Wormald, MD, FRACS
Sarah Vreugde, MD
Woodville, South Australia
Australia

COI: No Disclosure Reported

Aims
Tertiary lymphoid organs (TLOs) have been found in severe chronic inflammatory diseases and their presence is associated with strong prognostic implications. Their occurrence in Chronic Rhinosinusitis (CRS) has not previously been demonstrated. This study aims to investigate the prevalence and potential role of TLOs in CRS.

Methodology
Sinonasal tissue along with detailed information on disease severity and clinical history was obtained from CRS patients with nasal polyps (CRSwNP), CRS without nasal polyps (CRSsNP) and non-CRS controls. Haematoxylin & Eosin stained tissue sections from 158 patients were analyzed for the presence of TLO-like lymphoid aggregates and representative samples from the 3 groups were analyzed by immunohistochemistry for the presence of TLOs. mRNA was analyzed using a microfluidic qPCR array for expression of 29 TLO-related genes.

Results
TLOs were observed in 28/75 CRSwNP (37%), 6/59 CRSsNP (10%), and 0/24 control patients. TLOs were exclusive to CRS patients compared to non-CRS controls ($p = 0.002$) and were 5.2-times more prevalent in CRSwNP than in CRSsNP patients ($p = 0.003$). 17 TLO-related genes had increased expression in CRSwNP patients ($p < 0.05$). TLOs were associated with disease recalcitrance ($p = 0.01$) and tissue eosinophilia ($p = 0.003$).

Conclusions
This is the first description of TLOs in the sinonasal mucosa of CRS patients. Our data indicates that recalcitrant CRS patients demonstrate TLO formation in association with tissue eosinophilia. Our finding that TLOs are found exclusively in CRS patients and are associated with recalcitrance of disease has potentially important diagnostic, prognostic and therapeutic implications.

2:36 PM
Non-invasive quantitative liquid biopsy for chronic rhinosinusitis with nasal polyps using mucus derived exosomal proteomics
Sarina Mueller, MD
Angela Nocera, MS
Simon Dillon, PhD
Towia Libermann, PhD
Benjamin Bleier, MD, FARS
Boston, MA
USA

COI: No Disclosure Reported

Introduction
Exosomes are secreted epithelial derived vesicles which contain a conserved protein array representative of their parent cell. Exosomes may be reproducibly and non-invasively purified from nasal mucus. The entire exosomal proteome can be quantified using SOMAscan, a highly multiplexed, aptamer based proteomic platform. The purpose of this study was to determine whether the exosomal proteomic biosignature can be used to non-invasively predict the presence of CRSwNP.

Methods
Exosomes were isolated from whole mucus sampled from control and CRSwNP patients (n =10 per group) by differential ultracentrifugation. The SOMAscan platform was used to simultaneously quantify 1,310 biologically relevant human proteins. Matched tissue and whole mucus proteomes were also analyzed. The CRSwNP exosomal biosignature was compared to that of control using paired t-test after plate and hybridization normalization.

Results
Thirty one proteins were significantly differentially expressed in CRSwNP relative to control($p<0.01$, n=7; $p<0.05$, n=24). The exosomal proteome was predictive of CRSwNP with similar accuracy as matched tissue analysis. Thirty eight exosomal markers were 3 to 1190-fold enriched in the exosome fractions with no difference between groups validating the isolation method.

Conclusions
The development of a reproducible, non-invasive, serial, and quantitative test for rhinosinusitis which can predict endotype, prognosis, and therapeutic response represents a holy grail in rhinology. The exosomal proteomic approach has revealed a unique biosignature associated with CRSwNP providing both a method of non-invasive disease detection as well as new potential inflammatory pathway targets.

2:43 PM
Discussion

2:50 PM
Presidential Address
John DelGaudio, MD, FARS

3:10 PM
Break with Exhibitors

PROGRAM ABSTRACTS

3:30 PM
Panel: Appropriateness criteria for sinus surgery: Knowing when enough is enough
Moderator: Jeremiah A. Alt, MD, PhD, FARS
Panelists: Claire Hopkins, MD; Richard Douglas, MD; Todd Kingdom, MD, FARS; Richard Lebowitz, MD, FARS

Top Abstracts – Understanding CRS II
Moderators: Henry P. Barham, MD; Murray Ramanathan, Jr. MD, FARS

4:20 PM
Investigating the minimal clinically important difference for snot-22 symptom domains in patients electing sinus surgery for chronic rhinosinusitis
Naweed Chowdhury, MD
Jess Mace, MPH
Todd Bodner, PhD
Jeremiah Alt, MD, PhD, FARS
Adam DeConde, MD
Timothy Smith, MD, MPH, FARS
Portland, OR
USA

COI: No Disclosure Reported

Objectives
Prior work has described five domains within the 22-item SinoNasal Outcomes Test (SNOT-22) that allow for stratification of symptoms into similar clusters that can be used to direct therapy. While the outcomes of various interventions on these symptom domains have been reported, the minimal clinically important difference (MCID) of these domains has not been previously investigated, limiting clinical interpretation of these results.

Methods
The study was designed as secondary analysis of a prospective, multi-institutional, observational cohort. A total of 276 patients with medically-refractory CRS who underwent surgical management were enrolled. Distribution-based methods (half-standard deviation, standard error of measurement, Cohen's d, and the minimum detectable change) were used to compute MCID values for both SNOT-22 total and domain scores. The Medical Outcomes Study Short-Form 6D (SF-6D) health utility score was used to operationalize anchor-based associations using receiver-operating-characteristic (ROC) curves.

Results
The mean MCID of several distribution-based methods for total SNOT-22 scores was 9.0, in agreement with previously published metrics. Average MCID values for the rhinologic, extra-nasal rhinologic, ear/facial, psychological, and sleep domain scores were: 3.8, 2.4, 3.2, 3.9, and 2.9, respectively. Anchor-based approaches with SF-6D did not have strong predictive accuracy across total SNOT-22 scores or domains (ROC areas under-the-curve <0.71), indicating weak associations between improvement in SNOT-22 scores and health utility as measured by the SF-6D.

Conclusion
This determination of MCID values for the SNOT-22 symptom domains allows for improved clinical interpretation of results from past, present, and future rhinologic outcomes research.

4:27 PM
Bitter and sweet taste tests are predictive of disease status in chronic rhinosinusitis
Alan Workman, BA
Steven Brooks, MPH
Michael Kohanski, MD, PhD
David Kennedy, MD, FARS
Nithin Adappa, MD, PhD, FARS
Noam Cohen, MD, PhD, FARS
Philadelphia, PA
USA

COI: Yes, Patent Pending "Therapy and Diagnostics for Respiratory Infection"

Background
Taste receptors on airway epithelial cells play important roles in the regulation of innate immune defense. Bitter taste receptors detect bacterial products and activate downstream immune responses, while sweet taste receptors attenuate these responses in the presence of glucose. Genetic variation in taste receptor function is correlated with susceptibility to infection and severity of rhinologic disease. Thus, taste-testing patients for bitter and sweet sensitivity may be predictive of chronic rhinosinusitis (CRS) disease status.

Methods
Demographic and taste test data was collected prospectively from control patients as well as patients undergoing functional endoscopic sinus surgery for CRS. All subjects underwent standardized taste intensity testing for denatonium, quinine, phenylthiocarbamide (PTC), sucrose, and sodium chloride (NaCl).

Results
A total of 365 CRS patients and 356 controls were included in the study. Taste perception of the bitter compounds denatonium ($p<0.001$), quinine ($p<0.001$), and PTC ($p<0.05$) was significantly lower in intensity in CRS patients, while taste sensitivity to the sweet compound sucrose was significantly increased ($p<0.05$) in this same cohort. Taste perception of a non-bitter, non-sweet compound, NaCl, was equivalent in CRS and control patients.

Conclusions
Airway taste receptors modulate innate immune defense, and genetic variations in functionality assessed phenotypically with a taste test appear to have clinical impacts in chronic rhinosinusitis. Taste

testing for bitter and sweet compound sensitivity is an inexpensive potential diagnostic tool that may be predictive of disease status.

4:34 PM
Staphylococcus aureus impairment of sinus epithelial regeneration and repair is greater in crswnp than controls
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COI: No Disclosure Reported

Introduction
Staphylococcus aureus (SA) is frequent in patients with chronic CRSwNP, however its impact on nasal epithelium remains incompletely understood. We assessed whether SA exoproducts impacted nasal epithelial repair using primary nasal epithelial cell cultures (PNEC) from controls and CRSwNP patients.

Methods
Nasal epithelial cells were obtained at time of ESS from patients with CRSwNP (n=9) and controls (n=9). PNEC were raised to confluence, then epithelia were injured using a standardized technique, either under basal condition or immediately following exposure to exoproducts of SA. Speed of wound closure was assessed over 6 hours using time-lapse video microscopy. Wound closure rates were compared between CRSwNP and controls under basal conditions and following stimulation with 0.25% and 0.5% SA supernatant.

Results
Under basal condition, there was a small but non-significant difference in epithelial repair rate between control and CRSwNP samples (CTL: 48002 ± 6094; CRS: 43884 ± 6050 µm2/h, p=0.63).
Following SA exposure, epithelial repair slowed in both controls and CRSwNP samples (mean reduction, basal condition vs. SA 0.5%: CTL: 18757 ± 7128 µm2/h, p=0.03; CRSwNP: 27418 ± 5282 µm2/h, p<0.001).
Response to SA supernatant was significantly larger in the CRSwNP than in control samples. (mean difference: 12779 ± 5207 µm2/h, p=0.02).

Conclusions
SA exoproducts significantly impair the ability to repair of primary epithelial cultures raised from sinus biopsies. Impairment is more pronounced in CRSwNP, suggesting an underlying higher sensitivity to disturbance by SA secreted products in this group. This suggests that environmental and genetic factors are synergistic in CRSwNP physiopathology.

4:41 PM
Does greater antibiotic use prior to ess in crs influence outcomes?
Vijay Ramakrishnan, MD, FARS
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USA

COI: No Disclosure Reported

Introduction
Antibiotics have been a mainstay of CRS therapy, however, data suggest that antibiotics may also result in several adverse unintended consequences (eg, microbiome impact; delay of surgical management). We aimed to evaluate if greater antibiotic use prior to surgery was associated with differences in surgical outcomes.

Methods
Adult CRS patients enrolled in a prospective, multi-institutional, observational cohort study were asked to report systemic antibiotic use in the 90 days prior to ESS. Antibiotic use was examined in relation to demographics, disease characteristics, and outcomes.

Results
Data were collected for 271 study participants followed for a mean of 14.9 [±5.1] months across 4 institutions, with a mean preoperative antibiotic use of 27.8 [±22.7] days out of the 90 preceding ESS. After ESS, significant improvement (p<0.001) was reported for PROMs and endoscopy scores for the overall cohort. No correlation between antibiotic use and degree of benefit in objective clinical measures (endoscopy, BSIT) was seen. Increasing antibiotic use was associated with less improvement in SNOT-22 and its rhinologic subdomain. Prevalence of achieving an MCID in overall SNOT-22 symptom scores was lower in those using more preoperative antibiotics, although statistical significance was not reached when adjusting for independent covariates.

Conclusion
Higher amounts of antibiotic use do not appear beneficial—and may potentially confer some negative effect—for ESS outcomes. Specific recommendations for antibiotic use as part of CRS “maximal medical therapy” prior to ESS require further study, particularly given concerns for antibiotic overuse and implications for improving outcomes in the modern healthcare era.

4:48 PM
Discussion

4:55 PM
Business Meeting

PROGRAM ABSTRACTS

5:00 PM
Panel: Film FESStival

5:40 PM
Closing Remarks

5:45 PM
Presidential Welcome and Poster Reception

Saturday, September 9, 2017
Grand Ballroom 1-3
(Live International Webcast)
(Supported by the Pan American Association)

7:55 AM
Welcome
Richard Orlandi, MD, FARS

8:00 AM
Panel: Choosing the Extent of frontal sinus surgery
Moderator: Adam DeConde, MD
Panelists: Martin Citardi, MD, FARS; Zara Patel, MD, FARS; Alkis Psaltis, MD; Jeffrey Suh, MD

8:45 AM
The 13th Annual Kennedy Lecture – "Outcomes in the management of chronic rhinosinusitis: Past, present and future"
Timothy Smith, MD, MPH, FARS

9:25 AM
Break with Exhibitors

9:45 AM
Panel: The evolution of industry relationships
Moderators: Jiianne Lee, MD, FARS; Eric Holbrook, MD, FARS
Panelists: Scott Carpenter; Lisa Earnhardt; Stacey Gray, MD, FARS; Peter Hwang, MD, FARS; Peter-John Wormald, MD

10:30 AM
Panel: Evidence-based postoperative care
Moderator: Luke Rudmik, MD, FARS
Panelists: Ralph Metson, MD, FARS; Steve Pletcher, MD; Zachary Soler, MD; Adam Zanation, MD

11:15 AM
Panel: The nose in obstructive sleep apnea
Moderator: Brian W. Rotenberg, MD, MPH, FARS
Panelists: Andrew Goldberg, MD, FARS; Jeb Justice, MD; Ray Sacks, MD, FARS

12:00 PM
Lunch with Exhibitors

12:00 PM
Combined Lunch Session
Women in Rhinology
Supported by Cook Medical, Intersect ENT and KARL STORZ Endoscopy-America, Inc.
Residents & Fellows Program
Supported by Entellus Medical
Mentorship Program

Saturday, September 9, 2017 – Breakout Room 1
Grand Ballroom 1
Chairperson:
David Poetker, MD, FARS

12:57 PM
Welcome

Rhinosinusitis and Cystic Fibrosis
Moderators: Toas Higgins, MD, FARS; Erin O'Brien, MD, FARS

1:00 PM
Pulmonary aspiration of sinus secretions in patients with cystic fibrosis
Jacob Nelson, MD
Peter Karempelis, MD
Ryan Hunter, PhD
Jordan Dunitz, MD
Holly Boyer, MD
Portland, OR
USA

COI: No Disclosure Reported

Objective
Indirect evidence suggests that sinonasal secretions are aspirated into the lungs of patients with cystic fibrosis (CF) contributing to infection, subsequent tissue damage and decreased lung function. Our objective is to determine whether sinonasal secretions are transferred to the lungs in patients with CF related sinus disease and healthy subjects, particularly in recumbent position and during sleep.

Methods
We performed a prospective, controlled trial to detect pulmonary aspiration of radiolabeled albumin applied to the nasal mucosa of study subjects with chronic sinusitis related to cystic fibrosis and control subjects without sinus disease. Radioactive counts were measured in the lungs and compared to background counts in both groups after 8 hours of rest/sleep.

Results
Complete data was collected on 12 CF patients and 6 controls. The average counts of radiolabeled albumin

in the lungs of CF patients were significantly greater than background counts (p=0.03). Controls did not demonstrate this finding (p>0.90), with only half demonstrating lung counts greater than background counts.

Conclusions
This study provides direct evidence of aspiration of sinonasal secretions into the lungs of patients with cystic fibrosis and healthy adults in recumbent positon. The fact that both patients and controls aspirate secretions suggests that aspiration alone does not account for the pathogenesis of lung disease in CF patients, but that the microorganism content of the secretions and potentially differences in the lung environment between CF and non-CF subjects play a role as well.

1:07 PM
Timing and frequency of sinus surgery are associated with lung transplant outcomes in cystic fibrosis patients
Tracy Cheng, AB
Adam Honeybrook, MD
Kevin Choi, MD
Alice Gray, MD
Ralph Abi Hachem, MD, MSc
David Jang, MD
Durham, NC
USA

COI: No Disclosure Reported

Introduction
Lung transplantation has revolutionized the treatment of patients with end-stage pulmonary disease due to cystic fibrosis. However, concurrent chronic infection in the paranasal sinuses may affect transplant outcomes. While sinus surgery is frequently performed in this setting, it is unclear if surgery influences transplant survival outcomes.

Methods
This is a single-institution retrospective study of all patients who underwent lung transplantation for cystic fibrosis from 2005 to 2015 at Duke University Hospital. Bivariate analyses were performed to determine whether timing and frequency of sinus surgery, polyp status, radiographic score, and otolaryngologic consultation influenced survival rates after transplant.

Results
A total of 144 patients underwent lung transplantation in the study period. Three-year mortality was 27.4%. 42 patients underwent pre-transplant sinus surgery, 23 underwent post-transplant surgery, and 17 had both. The pre-transplant surgery group had greater three-year survival as compared to the post-transplant surgery group (p=0.011). A higher frequency of peri-transplant sinus surgeries was also associated with greater survival (p=0.029). Otolaryngologic consultation, polyp disease, and radiographic score were not associated with survival.

Conclusions
The timing and frequency of sinus surgery may influence lung transplant outcomes in patients with cystic fibrosis. A prospective study is needed to investigate these relationships further.

1:14 PM
Sinus and lung cultures in lung transplant patients with cystic fibrosis: do sinus bacteria infect the allograft?
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Adam Honeybrook, MBBS
Alice Gray, MD
Ralph Abi-Hachem, MD
David Jang, MD
Durham, NC
USA

COI: No Disclosure Reported

Introduction
Lung transplantation has revolutionized the treatment of end-stage pulmonary disease due to cystic fibrosis. However, infection of the transplanted lungs can lead to serious complications including graft failure and death. While many of these patients have concurrent sinusitis, it is unclear if bacteria from the sinonasal cavity can infect the allograft.

Methods
This is a single-institution retrospective study of all patients who underwent lung transplantation for cystic fibrosis from 2005 to 2015 at Duke University Hospital. Pre – and post-transplant nasal and pulmonary cultures obtained via nasal endoscopy and bronchoalveolar lavage (BAL) were analyzed.

Results
A total of 144 patients underwent lung transplantation. Pre- and post- transplant bronchoalveolar lavage culture (BAL) data were available for all patients. Sinus cultures were available for 76 patients (12 pre-transplant, 42 post-transplant, 22 both pre- and post-transplant), with the following results: 71% Pseudomonas, 34.2% MRSA, 9.2% Burkholderia, 7.9% Achromobacter, 5.3% Stenotrophomonas, and 51.3% other. There was a significant correlation between pre-transplant sinus and post-transplant BAL cultures for Pseudomonas (p=0.003), MRSA (P=0.013) and Burkholderia (p=0.001).

Conclusions
There is a high correlation between pre-transplant sinus cultures and post-transplant BAL cultures for Pseudomonas, MRSA, and Burkholderia. This suggests that the paranasal sinuses act as a reservoir for allograft colonization in patients with cystic fibrosis. Further studies are needed to determine if treatment of sinusitis affects transplant outcomes.

PROGRAM ABSTRACTS

1:21 PM
Effect of endoscopic sinus surgery on clinical outcomes in cystic fibrosis
Anali Dadgostar, MD
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Bradley Quon, MD
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Canada

COI: No Disclosure Reporte

Introduction
Chronic rhinosinusitis (CRS) is prevalent in the Cystic Fibrosis (CF) population. CRS exacerbations in CF are thought to contribute to pulmonary exacerbations. Literature regarding the impact of endoscopic sinus surgery (ESS) is inconclusive. This study aims to examine the rates of lung function decline and pulmonary exacerbation rates in CF patients who have undergone ESS.

Methods
Retrospective review of 40 CF patients at a tertiary care centre between 2005 and 2015. Demographic data, rate of lung function decline (Forced Expiratory Volume1(FEV1) % predicted, year 1 and 2 post-operatively), and number of pulmonary exacerbations (treatment with IV/oral antibiotic therapy +/- hospital admission) 2 years post-operatively was collected. Patients were matched on gender, age, and delta-F508 mutation.

1:28 PM
Pseudomonal sinusitis is associated with higher rejection rates after lung transplantation for cystic fibrosis
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Kevin Choi, MD
Tracy Cheng, BS
Ralph Abi Hachem, MD
David Jang, MD
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United States

COI: No Disclosure Reported

Introduction
Prior studies have suggested that allograft colonization with Pseudomonas aeruginosa (PsA) leads to poorer outcomes after lung transplantation for patients with cystic fibrosis. However, it is unclear if PsA infection specifically in the sinuses affects transplant outcomes.

Methods
This is a single-institution retrospective study of all patients who underwent lung transplantation for cystic fibrosis from 2005 to 2015. Sinus culture data before and after transplant were collected. Transplant outcomes included rejection, bronchiolitis obliterans, allograft failure, and death.

Results
A total of 144 patients underwent lung transplantation in the study period. Sinus culture data was available for 76 patients before or after transplant. PsA was present (+PsA) in 55 patients (72%) and absent (-PsA) in 18 patients (28%). Allograft rejection (acute and chronic) was significantly higher in the +PsA group (93%) compared to the –PsA group (72%) (p=0.036). There was no significant difference in survival, allograft failure, or bronchiolitis obliterans between the two groups.

Conclusions
Presence of PsA in the sinuses is associated with higher rejection rates after lung transplantation in patients with cystic fibrosis. This is likely due to seeding of bacteria from the sinuses into the allograft. Further studies are needed to determine if aggressive treatment of pseudomonal sinusitis can improve transplant outcomes.

1:35 PM
Discussion

Patient Reported Outcomes Measures
Moderators: Jose Gurrola II, MD; Joshua Levy, MD, MPH

1:42 PM
Factor analysis of the questionnaire of olfactory disorders in patients with chronic rhinosinusitis
Jose Mattos, MD, MPH
Rodney Schlosser, MD, FARS
Adam DeConde, MD
Madison Hyer, MS
Timothy Smith, MD, MPH, FARS
Zachary Soler, MD, MSc
Charleston, SC
USA

COI: No Disclosure Reported

Introduction
Olfactory-specific quality of life (QOL) can be measured using the Questionnaire of Olfactory Disorders Negative Statements (QOD-NS) which examines various aspects of olfactory dysfunction. It is unknown if certain factors of the QOD-NS differentially impact various aspects of QOL.

Methods
Patients with chronic rhinosinusitis (CRS) completed the QOD-NS, 22-item Sinonasal Outcomes Test (SNOT-22), Medical Outcomes Study Short Form 6-D (SF-6D) health utility measure, and Patient Health Questionnaire-2 (PHQ-2) depression screener. Exploratory factor analysis of the QOD-NS was performed. Associations between QOD-NS factors and other QOL metrics were analyzed before and after endoscopic sinus surgery (ESS).

Results
Outcomes were examined on 330 patients. The QOD-NS contains four distinct factors including: social, eating, anxiety, and annoyance. There was no difference in associations between the different factors and baseline clinical characteristics. ESS had greatest effect size (d) on the eating and annoyance factors (d = 0.29 and 0.27, p<0.05). Post-surgical changes in the SF-6D and SNOT-22 had strongest correlation with the eating factor scores (r=0.29 and 0.34, p<0.05), and changes in the PHQ-2 had strongest correlation to the anxiety factor (r=0.24, p<0.05). Abnormal QOD-NS scores at baseline were associated with effect size increases of 50 to 100% (p<0.05).

Conclusions
The QOD-NS measures four distinct factors. Eating-related questions had the greatest improvement after ESS. Health utility and CRS-specific QOL improvement most strongly associated with the eating factor, while PHQ-2 changes are most highly associated with the anxiety factor, suggesting a differential impact of the factors of the QOD-NS on varying aspects of QOL.

1:49 PM
A validated model for the 22-item sinonasal outcome test subdomain structure in chronic rhinosinusitis
Allen Feng, MD
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Katie Phillips, MD
David Caradonna, MD, DMD
Stacey Gray, MD, FARS
Ahmad Sedaghat, MD, PhD
Boston, MA
USA

COI: No Disclosure Reported

Background
Previous studies have identified subdomains of the 22-item Sinonasal Outcome Test (SNOT-22) as reflections of independent chronic rhinosinusitis (CRS) symptom categories. None of these studies have fully validated the existence of SNOT-22 subdomains.

Objectives
This study aims to validate the existence of underlying symptom subdomains using confirmatory factor analysis (CFA).

Methods
400 patients with CRS were included for this cross-sectional study. Each participant completed a SNOT-22 questionnaire. Suitability of the data was determined using a Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity. SNOT-22 responses were analyzed using factor analysis to determine the number of SNOT-22 subdomains. Reliability was confirmed with Cronbach's alpha. A CFA was performed to develop a validated model for the SNOT-22 subdomain structure. Several different measures for goodness of fit were calculated.

Results
Four distinct factors were found: sleep, nasal, otologic, and emotional symptoms (Cronbach's alpha, >0.7; KMO > 0.90; Bartlett's Test of Sphericity, p<0.001). The corresponding CFA measurement model demonstrated excellent measures of fit. These included root mean squared error of approximation (0.051 [95% CI, 0.043-0.059]), standardized root mean square residual (0.039), comparative fit index (0.977), Tucker-Lewis index (0.966) and Chi-squared to degrees of freedom ratio (2.032). Measures of construct validity were also excellent (Average Variance Extracted, >0.5; Composite Reliability, >0.7).
CONCLUSIONS: The SNOT-22 is validated to have four subdomains reflecting sleep, nasal, otologic and emotional symptoms. Regional variability in CRS may lead to differences in SNOT-22 subdomain structure. However, the existence of such variability and use of alternative SNOT-22 subdomains should be validated.

1:56 PM
A pilot comparison between care-giver and patient perceived quality of life in chronic rhinosinusitis
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USA

COI: No Disclosure Reported

Introduction
It has been well documented that Chronic Rhinosinusitis (CRS) negatively impacts a patient's quality of life, but current studies only address the patient's perception of their disease. Caregivers who live with the patient may perceive a worse quality of life than the patient's claim.

Methods
Patients with a confirmed CRS diagnosis who presented to a tertiary Rhinology clinic with a caregiver were enrolled into this prospective cohort study. At the initial visit, the patient completed a Rhinosinusitis Disability Index (RSDI). The caregiver completed an RSDI based on their perception of the patient's symptoms, and a Modified Caregiver Strain Index (MCSI) and an SF-36 to assess caregiving strain and overall health.

Results
Forty-six subjects were enrolled (23 pairs of patients and their caregivers). At the initial visit, patients reported an overall RSDI score of 36.8 [26.9, 46.6], and caregiver's reported a total RSDI score of 50.4 [38.8, 61.9] (P=.02). The emotional domain appeared to drive these

PROGRAM ABSTRACTS

differences with scores of 9.1 [6.6, 11.7] in patients and 15.7 [11.3, 20.1] in caregivers (P=.01). The physical domain was important with scores of 16.6 [12.1, 21.2] in patients and 20.8 [16, 25.7] in caregivers (P=.05). The patient's total RSDI is positively correlated with the caregiver's total MCSI with a spearman coefficient of .59 (p=.00).

Conclusions
Caregivers experience greater strain as the patient's QoL declines. Caregivers also perceive and report a worse QoL due to CRS than patients report. Between the patient and the caregiver, the societal impact of CRS may be under-estimated.

2:03 PM
Snot-22 based clusters associate with endotypic and prognostic features in chronic rhinosinusitis without nasal polyposis patients
Devyani Lal, MD, FARS
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Rohit Divekar, MBBS, PhD
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USA

COI: No Disclosure Reported

Introduction
Endotypic and prognosticating features of chronic rhinosinusitis without nasal polyposis (CRSsNP) subtype are poorly understood. Our objectives were to use an unbiased network approach to: 1. Study association of symptoms with clinical and endotypic features 2. Identify features predicating outcomes from endoscopic sinus surgery (ESS).

Methods
Clinical, CT, histopathology and 22-item sinonasal outcome test (SNOT-22) data was collected on146 CRSsNP patients who underwent ESS. Unsupervised network modeling of pre-surgical SNOT-22 scores was performed to reveal symptom based clusters. Subject characteristics and post-ESS SNOT-22 scores were compared between clusters.

Results
Baseline characteristics of the subjects were: Females: 56.2%; revision ESS in 35%; asthma prevalence: 32.6%; median preoperative Lund-Mackay CT score: 8; median SNOT-22 total score: 43. Network mapping and unsupervised clustering of pre-operative SNOT-22 scores revealed four distinct clusters: A) severely-burdened with high scores in all four sub-domains; B) moderately-burdened with high scores in rhinologic subdomain C) moderate-burdened with high scores in psychological-sleep subdomains D) mildly-burdened. Number of previous ESS and asthma prevalence differed significantly between clusters; CT scores were similar. Asthma-burden, tissue inflammation and tissue eosinophilia were greatest in cluster A (p=0.03). All groups showed significant improvement at 3 months post-ESS (p<0.0001). At 6 months, Cluster C subjects tended to worsen.

Conclusions:
SNOT-22 scores may correlate with endotypic characteristics in CRSsNP patients. Asthma, tissue eosinophilia and inflammatory severity were highest in severely symptomatic patients. Patients with predominant rhinological symptom-burden (severe, moderate or mild) show significant, stable improvement from ESS; those with high sleep-psychosocial symptoms may have shorter-term benefit.

2:10 PM
The 22-item sinonasal outcome test accurately identifies patient-reported control of chronic rhinosinusitis symptomatology
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USA

COI: No Disclosure Reported

Background
Patient-reported control of chronic rhinosinusitis (CRS) symptoms is associated with the quality of life impact of CRS. We sought to determine if 22-item Sinonasal Outcomes Test (SNOT-22) score is predictive of patient-reported CRS symptom control.

Methods
Prospective cross-sectional study of 202 patients with CRS. Participants were asked to rate their CRS symptom control as "Not at all", "A little", "Somewhat", "Very" and "Completely". The severity of patient CRS symptomatology was measured using the SNOT-22. The relationship between SNOT-22 score and patient-reported CRS symptom control was determined using regression, ANOVA, and receiver operating characteristic (ROC) analysis.

Results
SNOT-22 was negatively associated with patient-reported CRS symptom control (adjusted ?=-0.03, 95%CI: -0.04– -0.02, p<0.001), after controlling for demographic and clinical characteristics. There was a significant difference in SNOT-22 scores of participants reporting each level of symptom control (p<0.001) with the greatest differences between participants who rated their CRS symptom control as "Not at all", "A little" and "Somewhat", which we deem poor CRS symptom control, and the group who described their level of CRS symptom control described as "Very" and "Completely", which we deem well-controlled CRS symptoms. These results were true across all SNOT-22 subdomains scores. Using ROC analysis, a SNOT-22 score of 35 identified patients reporting poor vs. well-controlled CRS symptom control with 71.4% sensitivity and 85.5% specificity.

Conclusion
SNOT-22 score is associated with how well patients feel their CRS symptomatology is controlled. Moreover, SNOT-22 score can be used to accurately distinguish patients with poor vs. well-controlled CRS symptoms.

2:17 PM
Discussion

2:24 PM
Panel: Challenges in rhinology: An international perspective
Moderator: Samer Fakhri, MD, FARS

3:00 PM
Break with Exhibitors

Comparing Endoscopic Techniques
Moderators: Gretchen Oakley, MD; Marc Zacharek, MD, FARS

3:20 PM
Outcomes and complications of balloon and conventional endoscopic sinus surgery
Mohamad Chaaban, MD
Jacques Baillargeon, PhD
Gwen Baillargeon, MS
Vicente Resto, MD, PhD
Yong-Fang Kuo, PhD
Galveston, TX
USA

COI: No Disclosure Reported

Background
Since the FDA approval of balloon sinuplasty, no nationally representative population-based study has examined the adverse events with its use compared to conventional functional endoscopic sinus surgery (FESS).

Methods
We conducted a retrospective cohort of patients diagnosed with chronic rhinosinusitis (CRS) between 2011 and 2014 using the Clinformatics Data Mart (CDM) database. Our cohort included pediatric and adult patients who underwent conventional FESS or balloon sinuplasty. Demographics, surgical site, year, and place of surgery were included. Our outcomes were complication rates and need for revision surgery within 6 months of initial surgery.

Results
A total of 661,738 patients with CRS were included. 2,851 patients underwent balloon sinuplasty and 13,324 underwent conventional FESS. Balloon sinuplasty was mostly performed in the office (85.53%). The complication rate was 5.26% in the balloon sinuplasty group and 7.33% in the conventional FESS group. The most common complication was epistaxis requiring surgical control in 0.91% with balloon sinuplasty group and 1.27% with FESS. Multinomial logistic regression analyses demonstrated that conventional FESS was 1.41 (95% CI,1.17- 1.70) times more likely to result in complications compared to balloon sinuplasty. Compared to patients who had maxillary surgery only, patients with additional frontal sinusotomy or full-house FESS were 1.61 (95% CI,1.46-1.77) and 2.55 (95%CI,2.30-2.80) times more likely to have revision sinus surgery, respectively.

Conclusion
Complications from balloon sinuplasty may require surgical management similar to conventional FESS. Since most of the balloon sinuplasty procedures are performed in the office, discussion with the patients regarding potential adverse events is crucial.

3:27 PM
Equivalence in outcomes between Draf 2b versus Draf 3 frontal sinusotomy for refractory chronic rhinosinusitis
Vishal Patel, BS
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Zara Patel, MD, FARS
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COI: No Disclosure Reported

Introduction
Draf 2B and Draf 3 frontal sinusotomies are frequently utilized techniques for surgically refractory chronic rhinosinusitis (CRS). The purpose of this study was to compare outcomes of Draf 2B vs. Draf 3 surgery.

Methods
A retrospective cohort study was conducted comparing patients undergoing bilateral Draf 2B versus Draf 3 procedures from 2000-2017. Patients with neoplasia, mucocele, cystic fibrosis or ciliary dyskinesia were excluded. Pre-operative disease parameters included number of prior surgeries, presence of polyps, pre-operative SNOT-22 score, frontal Lund-Mackay score, anterior-posterior diameter of the frontal ostium, and Global Osteitis Scoring Scale. Post-operative outcomes included SNOT-22 score, neo-ostium patency, revision rates, and complications.

Results
21 patients with bilateral Draf 2B and 17 patients with Draf 3 surgeries were compared. Mean follow-up time was 15.6 months. No significant differences were seen between groups for any of the pre-operative disease parameters. Both cohorts showed statistically significant (p=0.0001 [Draf 2B]; p=0.0001 [Draf 3]) and clinically meaningful improvement (?=24.1; ?=24.9) in SNOT-22 at last follow-up versus preoperatively. The Draf 2B group had significantly greater improvement in SNOT-22 score than the Draf 3 group at 1-3 months (p

PROGRAM ABSTRACTS

= 0.003), but the magnitude of improvement equalized at 5-9 months (p=0.66) and at last follow up (p=0.90). No significant differences were seen for neo-ostium patency, revision rates, or complications.

Conclusion
Both Draf 2B and Draf 3 procedures offer durable symptomatic improvement for patients with refractory CRS. The Draf 2B sinusotomy is associated with earlier symptom improvement and overall shows equivalent outcomes to the Draf 3 sinusotomy.

3:34 PM
Outcomes of the endoscopic modified lothrop procedure (draf III) discriminated by snot-22 scoring, stent use, and cystic fibrosis
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USA

COI: No Disclosure Reported

Background
The endoscopic modified Lothrop procedure (EMLP) can be employed for refractory subtypes of chronic rhinosinusitis (CRS), mucoceles, and tumors. The outcomes of EMLP in relation to SNOT-22 scoring, stent use, and subtype of CRS such as cystic fibrosis has not been well studied to date.

Methods
Retrospective analysis for all patients between 2000 and 2016 who underwent EMLP for non-malignant pathology. Post-operative outcomes included SNOT-22 scores, minimal clinically important difference (MCID), neo-ostium patency, complication and revision rates. Adjunctive intraoperative use of stents was recorded.

Results
Forty-five (45) EMLP patients met inclusion criteria, with an average follow-up of 15.9±6.6 months (range = 3-78.7 months). The most common EMLP indication was CRS (66.7%). The mean SNOT-22 score decreased from 44.8±19.7 to 28.8±17.1 (p<0.0001) and 71% patients achieved a MCID of 10. At a mean follow-up of 15.9 months, neo-ostium patency was 86.7%. The major complication rate was 2.2% (1 post-operative anosmia) and minor complication rate was 4.2%. Overall revision rate was 15.5%. Patients with CF demonstrated significantly higher revision rates compared to non-CF groups (50% [CF] vs. 10.3% [non-CF], p=0.039). Patients with intraoperative stent placement had significantly lower revisions compared to non-stented EMLP patients (0% [stent] vs. 25.9% [non-stent], p=0.031).

Conclusion
EMLP makes lasting, quantifiable symptomatic improvements for patients with refractory frontal sinusitis. This procedure however has limited success in CF patients, and suggests that a high threshold may be required in offering advanced frontal work to this subpopulation. EMLP stenting can significantly reduce the need for revision EMLP surgery.

3:41 PM
Patient-reported outcomes / quality of life outcomes in studies of sinonasal and skull base malignancy: A look into quality of methodology and clinical relevance
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COI: No Disclosure Reported

Purpose
The aim of this study was to investigate methodology and clinical relevance of quality of life (QoL) and patient-reported outcomes (PRO) measures used in studies of sinonasal and skull base malignancy.

Methods
A systematic review of literature was conducted utilizing PubMed database for articles published in English since January 2000 that discussed QoL / PRO in sinonasal and skull base malignancy. Extracted information included study demographics, clinical characteristics, and clinical decision making and significance.

Results
27 articles were assessed including 1575 patients. QoL / PRO was the primary goal of 23 studies (85.2%). 22 (81.5%) provided rationale for the questionnaires employed. Most articles interpreted results from QoL / PRO assessments (n = 20, 74.1%) and discussed clinical significance of the results (n = 19, 70.4%). 26 articles acknowledged missing data in their methodology (96.3%), but 17 (63.0%) stated how missing data was handled statistically. 11 studies explicitly mentioned how QoL / PRO instruments were administered (40.7%).

Conclusion
Most QoL / PRO studies were of good quality. Many utilized validated questionnaires. However, recommendations for improvement are based on limitations discussed in articles, disease states in question, and The International Society of Quality of Life Research. These include providing rationale for usage of QoL / PRO tools, including disease-specific symptoms in statistical analysis, discussing how missing data is handled, interpreting results of QoL / PRO instruments, and discussing clinical significance of QoL / PRO findings. Standardized reporting of QoL / PRO data is necessary to draw accurate conclusions for clinical practice.

3:48 pm
The upper blepharoplasty approach to the frontal sinus: a cadaveric feasibility study
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USA

COI: No Disclosure Reported

Introduction
Despite advances in technology and instrumentation, access to the lateral frontal sinus remains a challenge for rhinologic surgeons. While the Modified Endoscopic Lothrop (MELP) and traditional sub-brow trephine approaches offer excellent access to the medial aspects of the frontal sinus, there are often limitations in visualizing and instrumenting the lateral wall and floor of the frontal sinus. We sought to quantify the reach and applicability of the upper blepharoplasty approach to the frontal sinus.

Methods
Twelve cadaveric specimens were obtained for anatomic research. The frontal sinus was divided into three distinct zones. Zone I was defined as medial to the supraorbital neurovascular bundle. Zones 2 and 3 were defined by bisecting the remaining orbit. 24 upper blepharoplasty approaches were performed followed by 12 MELPs. The ability to both visualize and instrument all walls of each frontal sinus was recorded for the MELP, upper blepharoplasty approach, and combined approach.

Results
The upper blepharoplasty approach provided excellent access to the lateral frontal sinus in Zones 2 and 3 (89% and 100%). The MELP provided poorer access in Zone 3 (67%), but improved access in Zone 1 (83-100%) as compared to the upper blepharoplasty approach (22-78%). The combined approach yielded 100% access to all walls of the frontal sinus.

Conclusion
The MELP in combination with the upper blepharoplasty/lateral trephination approach provides excellent access to each frontal sinus wall. The upper blepharoplasty trephination provides excellent access to the lateral frontal sinus but is limited medially by the supraorbital neurovascular bundle.

3:55 PM
Discussion

Pathophysiology of CRS
Moderators: Anne Getz, MD; Michael Platt, MD

4:02 PM
Air pollutants may be modifiable environmental risk factors in chronic rhinosinusitis disease progression
Leila Mady, MD, PhD, MPH
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COI: No Disclosure Reported

Introduction
Little is known about the role of environmental exposures in the pathophysiology of chronic rhinosinusitis (CRS). We previously reported a relationship between CRS with nasal polyposis (CRSwNP) and air pollutants (AP) [particulate matter-(PM2.5) and black carbon-(BC)]. In this study, we measured AP impact on disease phenotypes including CRSwNP and CRS without nasal polyposis (CRSsNP) and investigated the concomitant role of asthma.

Methods
Spatial modeling from AP monitoring sites were used to estimate a 300m-periphery surrounding residences for patients meeting inclusion criteria. To quantify inflammation, modified Lund-Mackay (mLM) scores were performed and oral steroid use, number of functional endoscopic sinus surgeries (FESS), and Sino-nasal Outcome Test (SNOT-22) scores were examined.

Results
Among all CRS patients (n=234, CRSsNP n=96, CRSwNP=138), there was a positive correlation between PM2.5 ($p<0.01$) and BC ($p<0.05$) with number of FESS. PM2.5 and BC were significant predicators of number of surgeries, whereas BC alone was associated with greater SNOT-22 score by multivariate regression ($p<0.05$). In subgroup analysis, PM2.5 was a significant predictor of proceeding to FESS and PM2.5 and BC were associated with greater SNOT-22 scores among patients with CRSsNP ($p<0.05$). CRSwNP patients with asthma or AERD demonstrated increased number of FESS ($p<0.05$) and trended towards higher BC exposure ($p=0.12$).

Conclusion
This study is the first to demonstrate the role of inhalant environmental pollutants in CRS, addressing a critical knowledge gap in potential modifiable risk factors for disease phenotype and severity. These results also suggest that air quality may be playing a role in CRSsNP disease progression.

PROGRAM ABSTRACTS

4:09 PM

Characterization of a rapid, novel cysteine protease-induced murine model of chronic rhinosinusitis

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COI: No Disclosure Reported

Background
Chronic rhinosinusitis (CRS) is characterized by an eosinophilic inflammatory infiltrate and a local type 2 cytokine milieu. Current animal models of CRS often fail to recapitulate many of the innate and adaptive immunological hallmarks of the disease. In the present study, we utilize the cysteine protease papain, which shares functional similarities with parasitic proteases and aeroallergens, to generate a rapid, inducible murine model of CRS.

Methods
C57BL/6 mice underwent intranasal instillation with 20 µg active or heat inactivated papain on days 0-2 and days 7-11 and sacrificed on day 12. Nasal lavage fluid (NALF) was analyzed to quantify eosinophils. Sinonasal tissue was sectioned and stained for goblet cells and eosinophils. Serum samples were assayed for papain-specific IgE by direct ELISA. Sinonasal mucosal tissue was dissociated and analyzed by flow cytometry.

Results
Compared to heat-inactivated papain treated mice, enzymatically active papain treatment induced significant eosinophilia in NALF, goblet cell hyperplasia, and production of papain-specific IgE ($p<0.05$). Immunohistochemistry revealed that the eosinophilic infiltrate was localized primarily to the anterior maxillary sinuses. ELISA of NALF demonstrated significant increases in IL-5, IL-13, and IL-33 ($p<0.05$). Flow cytometry for IL-13+ cells revealed that papain induced activation and proliferation of group 2 innate lymphoid cells and basophils.

Conclusions
In this study, we demonstrate for the first time that the cysteine protease papain induces allergic sinonasal inflammatory conditions which closely resembles chronic rhinosinusitis. This murine model permits further study into the underlying pathophysiology of CRS and provides a potential model system for drug testing.

4:16 PM

Submucosal gland mucus strand velocity is decreased in chronic rhinosinusitis

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COI: No Disclosure Reported

Introduction
Chronic rhinosinusitis (CRS) may be initiated by innately impaired host defense mechanisms that predispose the upper airways to infection. Mucociliary transport (MCT) is one such mechanism that traps and propels inhaled pathogens out of the airways and is particularly deficient in cystic fibrosis (CF). When compromised, mucus stasis occurs and sinuses become susceptible to a perpetuating cycle of infection and obstruction. Recent evidence suggests tethering of submucosal gland mucus strands represents an inciting event within CF airways, occurring prior to onset of chronic infection. Submucosal gland hypertrophy and defective MCT are present in actively inflamed sinuses, but mucus strand velocity may also be affected as a secondary event, further contributing to the chronic disease. The objective of this study is to assess whether mucus strand velocity is decreased in patients with CRS.

Methods
Mucosal explants from patients with and without CRS were submerged in Ringer's solution mixed with fluorescent nanospheres. Methacholine was then added, and videos demonstrating strand growth and detachment were generated from a time-lapse of z-stack images using a multiphoton confocal microscope. Dynamic mucus strands were identified and individual velocities quantified with the MTrackJ plugin of ImageJ.

Results
Mucus strands were recorded (pixels/second) streaming from the submucosal gland openings. Average mucus strand velocities were significantly decreased in patients with CRS (12.2+/-2.5 vs. control, 48.9+/-23.1; $p<0.05$).

Conclusions
This study is the first to report evidence of abnormal mucus strand velocity from submucosal glands in diseased sinonasal mucosa. Future pharmacologic studies targeting this critical component of MCT are warranted.

4:23 PM

Loss of function Trpv1 Snp (rs8065080) is associated with chronic rhinosinusitis

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COI: No Disclosure Reported

Introduction
Transient receptor potential (TRP) channels are cation channels that are critical in 'sensing' environmental stimuli. TRPV1 and TRPA1 are expressed by airway neurons and epithelial cells. When activated, TRPV1 and TRPA1 can mediate local and systemic inflammation and irritation as well as cough and pulmonary edema. Recently the TRPV1 I585V rs8065080 allele was associated with difficult to treat asthma, loss of TRPV1 function, and an increase in TRPA1 expression. We sought to determine the expression of TRPV1 and TRPA1 in ex vivo and in vitro CRS cultures and the association between rs8065080 and CRS.

Methods
DNA was collected and genetic screening for rs8065080 among control (n=52) and CRS (n=90) groups non-Hispanic white adults performed. The presence (CRSwNP) or absence (CRSsNP) and the prevalence of co-occurring asthma were collected. Western blots were performed of TRPV1 and TRPA1.

Results
TRPV1 and TRPA1 were ubiquitously expressed in sinonasal airway epithelial cells. Using an additive model, the presence of rs8065080 was significantly associated with CRS compared to controls (OR: 1.67 wt/rs8065080, 2.77 rs8065080/ rs8065080; p=0.04), however this effect was driven by a sub-phenotype of CRSwNP and strengthened in those with asthma. TRPA1 levels were also increased in sinonasal tissue from individuals with the rs8065080 allele.

Conclusions
We determined a subphenotype of CRSwNP associated with the TRPV1 I585V rs8065080 SNP. Further mechanistic studies are required to determine the molecular endotype of TRPV1 and TRPA1 in this association.

4:30 PM
Trends in sinusitis research: a systematic review of extramural funding
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COI: N/A

Introduction
Innovation represents a core value of the American Rhinologic Society (ARS), with multiple efforts to promote research in the advancement Rhinologic care. We therefore sought to identify trends in extramural rhinology funding and underutilized sources of support to facilitate future efforts.

Methods
Systematic review of the National Institutes of Health (NIH) Research Portfolio Online Tools (RePORTER) database (fiscal year 1993 to 2017) was completed with the search strategy: ("chronic sinusitis" OR rhinosinusitis). All identified studies were accepted for review, with comparison to ARS membership rolls to identify studies supported by ARS investigators. Foundation awards were surveyed to identify and characterize additional sources of support.

Results
Systematic review identified 958 projects receiving NIH funding, of which 120 remain active. The percentage of CRS-related awards and total funding relative to all NIH awards increased over the past ten years (2006-2016) from 0.06% (8/9128) and 0.09% ($2,151,152/$3,358,338,602) to 0.87% (86/9540) and 0.90% ($37,201,095/ $4,300,145,614). Among active studies, 9 investigators maintain membership in the ARS and serve as principal investigator or project leader in 12 (10%) studies. ARS investigators received the greatest number of awards from the NIDCD (n=8,66.7%), while only receiving 2.2% of awarded funding from the NIAID ($607,500/$26,873,022), the largest source of awards among non-ARS investigators.

Conclusions
Support for sinusitis-related research is growing, with the largest source of active funding not being fully utilized by members of the ARS. Further efforts to promote funding priorities among extramural sources is necessary to facilitate increased funding for ARS member initiatives.

4:37 PM
Discussion

4:45 PM
Panel: Extramural Funding: How I Did It
Moderator: Noam Cohen, MD, PhD, FARS
Panelists: Andrew Lane, MD, FARS; Vijay Ramakrishnan MD, FARS; Timothy Smith, MD, MPH, FARS; Bradley Woodworth, MD, FARS

5:25 PM
Closing Remarks & Adjourn

PROGRAM ABSTRACTS

Saturday, September 9, 2017 – Breakout Room 2 Grand Ballroom 2

Chairperson: Eugenia Vining, MD

(Live International Webstreaming)

Supported by the Pan American Association

12:57 PM
Welcome

Examining Outcomes I
Moderators: Kenneth Rodriguez, MD; John Schneider, MD

1:00 PM
Management of rhinosinusitis in immunocompromised patients: predictors, treatment trends, and outcomes
Sanjeet Rangarajan, MD
Christopher Shumrick, BS
Mindy Rabinowitz, MD
Meghan Crawley, MD
Gurston Nyquist, MD, FARS
Marc Rosen, MD, FARS
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COI: No Disclosure Reported

Background
Immunocompromised patients are prone to serious complications of bacterial and fungal sinusitis. There are no practice guidelines for the management of rhinosinusitis in this population despite the frequency with which rhinologists encounter it. We seek to identify the clinical factors which influence treatment decisions and affect outcomes.

Methods
Immunocompromised patients evaluated for sinusitis at our institution between 1/2011 and 9/2016 were identified. Medical and surgical treatments, microbiology data, and imaging reports were reviewed. Fisher exact and individual sample t-tests were utilized to analyze data.

Results
Our service evaluated 121 immunocompromised patients for rhinosinusitis, an average of four days following initial admission (0-40 days). 90 patients met clinical criteria for sinusitis. Malignancy or hematologic disease was the most common reason for immunosuppression (66%, n=59). Surgery was performed on 32 patients (36%), and the remainder were treated medically. Presence of purulence/abnormal secretions or abnormal mucosa on nasal endoscopy was predictive of an actual sinusitis diagnosis (p = 0.0115 and 0.0106), as were abnormal CT scans (p = <0.0001). Neutropenia was a predictor of surgical intervention (p = 0.035). Bedside cultures most often grew normal flora, whereas operative cultures were most often positive for staphylococcus or pseudomonas species. Eight patients (9%) died during admission.

Conclusions
Expedient endoscopic examination and imaging rapidly establish a diagnosis of sinusitis and guide further management. Surgery is often performed in patients with neutropenia or severe illness, with longer hospital stays and higher mortality expected.

1:07 PM
Similar outcomes for unilateral and bilateral chronic rhinosinusitis without nasal polyposis after endoscopic sinus surgery
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COI: No Disclosure Reported

Introduction
Although the majority of patients with chronic rhinosinusitis without nasal polyposis (CRSsNP) suffer from bilateral disease, a subset suffer from unilateral disease. Currently, outcomes following endoscopic sinus surgery (ESS) for medically recalcitrant CRS are inferred from outcomes for patients with bilateral disease. This study compares outcomes of ESS between patients with unilateral and bilateral disease.

Methods
Patients with CRSsNP who failed appropriate medical therapy and elected ESS were enrolled between 2011 and 2015. Patients were dichotomized according to radiographic evidence of unilateral disease (Lund-Mackay (LM) score=0 for one side) or bilateral disease (LM>1 for both sides). The primary outcome of interest was the 22-item Sinonasal Outcome Test (SNOT-22), with secondary outcomes including the Brief Smell Identification Test (BSIT) and the Lund-Kennedy (LK) endoscopy staging system.

Results
One hundred and ninety patients met inclusion criteria, 19 with unilateral (10%) and 171 with bilateral CRSsNP (90%). Both groups were similar across all preoperative demographic factors, SNOT-22 and BSIT scores. Postoperatively, patients with bilateral disease reported greater improvement in mean SNOT-22 scores compared to unilateral disease, but this difference was not statistically or clinically significant (-24.3[+21.1] vs. -21.5[+24.0], p=0.58). Mean LK scores improved for patients with bilateral disease but not unilateral disease without a difference between groups (-2.0¬[+3.5] vs.

-0.4[¬+2.4], p=0.09). Neither bilateral nor unilateral disease groups achieved a significant improvement in BSIT scores (-0.2[+2.4] vs. -0.3[+2.1], p=0.93).

Conclusions
Patients with unilateral CRSsNP experience improvement after ESS comparable to patients with bilateral disease on patient reported outcome measures.

1:14 PM
Association of socioeconomic status, race and insurance status with chronic rhinosinusitis patient-reported outcome measures
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COI: No Disclosure Reported

Introduction
Disparities in health and healthcare access are widely prevalent. However, less is understood regarding the impact of socioeconomic status on chronic rhinosinusitis (CRS) patients. We investigate if CRS severity at presentation differs based on socioeconomic factors.

Methods
Prospective cross-sectional cohort of 300 patients presenting with CRS. Outcome variables included CRS symptomatology, reflected by Sinonasal Outcomes Test (SNOT)-22, general health status, reflected by EQ-5D visual analog scale (EQ-5D VAS), and CRS-related antibiotic and systemic corticosteroid use. Race/ethnicity, zip code income bracket, education level, and insurance status were used as predictor variables. Regression, controlling for clinical and demographic characteristics, was used to determine associations between predictor and outcome variables.

Results
Mean SNOT-22 score was 33.8 (SD=23.2) and mean EQ-5D VAS score was 74.2 (SD=18.9). On multivariable analysis, presenting SNOT-22 and EQ-5D VAS scores were not associated with non-White patient race/ethnicity (P=0.634 and P=0.866 respectively), education (P=0.106 and P=0.586 respectively) or the percent of households in the zip code with incomes under $50,000/year (P=0.917 and P=0.979 respectively). SNOT-22 scores did not differ by insurance type, but Medicare patients reported worse general health status. Use of oral antibiotics or oral steroids for CRS was not associated with predictor variables either.

Conclusion
CRS patients presented to a tertiary rhinology center with similar metrics for CRS severity and pre-presentation medical management regardless of race/ethnicity, education status or zip code income level. Patients with Medicare had worse general health status. Further research should investigate potential disparities in diagnosis of CRS, specialist referral, and treatment outcomes.

1:21 PM
Correlation of exhaled nasal nitric oxide to sinus ct and sinonasal outcome test scores: a prospective study
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COI: No Disclosure Reported

Background
Computed tomography (CT) of the paranasal sinuses is the gold standard for diagnosis of chronic rhinosinusitis (CRS). Detection of nasal nitric oxide (nNO) levels has been investigated as a diagnostic tool in sinus disease, as sinus obstruction results in a lower level of nNO.

Objective
The primary aim was to determine the correlation of passive (baseline) plus dynamic (humming) nNO to CT findings of sinus inflammation and symptoms as measured by the Sinonasal Outcome Test (SNOT-22).

Methods
Subjects with previously scheduled sinus CT scans were asked to participate. Baseline and humming nNO levels were measured using a Siever chemiluminescence NO analyzer. Each subject completed the SNOT-22 survey. The CT was scored using the Lund-Mackay (LM) system (positive CT defined by LM score > 3). Correlation was measured by linear regression analysis (LRA) comparing SNOT-22, LM, and nNO measurements.

Results
Fourteen subjects participated. LM scores had a positive pairwise correlation with total SNOT-22 scores (R^2 = 0.1457, corr: 0.3817) and the humming:baseline nNO (positive pairwise correlation, R^2 = 0.0912, corr: 0.3021). Baseline nasal nNO scores had a negative pairwise correlation with LM scores (negative pairwise correlation, R^2 = 0.1172, corr: -0.3424) and SN0T-22 scores (negative pairwise correlation, R^2 = 0.1515, corr: -0.3893).

Conclusions
Baseline nNO decreased with increasing LM and SNOT-22 scores, while the ratio of humming:baseline nNO increased with increasing LM scores. Nasal NO may be a useful tool for screening for CRS as an inexpensive point-of-service screening test and for longitudinal monitoring of treatment response.

PROGRAM ABSTRACTS

1:28 PM
Self-reported anxiety and depression are unchanged after functional endoscopic sinus surgery for chronic rhinosinusitis
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COI: No Disclosure Reported

Background
Prior research has established that anxiety and depression, as measured by the Hospital Anxiety Depression Score (HADS), are strongly correlated with disease-specific quality of life (Rhinosinusitis Disability Index – RSDI) in chronic rhinosinusitis (CRS). We hypothesized that anxiety and depression would decrease after functional endoscopic sinus surgery (FESS), and furthermore that HADS would predict improvement in RSDI following surgery.

Methods
The study cohort from 2014 consisted of 124 patients presenting to an academic rhinology clinic with CRS; all subjects underwent nasal endoscopy, RSDI, and HADS evaluation. The cohort was segregated by whether or not they underwent FESS. For 34 surgical patients, pre- and post-operative RSDI and Lund-Kennedy endoscopic scores were compared, and an updated HADS questionnaire administered.

Results
Lund-Kennedy scores improved from 5.77 ± 4.05 to 3.16 ± 2.58 following surgery (p=0.0016), as did total RSDI (38.24 ± 25.47 to 29.06 ± 31.22, p=0.03) and its physical subscore (14.56 ± 9.70 to 10.59 ± 10.84, p=0.03). Total HADS (9.83 ± 6.43 to 11.28 ± 7.36, p=0.37) as well as depression and anxiety subscores were unchanged. Linear regression did not reveal a correlation between HADS and change in RSDI following FESS.

Conclusions
Despite improvements in objective evidence of sinonasal inflammation (Lund-Kennedy score) and disease-specific quality of life (RSDI), neither depression nor anxiety improved after FESS, nor did the magnitude of psychological comorbidity predict post-operative improvement in quality of life. Levels of depression and anxiety may be hard-wired, and therefore not influenced by changes in objective or perceived sinonasal disease burden.

1:35 PM
Discussion

Skull Base Surgery
Moderators: Edward McCoul, MD, MPH, FARS; Lee Zimmer, MD

1:42 PM
Prospective trans-frontal sheep model of skull base reconstruction using vascularized mucosa
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COI: No, but senior author is a consultant for Cook Medical

Objective
No high-fidelity animal model exists to examine prospective wound healing following vascularized reconstruction of the skull base. Such a model would require the ability to study the prospective behavior of vascularized mucosal repairs of large dural and arachnoid defects within the intranasal environment. The objective of this study was to therefore develop and validate a novel, in vivo, trans-frontal sheep model of cranial base repair using vascularized sinonasal mucosa.

Methods
Twelve trans-frontal craniotomy and 1.5cm durotomy reconstructions were performed in 60-70kg Dorset/Ovis Aries sheep using vascularized mucosa with or without an adjunctive heterologous porcine small intestinal submucosal underlay graft(n=6 per group). Histologic outcomes were graded (scale 0-4) by a blinded veterinary histopathologist after 7, 14 and 28 days for a range of wound healing parameters.

Results
All sheep tolerated the surgery which required 148+/-33 minutes. By day 7, the mucosa was fully adherent with complete partitioning of the sinus and intracranial compartments. Fibroblast infiltration and flap neovascularization scores significantly increased between day 7(0.3+/-0.5 and 0.0+/-0.0) and day 28 (4.0+/-0.0, p=0.01 and 2.0+/-0.8, p=0.01; respectively) while hemorrhage scores significantly decreased from 2.5+/-0.6 to 0.0+/-0.0 (p=0.01). The inflammatory scores were not significantly different between the heterologous graft and control sides.

Conclusions
The described sheep model accurately reflects prospective intranasal wound healing following vascularized mucosal reconstruction of dural defects. This model can be used in future studies to examine novel reconstructive materials, tissue glues, and transmucosal drug delivery to the central nervous system.

1:49 PM

Porcine small intestine submucosa graft promotes improved remucosalization at sites of upper airway tissue remodeling

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COI: No Disclosure Reported

Introduction
The pedicled nasoseptal flap (NSF) is a workhorse flap for skull base reconstruction, but creates an exposed nasal septum that often displays delayed healing and crusting. We evaluated whether donor site grafting with porcine small intestinal submucosa (SIS) sheet is effective in promoting remucosalization to further study upper airway tissue regeneration.

Methods
In this multi-center, randomized, prospective trial, subjects were randomized to intervention (SIS) or control (no graft) intraoperatively after NSF elevation in skull base surgery. Individuals were evaluated at 2, 6, and 12 weeks post–intervention with endoscopic recordings. Using a standardized visual analogue scale, videos were graded on remucosalization, crusting, and edema by 3 blinded otolaryngologists. Scores were analyzed for inter-rater reliability and cohorts compared. Immunohistochemistry at the leading edge of wound healing was performed.

Results
Of 46 procedures in 46 patients, 22 were randomized to intervention and 24 to control group. Subjects receiving the SIS graft had significantly greater overall rate of remucosalization (p=0.01) than controls over the 12-week period. There was also less crusting at all points in the SIS cohort, although not statistically significant (p =0.08). No effect on nasal edema was seen (p=0.2). Tissue biopsy of the leading edge demonstrated airway basal cells in both groups, suggesting that the graft did not interfere with normal tissue proliferation via progenitor cells.

Conclusion
Results of this prospective, randomized trial indicate that SIS grafts placed onto the NSF donor site confers improved remucosalization and wound healing for patients undergoing complex skull base procedures.

1:56 PM

Raman spectroscopy for inverted papillomas: distinguishing friend from foe

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COI: No Disclosure Reported

Introduction
Inverted papillomas (IP) are locally invasive tumors of the nasal cavity with a propensity to recur, requiring close follow-up. The modernization of optical diagnostic tools, including Raman spectroscopy, can potentially identify early tumor recurrence based on the biological fingerprint of normal and neoplastic tissue.

Methods
A proof of concept study comparing tissue samples from patients with normal nasal mucosa and IP using RS and histopathology. Raman signals were measured at 4 random points on ex-vivo specimens (4 co-additions and 60 seconds integration time per point) with a 785-nm laser. Spectral data were compared to histopathology using principle component analysis (PCA) and linear discriminant analysis (LDA) after data pre-processing.

Results
A total of 18 normal and 17 IP biopsy specimens were evaluated by Raman spectroscopy and histopathology. Consistent differences in spectral peaks were observed tissue types at 1302, 1207, 755 and 717 cm-1. The PCA-LDA model distinguished tissues with 99% accuracy, sensitivity of 95% CI [0.83-1] and specificity of 95% CI [0.84-1].

Conclusion
Inverted papillomas can be distinguished from normal sinus mucosa using Raman spectroscopy. A larger validation study is needed to assess its utility in the surgical management of inverted papillomas.

2:03 PM

Significance of human papillomavirus positivity in sinonasal squamous cell carcinoma

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COI: No Disclosure Reported

Objective
To investigate the role of Human Papillomavirus (HPV) positivity in sinonasal squamous cell carcinoma (SNSCC).

PROGRAM ABSTRACTS

Study Design
Retrospective cohort study.

Methods
The National Cancer Database was queried for cases of SNSCC with known HPV status. Demographics, socioeconomic variables, TNM stage, histologic subtype, grade, treatment modalities, and overall survival (OS) through 5 years were compared between HPV-positive and HPV-negative tumors. Cox proportional hazard regressions were performed.

Results
770 cases were identified; 526 were HPV-negative (68.3%), and 244 (31.7%) were HPV-positive. Age, sex, race, facility type, insurance type, median income, education level, and Charlson-Deyo comorbidity score did not vary by HPV status (p=0.05). Nasal cavity (49.4%) tumors were more likely to be HPV positive (p<0.05) than maxillary (18.8%), ethmoid (18.8%), and frontal (18.2%) sinus tumors. Large cell nonkeratinizing (42.4%), papillary (42.1%), and basaloid (56.5%) tumors were more likely than keratinizing (25.2%) tumors to be HPV positive (p<0.05). Well differentiated (grade I) tumors (9.0%) were less likely than higher grade tumors to be HPV positive (p<0.05). Overall stage, T-stage, N-stage, M-stage, tumor size, treatment modality, surgical approach, and surgical margins did not vary by HPV status (p=0.05). HPV-positive tumors had higher OS than HPV-negative tumors (p<0.0001). At 5-years, OS was 68.1% and 51.5% for HPV-positive and HPV-negative tumors, respectively. On multivariate analyses, HPV positivity remained a favorable prognostic factor (H.R.=0.49, 95% CI=0.34-0.70).

Conclusion
HPV-positivity is more common in nasal cavity SCC and nonkeratinizing SNSCC. It is also a favorable prognostic factor in SNSCC. Future studies on SNSCC should take HPV-positivity into consideration.

2:10 PM
Esthesioneuroblastoma short and long term outcomes: analysis from the national cancer database
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COI: No Disclosure Reporte

Introduction
Sinonasal malignancies, including esthesioneuroblastoma (ENB), are uncommon and thus often require population-level data for assessment of disease- and treatment-related factors. The National Cancer Database (NCDB) contains outcomes information for patients at over 1,500 treatment centers in the United States. Using the NCDB, we examined the effects of tumor characteristics and treatment-factors on short- and long-term outcomes in patients with sinonasal ENB.

Methods
The NCDB was queried for location codes corresponding to the nasal cavity and paranasal sinuses and the histology code for ENB. Only behavior code corresponding to primary malignancy was included. Multivariate analyses of tumor and treatment variables was performed against the following outcomes: overall survival, days to discharge, 30-day readmission, and 30- and 90-day mortality.

Results
The database contained 1225 patients with sinonasal ENB. African American race and surgical margins with residual tumor were both associated with worse overall survival ($P < 0.05$). Treatment with surgery then chemoradiation or surgery then chemotherapy alone had worse overall survival ($P < 0.05$). Treatment with radiation then surgery was associated with better overall survival ($P < 0.05$). There were no significant associations between the variables examined and short-term outcomes (days to discharge, 30-day readmission, and 30- and 90-day mortality).

Conclusions
Disease and treatment related factors impact survival of patients with sinonasal ENB. An understanding of these differences may help improve treatment and prognostication of ENB.

2:17 PM
Discussion

2:24 PM
Panel: Minimally invasive skull base surgery – assessment of the evidence
Moderator: Eric Wang, MD, FARS
Panelists: Nithin Adappa, MD, FARS; Jean Anderson Eloy, MD; Raj Sindwani, MD, FARS

3:00 PM
Break with Ehibitors

Optimizing Surgical Outcomes
Moderators: Charles Ebert, MD, FARS; Oswaldo Henriquez MD

3:20 PM
Risk stratification for postoperative venous thromboembolism after endoscopic sinus surgery
Daniel Beswick, MD
Reza Vaezeafshar, MD
Yifei Ma, MS
Peter Hwang, MD, FARS
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COI: No Disclosure Reported

Objectives
Venous thromboembolism (VTE) contributes to significant patient morbidity, yet the incidence of VTE following endoscopic sinus surgery (ESS) is unknown. Quality improvement criteria are prompting increased standardization of perioperative VTE prophylaxis. Risk stratification for VTE may better define best practice measures to balance limiting VTE development with avoiding unnecessary chemoprophylaxis against VTE.

Methods
Patients who underwent ambulatory and inpatient ESS without perioperative chemoprophylaxis from 2008 – 2016 at a single tertiary hospital were retrospectively evaluated. Identification of VTE was performed via screening diagnosis and procedure codes and clinical notes, with subsequent confirmation of true positive VTE. Data for individual Caprini scores were abstracted from electronic medical records. The primary outcome was development of VTE within 30 days following ESS relative to the Caprini score.
Results
2440 ESS cases were evaluated. While initial screening identified multiple potential VTE events, in-depth medical record review confirmed only 4 true VTE (0.16%). The VTE rate among cases with a Caprini score of <8 (0.09%, 2/2349) was significantly less ($p<0.008$) than the rate with a score of >8 (2.2%, 2/91). Beyond overall score, specific risk factors associated with the development of postoperative VTE included stroke, central venous access, and sepsis (all $p<0.015$), while prior VTE and hypercoagulability were not associated with postoperative VTE (all $p>0.5$).

Conclusions
In the absence of perioperative chemoprophylaxis, postoperative VTE following ESS is rare, particularly for patients carrying low-to-moderate Caprini scores. Risk stratification will assist in the design of perioperative VTE prophylaxis guidelines for patients undergoing ESS.

3:27 PM
A systematic review of sinonasal debridement versus no debridement for postoperative care of patients with endoscopic sinus surgery

WITHDRAWN

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Moshe Leshno, MD
Peter Hwang, MD, FARS
Ethan Soudry, MD
Petach Tikva, Israel
Israel

COI: No Disclosure Reported

Background
Post-operative debridement of the sinonasal cavities after endoscopic sinus surgery (ESS) has been suggested to be associated with improved healing outcomes.
Objective: The aim of this study was to perform a systematic review of the literature to assess the effects of postoperative sinonasal debridement versus no debridement following ESS. Primary outcome was quality of life (QOL). Secondary outcome was post-operative endoscopic sinonasal appearance.

Methods
Systematic review of the literature. Only Randomized controlled trials (RCTs) comparing postoperative nasal debridement versus no debridement with at least three months of follow-up were included.

Results
375 studies were independently assessed by two authors. 4 studies were included with a total of 152 participants diagnosed with recurrent acute and chronic rhinosinusitis. All participants underwent at least antrostomy and ethmoidectomy. Nasal douching post-operatively were used in all patients. QOL showed no difference between the groups. Although improved endoscopic scores were noted in the debridement group, there was no statistically significant difference between groups. A sub-analysis for adhesion rates showed a lower adhesion rate for the debridement group with a statistical significant difference (RR 0.44; 95% CI 0.28 to 0.68, $P<0.001$). Number needed to treat analysis was performed for endoscopic score and adhesion rate and revealed a 3:1 and 5:1 ratio respectively.

Conclusions
We could not reach a firm conclusion regarding postoperative sinonasal debridement due to high risk of bias and low quality of evidence. However, a low number needed to treat ratio in preventing post-operative adhesion formation should favor surgeons performing debridement.

3:34 PM
Preoperative acute purulent sinusitis, chronic sinusitis or concominant endoscopic sinusotomy may not be associated with the development of postoperative meningitis in endoscopic endonasal skull base surgery (eess)
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COI: No Disclosure Reported

Traditional dictum has raised caution when performing endonasal endoscopic skull base surgery (EESS) with evidence of paranasal sinusitis. The aim of this study was to determine if preoperative sinusitis, either radiographic or culture-positive sinusitis, was a risk factor in the development of postoperative meningitis in EESS.

PROGRAM ABSTRACTS

681 consecutive cases were reviewed. 510 (75%) demonstrated no evidence of radiographic sinusitis, 171 (25%) demonstrated acute or chronic sinusitis on preoperative imaging. Primary or intraoperative CSF leaks occurred with radiographic evidence of sinusitis in 99 cases (15%) and sinus culture positive procedures in 78 cases (11%). Six patients developed postoperative culture positive or chemical meningitis (0.9%). Of these 6 meningitis patients, 5 had grade 3 intraoperative CSF Leaks, 5 had extended complex skull base approaches with operative times more than 6 hours, 4 had nasoseptal flaps, 2 had prior surgery, 2 patients had lumbar drains and 1 patient had postoperative CSF leak. The cases were further classified as to presence of intraoperative cerebrospinal fluid leaks (CSF) or postoperative delayed CSF leaks. Culture positive sinusotomy with intraoperative CSF leaks were classified as the "at risk" to develop meningitis" group. No patients with postoperative meningitis had either radiographic or culture-positive sinusitis.

This data suggests that the presence of preoperative radiographic or culture-positive sinusitis in EESS does not predispose patients to postoperative meningitis. Furthermore, concomitant sinusotomy does not increase the risk of developing meningitis. The complexity and duration of the procedure and reoperation may predispose patients to postoperative meningitis.

3:41 PM
Total intravenous anesthesia with propofol versus inhaled anesthesia for endoscopic sinus surgery: A meta-analysis of randomized controlled trials
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COI: No Disclosure Reported

Introduction
Safe and effective endoscopic sinus surgery (ESS) relies upon adequate surgical visibility, which is negatively influenced by blood loss. Total intravenous anesthesia (TIVA) has been postulated to reduce bleeding and improve surgical field quality compared to inhaled anesthesia (IA). Prior systematic reviews and meta-analyses on this topic were limited by a small number of studies, but a number of additional trials have since been published. We performed an updated meta-analysis to determine the benefit of TIVA versus IA during ESS.

Methods
PubMed, Embase, and Cochrane Library were searched for randomized controlled trials (RCTs) comparing TIVA with propofol versus IA in ESS. Demographic and outcome data were extracted from articles meeting selection criteria and analyzed.

Results
We included 16 RCTs with a total of 848 patients: 12 trials reported on surgical field score, 10 on operative time, and 15 on blood loss. Preoperative characteristics (age, weight, gender, Lund-Mackay score) were similar between the two groups. Compared to IA, TIVA with propofol improved the Boezaart field score by 0.34 (95% Confidence Interval (CI) 0.05 to 0.64; $p<0.05$), reduced blood loss by 59.4 mL (CI 15.5 to 103.3 mL; $p<0.01$), and surgical time by 6.2 minutes (CI 1.2 to 11.3 minutes; $p<0.05$). There was no difference in heart rate, mean arterial pressure, and anesthesia time.

Conclusion
TIVA with propofol, in comparison to IA, may improve surgical field quality, reduce blood loss, and decrease surgical time in ESS.

3:48 PM
Antibiotic use in functional endoscopic sinus surgery: a survey of the american rhinologic society
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USA

COI: No Disclosure Reported

Introduction
There is a paucity of data supporting antibiotic use in endoscopic sinus surgery (ESS). Perioperative antibiotic use among otolaryngologists varies significantly. The goal of this study is to determine antibiotic prescribing patterns in ESS.

Methods
An online-based survey was designed and distributed to American Rhinologic Society members using SurveyMonkey. SPSS v22.0 was used for statistical analysis.

Results
Of the 204 responses, 36.8% of respondents were in full-time academic positions, 32.8% were in private practice, and 30.4% were in academic-affiliated private practice. 20.6% of respondents routinely gave preoperative antibiotics with the most commonly cited reasons being to reduce bacterial burden (60%) and to reduce mucosal inflammation (60%). 54.4% of respondents routinely gave intraoperative antibiotics, most commonly to reduce the risk of postoperative infection (63%). 62.3% of respondents routinely gave postoperative antibiotics, citing the need to reduce the perceived risk of postoperative infection (75.6%). 39.2% of respondents reported that diagnosis influenced their use of postoperative antibiotics and, within this group, antibiotic use was most influenced by diagnoses of chronic rhinosinusitis with nasal polyposis (72.5%) or aspirin-exacerbated respiratory disease (52.5%). Compared to private practitioners, full-time academicians were significantly less likely to give preoperative

antibiotics (12% vs 25.6%, p=0.021) but more likely to give intraoperative antibiotics (66.7% vs 47.3%, p=0.007).

Conclusion
This study demonstrates the significant variation in perioperative antibiotic use among otolaryngologists which was influenced by practice setting. These survey results provide support for the establishment of evidence-based practice guidelines based upon randomized clinical trials investigating perioperative antibiotic use in ESS.

3:55 PM
Discussion

Microenvironments
Moderators: Philip Chen, MD; Anthony Del Signore, MD

4:02 PM
Heterogeneity of human sinonasal epithelial basal cells
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USA

COI: No Disclosure Reported

Introduction
Sinonasal epithelial cells (SNEC) form the primary barrier against pathogens and environmental insults. Epithelial basal cells are considered stem cells crucial for repair and regeneration. Recent lower airway investigations report differential surface marker expression among basal cells, suggesting the presence of phenotypically distinct subpopulations. Sinonasal epithelial basal cells have not been similarly characterized.

Methods
Flow cytometry was performed on SNEC samples stained for cell surface and intracellular markers. SNEC are characterized as Lineage-(CD45-CD31-)EpCAM+ cells, which excludes all lymphoid, myeloid, and endothelial cells. Nasal epithelial cells were further characterized by a panel of surface markers: CD104, CD49f, CD200, CD29, CD47, Lgr5, Lgr6, CD24, and Krt14/15/16.

Results
Over 70% of Lineage-EpCAM+CD104+ cells were positive for intracellular Krt14/15/16 expression indicating basal cell characteristics. Lineage-EpCAM+CD49f+ cells were also positive for CD104 expression. While CD47 was expressed on all Lineage-EpCAM+ cells, Lgr6 was not expressed in the nasal epithelium. Sinonasal epithelial basal cells were characterized by CD24lo expression. Finally, CD29, CD200, and Lgr5 were present at varying levels in Lineage-EpCAM+CD104+ cells.

Conclusions
This study defines for the first time sinonasal epithelial basal cell subpopulations as identified by surface marker expression. While sinonasal epithelial basal cells are typically thought to be homogeneous, our findings suggest that subtypes exist with potentially different functional properties. Further research is needed to explore how epithelial basal cell subpopulations are regulated and what roles they may play in health and disease.

4:09 PM
Altered immunoglobulin d humoral and b cell immunity in patients with chronic rhinosinusitis
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COI: No Disclosure Reported

Introduction
Immunoglobulin D (IgD) is an enigmatic antibody isotype best characterized in naïve B cells. However, soluble IgD (sIgD) and IgD+ B cell populations are described in human upper respiratory mucosa. We assessed for alterations in sIgD and IgD+ B cells in nasal mucosa of patients with chronic rhinosinusitis (CRS), and clinical parameters associated with IgD shifts.

Methods
sIgD levels were quantified by ELISA in nasal tissues, secretions, and serum. IgD+ cells were detected by immunohistochemistry and flow cytometry. Inflammatory mediators were measured using real-time PCR and Luminex assay. Middle meatal swabs were taken for bacterial culture and medication use history was reviewed. Additionally, tissues explants were cultured in IL-2-conditioned media in selected experiments.

Results
sIgD levels and IgD+ cells were significantly increased in uncinate tissue (UT) of CRS without nasal polyps (CRSsNP) compared to controls (4-fold, P<.05). IgD+CD19+CD38bright plasmablasts were significantly elevated in mucosa of CRSsNP patients compared to controls (P<.05), and never detected in circulating blood. IL-2 levels were increased in CRSsNP UT, and positively correlated with tissue IgD levels. Additionally, IL-2-stimulated CRSsNP tissue in vitro induced significant sIgD production compared to IL-2-stimulated controls (P<.05). CRS patients with preoperative antibiotic use or harboring pathogenic bacteria demonstrated higher tissue IgD levels than patients lacking these variables (P<.05).

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Conclusion
sIgD levels and IgD+ B cell plasmablasts are selectively increased in the upper airway tissues of CRS patients. sIgD levels are associated with IL-2 and the presence of pathogenic bacteria. These findings suggest that IgD may enhance mucosal inflammation in CRSsNP.

4:16 PM
The effect of medical treatment on the bacterial microbiome in patients with chronic rhinosinusitis: a randomized trial
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COI: No Disclosure Reported

Introduction
Antibiotics and corticosteroids are prescribed to patients with chronic rhinosinusitis (CRS) to reduce bacterial burden and mucosal inflammation. Unfortunately, clinical improvement is often short-lived and symptoms typically recur following cessation of treatment. The impact of systemic therapies on bacterial communities is not well understood. Improved knowledge of how medical therapies influence the intranasal ecosystem may allow for more effective prescribing and the development of more targeted treatments.

Methods
Twenty patients with CRS were randomized to receive either doxycycline 100 mg twice daily or prednisone 30 mg once daily for 7 days. A further six patients with CRS were allocated as untreated controls. Swabs were taken immediately before and after the study period. Symptom scores (SNOT-22) were recorded. Bacterial communities were characterized using 16S rRNA gene-targeted amplicon sequencing. Bacterial abundance was estimated using quantitative PCR of 16S rRNA gene copies.

Results
Bacterial profiles were dominated by members of the genera Corynebacterium and Staphylococcus. Patients treated with either doxycycline or prednisone had variable and unpredictable changes in communities. The average relative abundance of Propionibacterium increased after treatment in the doxycycline treatment group, and Corynebacterium reduced in the prednisone group. Significant differences in clinical scores, bacterial community richness, diversity and bacterial abundance were not seen after treatment.

Conclusions
The short-term response of bacterial communities to antibiotic or corticosteroid therapy is variable and does not follow an obvious pattern. This study suggests that the use of systemic therapy in patients with stable CRS should be rationalized to minimise antibiotic-associated morbidity and bacterial dysbiosis.

4:23 PM
Mechanisms of response to intranasal administration of lactococcous lactis w136 probiotic in refractory crs
Martin Desrosiers, MD, FRCSC
Saud Alromaih, MD, FRCSC
Leandra Mfuna Endam, MSc
Montreal, QC
Canada

COI: Yes, Dr Desrosiers is president and Founder of ProbionaseTherapies, a start up company developed with the Université de Montréal and McGill University to commercialise the Lactococcus lactis W136 bacteria used in the clinical trial. This work was done prior to the start up development, while the clinical research was still in the academic setting.

Introduction
Topical nasal administration of 'healthy' probiotic Lactococcocus lactis W136 (L lactis W136) to symptomatic post-ESS CRS patients has been shown to be well-tolerated and improve symptoms, QOL indices and endoscopic mucosal scores. (Desrosiers, 2016). We wished to identify mechanisms and pathways underpinning these responses by using gene expression profiling of mucosal samples.

Method
Clinical results from this trial have previously been reported. Patients with CRS refractory to ESS participated in a prospective clinical trial, receiving BID nasal administration of L lactis W136 via nasal irrigation. Mucosal samples collected by cytology brush were collected immediately prior to and following the 14 day course of therapy were used for gene expression analysis. RNA was extracted and gene expression profiled using the Illumina HumanHT-12 V4 BeadChip, which assesses 47 231 transcripts. Raw intensities were adjusted and analyzed using BioConductor Limma package. Gene expression was reported as Fold Change (FC) and corrected p-values.

Results
105 transcripts were differentially expressed between pre- and post- treatment conditions at Pcorrected=0.01 and false discovery rate (FDR) =5%. Top genes upregulated with treatment were LYNX1, a putative target for asthma, and BCAT1, SPRR, KRT4 and TNFRSF18 genes implicated in epithelial differentiation and migration. Top downregulated genes included IGLL1 (a B lymphocyte surface marker), AMY2A, and CACGN6, a gene previously associated with aspirin-intolerant asthma.

Conclusion
This suggest that clinical effects observed with L lactis W136 probiotic therapy may be secondary to direct or

indirect effects on i) the immune system and ii) epithelial regeneration and repair.

4:30 PM
Bacterial microbiome changes in chronic rhinosinusitis patients from baseline to clinical exacerbations
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COI: No Disclosure Reported

Background
Chronic rhinosinusitis (CRS) is associated with a dysbiosis of the sinus microbiome. Clinically, CRS patients often experience acute exacerbations characterized by worsening symptoms and purulent secretions. We sought to describe microbiome changes in CRS patients between their baseline and acute exacerbation.

Methods
Endoscope-guided swabs of the middle meati or open sinus cavities were taken from 8 CRS patients, sampled at baseline and during an acute exacerbation. DNA extraction, 16S rRNA gene amplification, and MiSeq-Illumina platform sequencing methods were used for analysis. Taxonomic classification of isolated species was achieved using Quantitative Insights Into Microbial Ecology software. The Comprehensive Antibiotic Resistance Database was used to code antibiotic resistance genes.

Results
In 6 of 8 patients, bacterial diversity decreased during an exacerbation relative to their baseline samples. In one patient, the diversity increased from 100% of an unclassified bacteria at baseline to 81.8% Moraxella catarrhalis, 14% Streptococcus pneumonia and 4.5% Corynebacterium accolens during an exacerbation. One patient went from 100% of an unclassified bacteria to 100% Bacteroides vulgatus. Each exacerbated state was characterized by a unique dominant species commonly associated with CRS or acute sinusitis such as S. pneumoniae, H. influenzae and S. aureus. Several antibiotic resistance genes were identified, with the lower bacterial diversity at exacerbation associated with fewer antibiotic resistance genes.

Conclusions
Additional decrease in the bacterial microbiome diversity typically occurs from a CRS baseline state to an exacerbation. CRS exacerbations as analyzed by deep sequencing were associated with bacterial species often implicated with acute bacterial sinusitis by culture techniques.

4:37 PM
Discussion

4:45 PM
Panel: Advances in understanding nasal polyps
Moderator: Stephanie Joe, MD, FARS
Panelists: Stella Lee, MD; Jayant Pinto, MD; Rodney Schlosser, MD, FARS

5:25 PM
Closing Remarks & Adjourn

Saturday, September 9, 2017 – Breakout Room 3 Grand Ballroom 3 Chairperson: Douglas Reh, MD, FARS

12:57 PM
Welcome

1:00 PM
Panel: ARS advocacy: What's on your radar screen?
Moderator: Seth Brown, MD, FARS
Panelists: Pete Batra, MD, FARS; Peter Manes, MD, FARS; Brent Senior, MD, FARS; Michael Setzen, MD, FARS

Examining Outcomes II
Moderators: Jonathan Ting, MD; Bozena B. Wrobel, MD, FARS

1:35 PM
Asthma onset pattern and patient outcomes in a chronic rhinosinusitis (crs) population
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USA

COI: No Disclosure Reported

Background
CRS is strongly associated with comorbid asthma. This study compares early- and late-onset asthma in a CRS population using patient-reported and clinical characteristics.

Methods
At enrollment into a clinical registry, CRS patients completed the 22-item Sino-Nasal Outcome Test (SNOT-22), Asthma Control Test (ACT), mini-Asthma Quality of

PROGRAM ABSTRACTS

Life Questionnaire (miniAQLQ), the 29-item Patient-Reported Outcomes Measurement Information System (PROMIS-29) and medication use questionnaires. Patients also reported comorbid asthma and age at first asthma diagnosis. Early- (<18 years) and late- (>18 years) onset asthma groups were defined. ANOVA, chi-square and Kruskal-Wallis tests were used to compare patient responses.

Results
199 non-asthmatics (56.1%), 71 early-onset asthmatics (20.0%) and 85 late-onset asthmatics (23.9%) completed the survey. BMI was significantly higher in late-onset asthmatics (p=0.046) while age, gender, race and smoking history did not differ. SNOT-22, ACT and miniAQLQ were not different between asthma groups but late-onset asthmatics had significantly lower physical function than non-asthmatics (p=0.008). Compared to non-asthmatics, late-onset asthmatics showed increased rates of nasal polyps (p<0.001), higher Lund-Mackey scores (p=0.024) and received more oral steroid courses (p<0.001) and endoscopic surgery (p=0.008) for CRS management. Late-onset asthmatics compared to early-onset asthmatics showed increased nasal polyposis (p=0.011), oral steroid courses for CRS (p=0.003) and treatment for asthma in the past five years (p=0.002).

Conclusions
While CRS- and asthma-specific PROM's were not significantly different across groups, CRS patients with late-onset asthma had poorer physical function, more frequent nasal polyposis and required increased treatment for CRS and asthma. Late-onset asthma may predict more severe disease in CRS.

1:42 PM
The impact of asthma on the cost effectiveness of surgery for chronic rhinosinusitis with nasal polyps
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USA

COI: No Disclosure Reported

Objective
To evaluate the impact of asthma on the cost-effectiveness of endoscopic sinus surgery (ESS) compared to medical therapy for patients with chronic rhinosinusitis with nasal polyposis (CRSwNP).

Methods
The study design consisted of a cohort-style Markov decision-tree cost utility analysis with a 31-year time horizon. Matched cohorts of CRSwNP patients with (n=95) and without (n=95) asthma who underwent ESS were compared with a cohort of 95 patients from the national Medical Expenditures Survey Panel (MEPS) database who underwent medical management for chronic rhinosinusitis (CRS). Baseline, one year, and two-year health utility values were calculated from responses to the EQ-5D instrument in both cohorts. The primary outcome measure was the incremental cost effectiveness ratio (ICER) for each cohort.

Results
The reference case for CRSwNP patients with asthma yielded an ICER for ESS versus medical therapy alone of $21,585.22 per QALY. The reference case for CRSwNP patients without asthma yielded an ICER for ESS versus medical therapy alone of $6,271.73 per QALY. At a willingness-to-pay threshold of $50,000/QALY, the cost effectiveness acceptability curves (CEAC) demonstrated 67% and 99% certainty that the ESS strategy was the most cost-effective option for CRSwNP patients with and without asthma, respectively. These results were robust to one-way analysis and probabilistic sensitivity analysis.

Conclusion
While ESS remains a cost effective intervention compared to medical therapy for patients both with and without asthma, the comorbidity of asthma negatively impacts the cost effectiveness profile.

1:49 PM
Outcomes after complete endoscopic sinus surgery and aspirin desensitization in aspirin exacerbated respiratory disease
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COI: No Disclosure Reported

Objective
This study aimed to assess patient outcomes after complete endoscopic sinus surgery (ESS) and aspirin desensitization for patients with aspirin exacerbated respiratory disease (AERD).

Methods
A retrospective chart review was conducted for patients with aspirin challenge proven AERD who underwent complete ESS followed by aspirin desensitization. Outcomes that were assessed included need for revision surgery and quality of life measures using the Sinonasal Outcomes Test-22 (SNOT-22). Data was collected preoperatively, postoperatively but pre-desensitization, and then at intervals post-desensitization through 36 months after aspirin desensitization. A mixed model logistic regression model was used for data analysis.

Results
Thirty-four patients met inclusion criteria for the study. Thirty-two patients successfully completed aspirin desensitization and were subsequently followed for 30 months after desensitization. Two patients were unable to complete desensitization. Five patients discontinued aspirin maintenance therapy due to gastrointestinal and respiratory side effects. Within the follow up period, there were only three (9.4%) revision sinus surgeries. Notably, one of these revision cases occurred in a patient who had discontinued aspirin maintenance therapy. After surgical treatment and prior to desensitization patients had significant reductions in SNOT-22 scores. The longitudinal linear mixed-effects regression model showed that total SNOT-22 scores remained statistically unchanged from immediate post desensitization through the 30 month follow up period.

Conclusion
Complete sinus surgery followed by timely aspirin desensitization and maintenance therapy appears to be an effective combination in the long term management of sinus disease in patients with AERD.

1:56 PM
L-methionine and the cftr potentiator, ivacaftor, abrogate pseudomonas aeruginosa biofilm mass
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Bradford Woodworth, MD, FARS
Birmingham, AL
USA

COI: No Disclosure Reported

Background
Biofilms contribute to medically and surgically recalcitrant chronic rhinosinusitis (CRS) by decreasing bacterial susceptibility to antibiotics. The CFTR potentiator, ivacaftor, and L/D-amino acids were recently identified to decrease biofilm formation when combined with the antibiotic ciprofloxacin. The objective of the current study was to evaluate whether ivacaftor and L-methionine abrogate P. aeruginosa biofilm formation in the absence of antibiotics.

Methods
Growth of Pseudomonas strain PAO1 in the presence of L-methionine and/or ivacaftor was measured at 600nm using a spectrophotometer and relative optical density units (RODUs) were calculated compared to vehicle control. A static biofilm formation assay was performed in 96-well polystyrene microtiter plates and eradication assessed using live/dead assay (BacTiter-Glo™ assay, Promega) and laser scanning confocal microscopy.

Results
At 24hr, PAO1 biofilm formation was significantly reduced in the presence of ivacaftor (8 or 16 µg/ml) + L-methionine (0.5 µM) (RODUs = 0.61+/-0.11, 0.59+/-0.11) compared to ivacaftor alone (RODUs = 1.1+/-0.07, 0.79+/-0.2) ($p < 0.0001$). There was no significant reduction of PAO1 biofilm formation with L-methionine (0.5 µM) alone at 24hr. At 72hr, PAO1 biofilm formation was significantly reduced with L-methionine (0.5 µM) (RODUs = 0.21+/-0.09) or L-methionine (0.5 µM) + ivacaftor (16 µg/ml) (RODUs = 0.20+/-0.11) ($p < 0.0001$). Samples treated with methionine (0.5uM) or ivacaftor (16 µg/ml) + methionine (0.5 µM) demonstrated dramatic reduction in the biofilm structure at 72hr.

Conclusion
L-methionine and ivacaftor synergistically reduce P. aeruginosa biofilms. This therapeutic strategy could improve bacterial susceptibility to antibiotics in patients with recalcitrant sinus disease.

2:03 PM
The effect of topical treatments for crs on the sinonasal epithelial barrier
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COI: No Disclosure Reported

Introduction
Carrageenan is a gelling agent extracted from red algae (Rhodophyceae). Carrageenans applied in nasal sprays have been shown to reduce the viral load in nasal secretions and lower the incidence of secondary infections in children with common cold. Despite the widespread use of carrageenans in topical applications, the effect of carrageenans on the sinonasal epithelial barrier has not been elucidated. We investigate the effect of different carrageens on the sinonasal epithelial barrier and inflammatory response in vitro.

Methods
Carrageenans of different isoforms and concentrations were diluted in commercially available saline irrigations (FLO CRS and FLO sinus care) and applied to the air-liquid interface cultures of primary human nasal epithelial cells from Chronic Rhinosinusitis patients and controls. Epithelial barrier structure and function was assessed by measuring the Transepithelial Electrical Resistance, the passage of fluorescently labelled Dextrans and the immunolocalization of the tight junction protein ZO-1. Cilia Beat Frequency, Toxicity and inflammatory response were measured.

Results
Kappa or Iota carrageenan in the different solutions was not toxic and did not have detrimental effects on epithelial barrier structure and function. Rather, application of Kappa carrageenan significantly increased

TEER values (p=0.04) and decreased interleukin-6 production in CRS patients (p=0.037).

Discussion
Kappa or Iota carrageenan in either FLO Sinus Care or FLO CRS solution was safe and did not negatively affect epithelial barrier function. Kappa carrageenan increased TEER and decreased pro-inflammatory IL-6 production in CRS patients, indicating positive effects of carrageenans on epithelial barrier function and on dampening pro-inflammatory cytokine production in these patients.

2:10 PM
Discussion

Olfactory Implications
Moderators: Karen Fong, MD, FARS; Ian Humphreys, DO

2:17 PM
Regulation of olfactory regeneration by acute inflammation and nf-kb
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USA

COI: No Disclosure Reported

Introduction
Olfactory basal progenitor cells are capable of reconstituting the neuroepithelium even after severe damage. The molecular events underlying this remarkable regenerative capacity remain poorly understood. In this study we demonstrate a previously unrecognized physiologic role of inflammation in olfactory repair after damage.

Methods
An acute olfactory injury was created in wild-type and genetically-modified mice using methimazole. Subsequent inflammatory cell infiltration and cytokine expression was quantified. The inflammatory response to injury was modulated using systemic corticosteroids and by genetic ablation of the TNF-a receptor. The importance of the NF-kB pathway in olfactory basal cell proliferation after injury was investigated using conditional knockout mice.

Results
Olfactory injury is associated with an acute, self-limited inflammatory response. Attenuation of this normal inflammation with either steroids or ablation of TNF-a receptor 1 impairs progenitor cell proliferation and neuronal differentiation. Genetic ablation NF-?B signaling specifically in horizontal basal cells impedes their proliferation at a very early stage of regeneration. Loss of NF-?B signaling in the newly regenerated olfactory neuroepithelium perturbs the homeostatic balance of proliferation and apoptosis.

Conclusions
Acute inflammation after injury is essential for key regenerative signals acting through NF-kB, activating progenitor cells to rebuild the olfactory epithelium. This finding contrasts with chronic rhinosinusitis, in which loss of olfactory function is believed to result from long-standing inflammation and may be reversed with corticosteroids. The role of inflammatory cytokines and NF-kB signaling in olfactory physiology and dysfunction is complex and warrants further study to identify potential therapeutic targets.

2:24 PM
Association of alterations in smell and taste with depression among older adults
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USA

COI: N/A

Objective
Examine the relationship between depression and changes in smell or taste in a nationally representative sample.

Study Design
Cross-sectional analysis of 2011-2012 and 2013-2014 National Health and Nutrition Examination Survey (NHANES).

Methods
We examined adults =40 years old who completed smell and taste questionnaires as well as a validated depression assessment instrument, Patient Health Questionnaire (PHQ-9). Analyses incorporated sampling weights to account for the complex sampling design and associations were analyzed using multivariate logistic regression adjusted for related demographics and socioeconomic data.

Results
The prevalence of altered smell and taste was 22.6% [95%CI: 20.5-24.6%] and 11.8% [95%CI: 10.8-12.8%], respectively. Among those who met criteria for major depressive disorder, the prevalence of altered smell and taste was higher at 41.1% [95%CI: 35.2-47.1%] and 23.8% [95%CI: 18.8-28.8%], respectively. In a multivariate model adjusting for age, gender, education, major comorbidities, smoking history, heavy alcohol use, sinus disease, cold symptoms, and trauma history, those who reported alterations in smell were more likely to meet criteria for major depressive disorder (OR: 2.12, p=0.005). There was no association between taste alteration and major depressive disorder when adjusted for sociodemographic factors (OR: 1.70, p=0.071).

Conclusion
There is an association between major depression and alterations in smell among older adults in the United States. Primary care providers should screen for depression when patients report changes in smell.

2:31 PM
Olfactory dysfunction predicts subsequent dementia in older US adults
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COI: No Disclosure Reported

Introduction
Sensory function has been associated with neurological disease, but there are few prospective studies. We investigated the relationship between olfactory dysfunction and a subsequent diagnosis of dementia within five years.

Methods
Objective odor identification ability was measured at baseline using a validated 5-item test (Sniffin' Sticks) in respondents from the National Social Life, Health, and Aging Project, a representative probability sample of home-dwelling older US adults ages 57-85 (n=2,906). Five years later, physician diagnosis of dementia was reported by the respondent or a proxy if they were too sick to interview or deceased. The association between baseline olfactory dysfunction and an interval dementia diagnosis was tested using multivariate logistic regression, controlling for age, gender, race/ethnicity, education, comorbidities (modified Charlson Index), and cognition at baseline (Short Portable Mental Status Questionnaire).

Results
Older adults with olfactory dysfunction had more than twice the odds of subsequently developing dementia five years later (OR 2.13, 95% CI: 1.32-3.43), controlling for the above covariates. Increasing number of odor identification errors was associated with increased probability of an interval dementia diagnosis (p=0.044, 1-df linear-trend test).

Conclusions
We show for the first time in a nationally-representative sample that home-dwelling older adults with normal cognition yet more difficulty identifying odors face higher odds of being diagnosed with dementia five years later, a risk independent of other significant factors. This validated five-item odor identification test is an efficient, low-cost component of the physical examination that can provide useful information while assessing patients at risk for dementia.

2:38 PM
Olfactory dysfunction and cognition among older adults in the United States
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Bozena Wrobel, MD, FARS
Los Angeles, CA
USA

COI: No Disclosure Reported

Objective
To investigate association between olfactory dysfunction and cognition in a nationally representative sample of US older adults.

Methods
We analyzed data from 2013-2014 National Health and Nutritional Examination Survey during which participants aged =60years (n=1,604) underwent both olfactory and cognitive testing. Olfaction was assessed by both objective test (8-odor Pocket Smell Test: smell impairment defined as score=2) and self-report. Cognitive assessment consisted of the Digit Symbol Substitution Test (DSST), the Consortium to Establish a Registry for Alzheimer's Disease (CERAD), and the Animal Fluency test. Regression models were used to examine the association between olfaction and cognition while adjusting for demographics and cardiovascular factors. Analyses incorporated sampling weights to yield results that are generalizable to the US population.

Results
The estimated prevalence of smell impairment in older adults was 20.6%[95%CI 16.4-24.8%] and 22.9%[95%CI 20.5-25.4%] based on objective smell test and self-report, respectively. In multivariate model adjusting for relevant factors, low smell test scores were consistently associated with low scores on cognitive assessments: DSST score difference of -1.8[95%CI -2.4 to -1.2], the Animal Fluency score difference of -0.6[95%CI -0.8 to -0.4], and the CERAD recall score difference of -0.3[95%CI -0.4 to -0.2] per one-point decrease in smell test score. There was no association between self-reported smell impairment and cognition.

Conclusion
Objectively-measured olfactory dysfunction is independently associated with cognitive impairment. These findings are consistent with previous studies and suggest the utility of objective olfactory tests as an indicator for cognitive impairment in comparison to self-reported olfactory dysfunction which is an uncertain indicator.

2:45 PM
Olfactory loss in chronic rhinosinusitis is associated with neuronal jnk activation
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USA

COI: No Disclosure Reported

Introduction
Olfactory inflammation in CRS is associated with cytokines that may result in the death of olfactory sensory neurons. Principal signaling molecules involved in the apoptotic pathway are c-Jun N-terminal kinases (JNK). While the JNK pathway has emerged as a key player in programmed cell death in neuroinflammation, its specific role in CRS-associated olfactory loss has not been thoroughly investigated.

Methods
JNK activation was studied in human tissue samples from control and CRS patients using immunohistochemical staining for phosphorylated c-Jun. A mouse model of inducible olfactory cytokine expression was used to experimentally control inflammation and assess JNK activation over time.

Results
In patients with CRS, activation of c-Jun is significantly increased relative to non-CRS control subjects, and there is an associated loss of sensory neurons. In the olfactory inflammation mouse model, prolonged induction of inflammation results in elevation of c-Jun expression and neuronal apoptosis.

Conclusions
Activation of neuronal JNK is a feature of chronic olfactory inflammation that is associated with neuronal apoptosis. Given that inhibition of JNK activity is neuroprotective in other settings, antagonism of this pathway may have therapeutic potential in the management of inflammatory olfactory loss or other disorders linked to olfactory neuronal apoptosis.

2:52 PM
Discussion

3:00 PM
Break with Exhibitors

Drug Eluting Stents and Topical Therapy
Moderators: Holly Boyer, MD; Adam Folbe, MD, FARS

3:20 PM
Preclinical therapeutic efficacy of the ciprofloxacin-eluting sinus stent for pseudomonas aeruginosa sinusitis
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Daniel Skinner, BS
Calvin Mackey, BS
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USA

COI: No Disclosure Reported

Background
The ciprofloxacin-eluting sinus stent (CSS) has extraordinary therapeutic potential for local antibiotic delivery to the sinuses. The objective of this study is to demonstrate the efficacy of CSS in eliminating P. aeruginosa infection in a rabbit model of sinusitis.

Methods
A ciprofloxacin-eluting sinus stent was created by coating ciprofloxacin/Eudragit RS100 on biodegradable PLLA (2mg). After analyzing the in vitro inhibition of PAO1 biofilm formation, a total of 8 CSSs (4 shams, 4 CSSs) were placed unilaterally in the rabbit's maxillary sinuses via dorsal sinusotomy after infected with PAO1. Animals were assessed in two weeks after the placement using nasal endoscopy, sinus culture, CT scan, and histology including scanning electron microscopy (SEM).

Results
From in vitro analysis, PAO1 biofilm formation was significantly reduced in wells with CSS placement ($p < 0.0001$). After the placement of CSS in the in vivo rabbit model of PAO1 infection for 2 weeks, there was significant improvement in sinusitis as visualized by nasal endoscopy compared to sham stents. CT also demonstrated no sign of mucosal edema or opacification in the sinus with CSS. SEM showed marked improvement in the structure of the mucosa, and regeneration of normal respiratory epithelium with a near-complete disappearance of biofilms.

Conclusion
Findings indicate significant improvement in PAO1 infected sinusitis after 2-week placement of the CSS in the rabbit model. CSS could provide a future avenue of therapy for refractory Pseudomonas sinus infections. Clinical studies are planned.

3:27 PM
A comparative study of two drug-eluting stent for the treatment of chronic sinusitis with polyposis
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USA

COI: No Disclosure Reported

Background
Drug eluting nasal dressings and implants are now widely used to help medialization of the middle turbinate, decreased scaring, mucosal adhesion, reduced polyps regrowth, and reduced mucosal inflammation. Herein, we compare the outcomes of 2 resorbable drug-eluting technologies; a Chitosan-based polymer nasal dressing (PosiSep) combined with Kenalog to Propel nasal implant following endoscopic sinus surgery for patient with chronic rhinosinusitis with nasal polyps.

Methods
Prospective, multicenter, randomized study, enrolling 35 patients with CRSwNP in 2 groups who failed medical therapy and elected endoscopic sinus surgery. Patients were randomized into either the PosiSep implant with Kenalog 20mg/ml, or Propel implant groups. Outcome was evaluated at 3 weeks and 3 months postoperatively. Primary outcome was a validated Post Operative Sinus Endoscopy score (POSE). Secondary outcomes included the validated quality of life outcomes survey. Baseline Lund-McKay CT scoring was used to determine the extent of sinus disease.

Result
Both the Sino-Nasal Outcome Test and POSE scores were significantly lowered after ESS and stent placement in both groups at both the 3 weeks and 3 months follow-up. However, ANOVA analysis between groups showed that the reduction in POSE score was actually better for the off-label group. SNOT-20 changes were similar

Conclusion
This study demonstrates the safety and efficacy of an inexpensive bioresorbable, steroid-eluting dressing for use in patients with CRSwNP. PosiSep implant is effective in improving wound healing and polyp recurrence. The Versatility in type of implant, the dose of drug, hemostatic and healing benefits afforded by the nasal dressing

3:34 PM
Safety and efficacy of a bioabsorbable fluticasone propionate-eluting sinus dressing in postoperative management of endoscopic sinus surgery a randomized clinical trial
Gwijde Adriaensen, MD
Keng-Hua Lim, MD
Wytske Fokkens, MD, PhD
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Netherlands

COI: Yes, this study is funded by Bioinspire

Background
Postoperative wound healing after endoscopic sinus surgery in patients with chronic rhinosinusitis (CRS) is an important factor in procedural success. Local steroids and separation of opposing mucosa are commonly implemented to optimize healing. A bioabsorbable, fluticasone propionate (FP)-eluting implant, SinuBand FP, was assessed for its safety and efficacy when used in patients with CRS and nasal polyps, who were indicated for ESS including bilateral anterior and posterior ethmoidectomy.

Methods
A first-in-human, randomized, partially double-blind, single-tertiary-referral-center, controlled trial enrolling 30 patients receiving 2 of 3 treatments (1 per sinus, intrapatient control): SinuBand FP, SinuBand (without FP), or standard nasal pack (Merocel®). Primary outcome measures were local safety, ocular safety (intraocular pressure [IOP], lens opacity), and 24-hour urine cortisol. Secondary measures (evaluated by independent review of postoperative video endoscopies) were ethmoid inflammation, polyp score, adhesion formation and Lund-Kennedy score. Patient reported outcomes of postoperative pain, nasal congestion and nasal discharge were collected.

Results
Of 30 enrolled patients (used for safety analysis), 27 patients completed the trial. SinuBand FP showed local safety, ocular safety, and no significant change in 24-hour urine cortisol. SinuBand FP showed a trend to do better concerning inflammation. Concerning polyp score SinuBand FP did significantly better compared to SinuBand without corticosteroids (P=0.006) and compared to Merocel (P=0.002). Adhesions were comparable across treatments. Patient reported pain was nominally lower in the SinuBand group.

Conclusions
SinuBand FP was well tolerated and showed evidence of efficacy. A larger study is needed to further evaluate and confirm the benefits of SinuBand FP.

3:41 PM
Corticosteroid-eluting implants placed in-office as an alternative to revision surgery in patients with recurrent sinus obstruction due to polyposis: a meta-analysis
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Robert Kern, MD, FARS
Joseph Han, MD, FARS
Keith Forwith, MD, PhD
Randall Ow, MD
Andrew Gould, MD
Atlanta, GA
USA

COI: Yes
Dr. Stolovitzky - consultant to Intersect ENT; Dr. Kern - none; Dr. Han - consultant to Intersect ENT; Dr. Fortwith - former consultant to Intersect ENT; Dr. Owe - none; Dr.Gould - none

Introduction
The safety and efficacy of bioabsorbable corticosteroid-releasing implants for recurrent sinonasal polyps were evaluated in two randomized, controlled, blinded, multicenter clinical trials. The purpose of this study was to perform a meta-analysis of the results from these trials.

Methods
The two trials enrolled 400 adults with chronic rhinosinusitis (CRS) indicated for revision surgery for medically-refractory ethmoid polyposis. Patients were randomized (2:1 ratio) to either in-office bilateral placement of sinus implants containing 1350 mcg of mometasone furoate (MF), or a sham procedure. All patients were required to use MF topical steroid spray once daily.

Outcome measures included symptoms and endoscopic grading by investigators and an independent panel.

Results
There were 254 patients randomized to the treatment group and 146 to control. At 90 days, the sinus implants significantly reduced nasal obstruction/congestion score (between-group difference -0.27, 95% CI -0.38, -0.04; p = 0.0176), bilateral polyp grade (-1.25, 95% CI, -1.44, -0.81; p < 0.0001) and percent ethmoid sinus obstruction (-21.52, 95% CI -23.5, -13.1; p < 0.0001) compared to control. The statistically significant improvement in endoscopic outcomes was corroborated by the independent panel (p = 0.001). Fewer treatment patients than control remained indicated for revision surgery (40.9% vs. 68.1%; p < 0.0001). One (0.5%) implant-related serious adverse event (epistaxis) occurred after 30 days, was treated and resolved without sequelae.

Conclusion
Office placement of corticosteroid-releasing implants is safe and significantly improves symptoms and endoscopic findings in patients with CRS and sinus obstruction due to polyposis, reducing the need for revision surgery.

Results:
Forty patients with CF (mean age 37.4, 60% male) were reviewed. Twenty underwent ESS. No significant difference was found between the surgical group and matched non-surgical controls in baseline FEV1(72.5% vs. 72.7%, p=0.98), number of pulmonary exacerbations (3.05 vs. 1.65, p=0.10), or Lund-Mackay scores (12.25 vs. 11.55, p=0.71). No significant difference was found in 1-year post-operative FEV1(70.5% vs. 72.8%, p=0.84), 2-year post-operative FEV1 (70.4% vs. 72.6% p=0.80), and 2-year post-operative number of pulmonary exacerbations (1.7 vs. 1.45, p=0.87). In the surgical group, no significant difference was identified between preoperative and postoperative FEV1, 1 -year (-2.51%, p=0.32) and 2-years after ESS (-3.10%, p=0.51), or in postoperative rate of pulmonary exacerbations (-1.28, p=0.11).

Conclusion
In this study, ESS does not appear to significantly improve FEV1 or significantly decrease the number of pulmonary exacerbations post-operatively.

3:48 PM
The safety and efficacy of colloidal silver in recalcitrant chronic rhinosinusitis: a randomized controlled trial
Mian Li Ooi, MD
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COI: No Disclosure Reported

Introduction
The management of recalcitrant chronic rhinosinusitis (CRS) is challenged by difficult-to-treat polymicrobial biofilms and multidrug resistant bacteria. This has led to the search for broad-spectrum non-antibiotic antimicrobial therapies. Colloidal silver has significant antibiofilm activity in vitro and in vivo against S. aureus, MRSA and P. aeruginosa. However, due to the lack of evidence, it is only currently used as an alternative medicine. This is the first study looking at the safety and efficacy of colloidal silver in recalcitrant CRS.

Methods
18 patients were randomised to 10 days of culture-directed oral antibiotics with saline douche (n=9) and 0.015mg/mL colloidal silver douche (n=9). Safety observations included pre- and post-treatment serum silver levels, University of Pennsylvania Smell Identification Test (UPSIT) and adverse event (AE) reporting. Efficacy was assessed comparing microbiology results, endoscopic Lund Kennedy Scores (LKS) and symptom scores using Visual Analogue Scale (VAS) and Sino-Nasal Outcome Test (SNOT-22).

Results
Colloidal silver demonstrated good safety profile with no changes in UPSIT and serum silver levels. There were no AEs reported. In both treatment groups, 1/9 patients had bacterial eradication. Both groups showed similar improvements in symptom and endoscopic scores although patients in the colloidal silver arm had more severe baseline disease compared to controls.

Conclusion
This study concludes that colloidal silver is safe and well tolerated. Its efficacy is comparable to oral antibiotics without the added risk of increasing bacterial resistance. With a higher concentration or longer treatment colloidal silver could potentially be a better alternative to antibiotics for our recalcitrant patients.

3:55 PM
Discussion

4:02 PM
Panel: Maximizing rhinology care in the office
Moderator: Greg Davis, MD, MPH, FARS
Panelists: Marc Dubin, MD, FARS; Michael Sillers, MD, FARS; Sarah Wise, MD, FARS

Empty Noses and Full Ears
Moderators: Jayakar Nayak, MD, PhD; J. Pablo Stolovitzky, MD, FARS

4:42 PM

Prevalence of eustachian tube dysfunction in patients with chronic rhinosinusitis

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COI: No Disclosure Reported

Introduction
While eustachian tube dysfunction (ETD) is a known comorbidity of chronic rhinosinusitis (CRS), its prevalence in the CRS population is poorly understood. We sought to determine the cross-sectional prevalence of ETD in patients with CRS using the validated ETD questionnaire ETDQ-7 and to correlate ETDQ-7 scores with Sinonasal Outcome Test-22 (SNOT-22), endoscopy, and CT scores.

Methods
Seventy-four patients with CRS completed the ETDQ-7 and SNOT-22 at their initial visit to our rhinology clinic. Lund-Mackay CT and Lund-Kennedy endoscopy scores were also obtained. Spearman's correlation coefficient (?) was calculated.

Results
Among the 74 patients, 36 patients (48.6%) had an ETDQ-5 score of =14.5, signifying clinically significant ETD. The mean ETDQ-7 score of the entire cohort was 18.5 (SD 11.1). The ? between ETDQ-7 and SNOT-22 score was 0.582 ($p < 0.001$), indicating moderate correlation. There was strong correlation between ETDQ-7 and the SNOT-22 ear subdomain (?=0.714, $p <0.001$). ETDQ-7 scores were poorly correlated to objective measures of sinonasal disease, including Lund-Mackay CT score (?=-0.144, p=0.22) and Lund-Kennedy endoscopy score (?=0.073, p=0.538).

Conclusion
ETD is highly prevalent among patients with CRS as documented by disease-specific patient-reported outcome measures. ETDQ-7 scores are strongly correlated to the ear subdomain of the SNOT-22 and moderately correlated to the total SNOT-22 score. ETD severity does not correlate with CT score or nasal endoscopy score.

4:49 PM

Eustachian tube dysfunction symptoms in patients treated in a tertiary rhinology clinic

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COI: No Disclosure Reported

Background
Ear complaints are common among patients presenting to a rhinology clinic. Validated inventories are available for patient quality of life in sinonasal disease and Eustachian tube dysfunction (ETD). This study sought to determine the extent of ETD symptoms, using validated metrics, in a large population of patients presenting to a tertiary rhinology clinic.

Methods
Seven-item Eustachian Tube Dysfunction Questionnaires (ETDQ-7) and 22-item Sinonasal Outcome Tests (SNOT-22) were prospectively collected from 492 patients treated in a tertiary rhinology clinic. Patient diagnoses were retrospectively determined from the medical record. Correlation between reported SNOT-22 and ETDQ-7 scores were analyzed, in addition to the number of patients meeting the criterion score for ETD.

Results
A total of 213 patients reported mean ETDQ-7 scores >2.1, consistent with a diagnosis of Eustachian tube dysfunction. Overall SNOT-22 scores were strongly correlated with ETDQ-7 scores ($r=0.679$, $p<0.001$). The SNOT-22 ear subdomain was very strongly correlated with the ETDQ-7 score ($r=0.847$, $p<0.001$), while there was a moderate correlation with the rhinologic subdomain ($r=0.486$, $p<0.001$). Patients with allergic fungal sinusitis had decreased ETDQ-7 scores compared to patients with other rhinologic diagnoses (p=0.010).

Conclusions
Symptoms of ETD are common in patients treated in a rhinology clinic, with 43.3% of patients reporting symptom scores consistent with a formal diagnosis of ETD. Increased SNOT-22 scores are correlated with increased ETDQ-7 scores, even when only the rhinologic subdomain is considered. Patients presenting for treatment of rhinologic symptoms likely have an increased prevalence of otologic symptoms and ETD.

4:56 PM

Is empty nose syndrome a geographical problem?

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Australia

COI: No Disclosure Reported

Background
Empty Nose Syndrome (ENS) is a post-surgical phenomenon from excessive loss of nasal tissues, particularly the inferior turbinate. Given the inferior turbinate is instrumental in maintaining nasal homeostasis in different environments, it is believed that ENS symptoms

only arise in certain geographical areas of the world. We sought to determine the geographical distribution of ENS patients and the impact of local factors on symptom severity.

Methods
A cross-sectional study was performed of individuals recruited from online ENS forums. ENS status was validated based on positive empty nose syndrome questionnaire score (ENS6Q) and sinus CT imaging or supporting medical documentation. Participants completed a survey encompassing demographic, geographic and clinical questions. Temperature, humidity, and pollution data were collected from global climate databases. Pearson correlation analysis was performed using an a=0.05 to determine significance.

Results
Fifty-three ENS individuals were included (N=53). Participants were distributed across fifteen countries over six continents. While temperature (SD 6.4), humidity (SD 2.5) and pollution (SD 3.9) varied between cities, there was no significant association found between ENS6Q symptom severity and these factors. However, many participants reported an exacerbation of ENS symptoms in response to dry air (94%), cold air/air conditioning (64%), change in season/weather (60%), and transitioning between indoors/outdoors (40%).

Conclusions
ENS is not a geographic condition, but a condition that does not tolerate acute shift in climate or humidity. These findings debunk the myth that ENS is only experienced in dry geographical areas and highlights the importance of recognizing this condition independent of geographical location.

5:03 PM
Examine the abnormal nasal aerodynamics in empty nose syndrome
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Edmund Pribitkin, MD
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COI: No Disclosure Reported

Introduction
Abnormal nasal aerodynamics has been frequently implicated in the symptomology of empty nose syndrome (ENS), yet we know little about it.

Methods
Computational fluid dynamics (CFD) was applied to 20 ENS patients to simulate their nasal aerodynamics based on their individual CT scans, and compared with 22 healthy controls. Patients' symptoms were confirmed through SNOT-22 and ENS6Q, a recently validated ENS specific QOL metrics.

Results
ENS patients had significantly lower (~30%) nasal resistance and larger (~3 times) nasal cross-sectional areas compared to controls ($p<0.05$). Though the increase in cross-sectional areas were quite uniform throughout all regions, CFD analysis showed that more airflow was drawn towards the middle meatus (68.3±17.1%) when compared to controls (47.9%±12.1, $p<0.05$). As a consequence, significantly less airflow (22.1±17.0%) and lower wall-shear-stress (3.7±3.5×10-2 Pa) were found in the inferior meatus of ENS patients than that of controls (35.8%±11.8; 7.3±2.3×10-2 Pa, both $p<0.05$).
Significant inverse correlations were found between the total ENS6Q score and CFD indices: anterior wall-shear-stress ($r=-0.35$, $p<0.05$) and anterior nasal cooling ($r=-0.49$, $p<0.01$). Breaking down the ENS6Q into elements, the nasal cooling inversely correlates with symptoms of "nose feels too open" ($r=-0.61$, $p<0.0001$) and "dryness" ($r=-0.49$, $p<0.01$). Wall-shear-stress also inversely correlates to "nose feels too open" ($r=-0.46$, $p<0.01$). These correlations all indicate decreased air-mucosal interactions (cooling and shear stress) resulting in worse symptom scores.

Conclusion
This is the largest cohort study on nasal aerodynamics among ENS patients. The results indicated that abnormal nasal aerodynamics and abnormal regional air-mucosal interactions potentially contribute to ENS symptomology.

5:10 PM
The functional and psychological burden of empty nose syndrome
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Australia

COI: No Disclosure Reported

Background
Empty nose syndrome (ENS) is a debilitating disorder thought to arise as a post-surgical phenomenon from excessive loss of nasal tissues. A profound impact on all aspects of life is often reported, but the extent of this burden has not been quantified. We sought to determine the impact of ENS on mental health and functional status.

Methods
A cross-sectional study was performed of ENS individuals recruited from online ENS forums. ENS status was validated based on positive empty nose syndrome questionnaire score (ENS6Q) and sinus CT imaging or supporting medical documentation. Subjects completed the ENS6Q, patient health questionnaire (PHQ-9) for

depression, generalized anxiety disorder questionnaire (GAD-7), work productivity and impairment (WPAI) questionnaire, and the EuroQol general health state survey (EQ-5D-5L). Pearson correlation analysis was performed using an a=0.05 to determine significance.

Results
Fifty-three ENS individuals were included (N=53). Overall, participants reported symptoms consistent with moderate anxiety (μ=12.7, SD 5.9) and moderately severe depression warranting treatment (μ=17.9, SD 6.8). Participants also noted a 62% reduction in productivity at work (n=24) and 65% in all other activities (n=53). ENS6Q symptom severity was correlated with more severe: depression ($p<0.001$), anxiety ($p<0.001$), overall pain/discomfort ($p=0.002$), and impairment in activities of daily living ($p=0.003$).

Conclusions
Individuals with ENS carry a clinically significant psychological burden and experience difficulties with many activities of daily living. A multimodal approach in addressing the tissue loss with surgery and cognitive behavioural therapy for the psychological burden may provide the most optimal outcome for these patients.

5:17 PM
Discussion

5:25 PM
Closing Remarks & Adjourn

POSTERS

Poster #101

A case of an infratemporal mass secondary to calcium pyrophosphate dehydrate of the temporomandibular joint: a diagnostic challenge.

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COI: No Disclosure Reported

Introduction

Calcium pyrophosphate dehydrate (CPPD) crystal deposition disease (also known as pseudogout) is a rare crystalline deposition disease that mainly affects the knee. This case illustrates a rare example of a symptomatic infratemporal mass caused by CPPD of the temporomandibular joint (TMJ).

Methods

We report the case of a 55 year-old female who presented with a chief complaint of right facial pressure. She had a history of TMJ misalignment and had experienced repeated dislocations of her TMJ in the past. Physical exam revealed mild bulging along the anterior wall of the right external auditory canal, adjacent to the TMJ, with no other relevant findings. Imaging revealed a well-circumscribed infratemporal mass, isotense on T1 and hypertense on T2. Management options were discussed with the patient and she elected to go to the operating room for biopsy and possible excision of the mass, if indicated.

Results

Patient was taken to the operating room for planned surgical excision via an endoscopic medial maxillectomy and sublabial approach. Frozen section of the mass revealed polarizable crystal deposits consistent with calcium pyrophosphate crystals. Complete surgical excision of the mass was deferred based on findings and the patient was referred to Rheumatology for outpatient management of CPPD of the TMJ.

Conclusions

Although a rare finding, CPPD of the TMJ should be considered as part of the differential diagnosis for any mass near the TMJ, especially in patients with a chronic history of TMJ issues.

Poster #102

A randomized controlled trial of manuka honey sinus irrigation for the treatment of cystic fibrosis chronic rhinosinusitis

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COI: No Disclosure Reported

Introduction

Bacterial persistence in cystic fibrosis chronic rhinosinusitis (CF CRS) has been partly attributed to prolific biofilm formation. Manuka honey (MH) is believed to attack biofilms. This study assessed the effectiveness of MH as an adjuvant treatment for patients with CF CRS.

Methods

This prospective single-blinded (clinician only) randomized controlled trial recruited post-endoscopic sinus surgery (ESS) patients with CF CRS and active disease identified as purulence on endoscopy. Patients were randomized to receive either MH or saline (SAL) sinus irrigations twice daily for 30 days. The primary outcome was Sino-Nasal Outcome Test-22 (SNOT-22) change score. Secondary outcomes included post-treatment culture negativity and Lund-Kennedy endoscopic change score.

Results

Ten patients were included in the analysis (MH n=5, SAL n=5). The SNOT-22 change score was clinically significant on MH (-10 [-20,-1]) but not SAL (-7 [-15,2]), although this difference was not statistically significant (p=0.44). Post-treatment culture negativity was better on MH (1/5, 20%) compared to SAL (0/5, 0%), but this difference was not statistically significant (p=1.00). Lund-Kennedy endoscopic change score was statistically significantly better on MH (-4 [-6,-2]) compared to SAL (0.4 [-0.7,2]) (p<0.001). MH was well-tolerated. No serious adverse events were reported.

Conclusions

In post-ESS patients with CF CRS, MH sinus irrigations resulted in significantly better endoscopic outcomes and a clinically significant improvement, achieving the minimally important difference, in SNOT-22 outcomes. Microbiological control, assessed by post-treatment culture negativity, was difficult to achieve. MH has potential as a topical treatment for CF CRS, but further study with larger sample size is warranted.

POSTERS

Poster #103

Accuracy of self-reported diagnosis of chronic rhinosinusitis

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Background
The prevalence of chronic rhinosinusitis (CRS) is difficult to accurately estimate using large cohort studies. At present, many investigations rely on International Classification of Diseases (ICD) codes in patient charts, which can have a low sensitivity and specificity. Others rely on self-report, but commonly do not distinguish acute and chronic sinusitis as separate entities. Both methods may result in misclassification of patient disease status. As a result we aimed to assess the sensitivity and specificity of self-reported disease status.

Methods
A prospective cohort study was performed, including patients presenting for evaluation for all causes to a tertiary care practice. All patients are asked to complete a screening questionnaire at initial presentation which includes information about past sinonasal diagnoses and questions aimed at improving diagnostic accuracy. The treating physician determined whether or not the patient met clinical practice guideline criteria for CRS based on symptoms and objective findings on exam and imaging.

Results
To date 144 patients have been included in the cohort. Self-reported CRS status had sensitivity of 84.6% (95% confidence interval, CI = 74.7-91.7%). Self-reported CRS status had specificity of 80.5% (95% confidence interval, CI = 70.26-88.4%). Based on an estimated prevalence of 12% in the general population, a positive predictive value of 37% and negative predictive value of 99% should be expected.

Conclusions
Self-reported CRS status had a high sensitivity and specificity in this cohort. Self-report may represent an effective and relatively inexpensive screening mechanism for CRS in large cohort studies.

Poster #104

Adverse outcomes in anterior craniofacial resection: a multi-institution cohort analysis

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Introduction
Anterior craniofacial resection (ACFR) is utilized to manage advanced tumors of the nose, sinus, midface and anterior cranial fossa. These procedures have high postoperative morbidity, but data is lacking regarding which factors place patients at highest risk. This study describes safety outcomes of ACFR to identify risk factors for 30-day postoperative adverse events using the National Surgical Quality Improvement Program (NSQIP) database.

Methods
We performed a retrospective cohort study involving patients in the 2006-2015 NSQIP database who underwent ACFR. Procedures included all approaches to the anterior cranial fossa, both with and without orbital exenteration. Analysis was performed to assess predictors of 30-day complications, readmissions, and reoperations.

Results
Among 648 ACFR cases identified, there were 178 complications (27.5%), 64 readmissions (9.9%), and 61 unplanned reoperations (9.4%). The most common complication was bleeding requiring transfusion (N=110, 16.9%). On multivariate analysis, overall complications were associated with diagnosis of diabetes mellitus (DM) (OR 1.79, CI 1.07-3.02, p=0.03), age 70 or greater (OR 1.99, CI 1.22-3.27, p<0.01), urgent or emergent surgery (OR 2.20, CI 1.33-3.63, p<0.01) and need for orbital exenteration (OR 2.28, CI 1.39-3.76, p<0.01). There was a trend toward increased risk of reoperation with DM (OR 2.04, CI 0.99-4.18, p=0.05). There were no factors associated with risk for readmission.

Conclusions
This multi-institutional study confirms that ACFR is a highly morbid procedure. Patients with DM, those >70 years old, and those undergoing orbital exenteration are at higher risk of experiencing postoperative complications. Further studies are required to improve patient safety after ACFR.

Poster #105

Adverse outcomes in transnasal repair of choanal atresia: a multi-institution cohort analysis

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Introduction

Choanal atresia (CA), the failure of the nasal cavity to communicate with the nasopharynx during development, has an incidence of 1 in 7000-8000 live births. CA is a rare entity, precluding large-scale studies assessing safety and postoperative outcomes. We describe demographics, safety and incidence of 30-day postoperative adverse events in children undergoing transnasal endoscopic repair of CA using data from a large multi-institutional database.

Methods

We queried the National Surgical Quality Improvement Program-Pediatric 2012-2015 public use database cases of transnasal CA repair (CPT 30540). Predictors included patient demographics and comorbidities. Outcomes included 30-day complications, reoperation and prolonged hospital admission (still admitted at postoperative day 30).

Results

178 cases were identified. The mean age was 3.2 years (2 days-17.5 years). There were 104 females (58.4%). Patients had high rates of prematurity as defined by gestational age <36 weeks (N=59, 33.2%), lung disease (N=57, 32.0%), and ventilator dependence (n=28, 15.7%). There were 11 postoperative complications (6.2%) and 20 children with prolonged admissions (11.2%). On multivariate analysis, age <1month (OR 11.4, 95%CI 2.9-45.4, p<0.01), prematurity (OR 5.7, 95%CI 1.5-21.5, p=0.01), and ASA class 4 (OR 5.3, 95%CI 1.1-21.5, p=0.04) were all independently associated with higher risk of prolonged hospital stay. There were no factors associated with increased risk of complication.

Conclusions

Children undergoing transnasal repair of CA are who are <1 month old, premature, or have high ASA class more likely to have prolonged hospital admission. Further studies are required to establish improved safety in this high-risk patient population.

Poster #106

Analysis of patients submitted to surgical treatment for control of spontaneous epistaxis

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COI: No Disclosure Reported

Introduuction

The present study contemplates the experience of our service in the surgical treatment of epistaxis in the period between 2007 and 2014. The surgery of choice for the control of epistaxis and ligation of the sphenopalatine artery by videoendoscopy. In most cases of treatment failure, the anterior ethmoid artery (AEA) is ligated. This study aims to determine clinical parameters that help to determine the need for AEA ligation in the first surgery.

Material and Methods

This is a retrospective study, through the analysis of 61 medical records of patients undergoing surgical treatment to control spontaneous epistaxis in our hospital.

Results

The majority of the sample was men, with a mean age of 58 years. Surgeries were performed under local anesthesia with sedation in 93% of the cases and the mean length of hospital stay was 6 hours and 44 minutes. Patients in whom the anterior ethmoid artery was cauterized presented, on average, 6 days between the first bleeding episode and the surgery, while the patients in whom the sphenopalatine artery was attached presented 3.6 days (p <0,0001). The need of blood transfusion was 8,2% and the success rate of surgery was 93.4%.

Conclusion

The surgical treatment of epistaxis presents a high success rate, a low rate of complications and can be performed under local anesthesia with sedation. In patients with intermittent epistaxis, beginning several days earlier and refractory to initial control measures, cauterization of the anterior ethmoidal artery is indicated in the first surgical time

POSTERS

Poster #107

Assessing approaches to nasal polyp scoring in clinical trials: Current scoring methods produce limited correlation between polyp grad and polyp volume in validating cast models

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COI: Study funded by OptiNose US Inc.

Background
Various endoscopic grading approaches are used to assess nasal polyps (NP) in clinical research. Most simple grading uses 3-4 unequal steps based on the vertical extension of polyps relative to turbinate margins, suffers from nonlinearity, ignores the 3-dimensional shape/extent and location of polyp mass, and is risky to interpret across trials.

Methods
Multiple simulated polyps exploring different levels of extension and shapes in typical locations were created using moldable material (Sugru, MI, USA) inserted in semitransparent casts with validated nasal geometry/dimensions (≈12 ml unilateral volume). Polyp Grade was assigned using a standard approach, volumes measured (water displacement), and distance from the lower nostril margin to nearest polyp surface measured.

Results
Ranges of unilateral polyp volume, fractional occupancy of the nasal cavity and distance from the nostril margin to polyp were: Grade 1: 0.3-1.9ml, 2.5-15.8%, 35-45mm; Grade 2: 0.8-7.8ml, 6.7-65%, 16-42mm; Grade 3: 1.2-8.6ml, 10-71.7%, 13-17 mm. Completely obstructing grade 4 polyps were only marginally larger than large grade 3 polyps.

Conclusions
Simulations of NP with different sizes in validated casts illustrate that common grading scales (0-3/4) are non-linear, sometimes non-ordinal, measures of polyp burden. Common grading does not capture clinically relevant differences in location and the wide range within, and substantial overlap in volumes between, grades. Small volume changes may improve scores, particularly at high grades (eg, 4-to-3), while larger changes may not. Reporting of baseline grade and change from baseline over time by baseline grade (unilateral/bilateral) are simple steps that may improve interpretability of change scores and reduce inaccuracy in cross-trial comparisons.

Poster #108

Assessment of postoperative healing following endoscopic, transnasal, transsphenoidal pituitary surgery without formal sellar grafting

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Introduction
Multiple options for sellar reconstruction after endoscopic transnasal, transsphenoidal surgery (TSS) exist including free mucosa, fat, bone and synthetic materials. The objective of this study is to assess healing and mucosalization of the sellar face following TSS without formal sellar grafting or reconstruction.

Methods
A retrospective chart review was conducted for patients undergoing TSS without intraoperative CSF leaks between January 2014 and March 2017 . No formal sellar reconstruction was performed for the entire patient group. Follow-up endoscopic data and clinical notes were coded for time to mucosalization of the sella as well as degree of abnormal mucosal healing, epistaxis, crusting and scarring.

Results
83 patients were included. Mean time to mucosalization was 116 days (range, 17 to 402 days). Incidence of abnormal mucosal healing, epistaxis, crusting and scarring rose from the first postoperative clinic visit to the second but trended down by the third visit. All patients who returned for at least four follow-up visits achieved full mucosalization of the sella. Nasal crusting was the most common finding, followed by abnormal mucosal healing. Two patients (2.4%) had postoperative CSF leaks requiring lumbar drain placement.

Conclusion
Sellar mucosalization is achievable in all cases without formal grafting or reconstruction after TSS. Great care must be exercised given small inherent risk of unmasking a subclinical intraoperative CSF leak. Patients should be followed closely endoscopically during the first four months after TSS to minimize the impact of crusting.

Poster #109

Association between the 17q21 Snp (rs7216389) risk allele and chronic rhinosinusitis

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Introduction

Chronic rhinosinusitis (CRS) and asthma frequently co-occur and this phenomenon of unified airway disease suggests a systemic link between the lower and upper airway. The T allele of SNP (rs7216389) on the 17q21 gene locus has been found in genome-wide association studies to be highly associated with early-onset asthma. We hypothesized that the rs7216389 risk allele would also be a genetic risk factor for CRS and a potential genetic risk factor in unified airway disease, independent of asthma.

Methods

DNA was extracted from buccal swabs or saliva samples and genotyped for rs7216389 in non-Hispanic white adults at the University of Arizona (n=72 controls, n=144 with CRS) and University of Pennsylvania (n=285 controls, n=250 with CRS). Demographic and symptomatic information was collected by questionnaire. Association was measured by chi-square test or logistic regression models.

Results

Using an additive model, each additional T risk allele for rs7216389 significantly increased the odds for CRS by 1.70 in the UofA population (95% CI, 1.1-2.6; P=.014) and by 1.30 in the UPenn population (95% CI, 1.0-1.7; P=.063), adjusting for sex and age. Meta-analysis of these estimates demonstrated significantly increased odds of CRS by 1.40 (95% CI, 1.1-1.8; P=.004). There was no relation between the rs7216389 allele and the presence of nasal polyposis.

Conclusions

We report an association between the 17q21 SNP (rs7216389) risk allele and CRS, independent of asthma. Our results highlight this SNP as a potential key component to the future development of the unified airway theory.

Poster #110

Asthma related ed visits are associated with distinct nasal microbiome composition in chronic rhinosinusitis patients

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Introduction

Chronic rhinosinusitis (CRS) adversely impacts asthma severity and may potentially contribute to emergency department (ED) visits or even hospitalizations. CRS patients have also been shown to have distinct nasal microbiomes compared to healthy individuals. This study investigated whether nasal microbiome composition is associated with asthma and asthma exacerbations requiring ED visits.

Methods

Endoscopic guided nasal swab samples were collected from the middle meatus in a prospective cohort of CRS patients. These patients with concurrent asthma were followed 1-year post sampling and also screened for asthma related events 2-years prior to sampling. Microbiome composition of samples were analyzed at phyla and genera taxonomic levels using 16S-ribosomal-RNA sequencing.

Results

Among 111 CRS cases, 46 (41.4%) had concurrent asthma. Asthmatic CRS had significantly higher relative abundance of Streptococcus genus compared to non-asthmatic CRS with mean of 1037.2 vs. 318.7, respectively ($p<0.05$). Asthmatics also had a trend towards decreased Anaerococcus and increased Burkholderia genera abundance. Overall, 17% of asthmatics had at least one ED visit from asthma exacerbation. Relative abundance of Proteobacteria and Burkholderia genera was significantly higher in asthmatic cases with ED visit vs. controlled asthmatics (mean±SD of 4287.1±3047.4 vs. 1835.1±2170.8 and 685.8±894.4 vs. 319.3±324.2, respectively).

Conclusions

Present study found that CRS patients with history of asthma had significantly increased nasal Streptococcus. Further, Burkholderia genus, which is known for its significant effect on lower airway inflammation, was linked to asthma and associated ED visits. Additional studies are necessary to determine mechanisms of how these bacterial populations contribute to the pathogenesis of asthma.

POSTERS

Poster #111

Atypical form of cervicofacial actinomycosis involving the skull base and temporal bone: Case report

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COI: No Disclosure Reported

Introduction
Actinomycosis is an uncommon indolent infection that most often involves the cervicofacial soft tissues with rare spread to the facial skeleton. Associated risk factors are mucosal disruption, immunodeficiency, and dental disease. We present a unique case of prolonged cervicofacial actinomycosis with development of skull base and temporal bone osteomyelitis in an otherwise healthy individual.

Study Design
Case report, literature review.

Methods
Case of prolonged cervicofacial actinomycosis with development of skull base and temporal bone osteomyelitis was reviewed.

Results
69-year-old male presented to clinic for evaluation of persistent actinomycosis of the right maxilla and adjacent soft tissues following 6 weeks of IV ceftriaxone and frequent oral antibiotics over the previous year. Due to clinical progression despite medical treatment, he underwent maxillectomy, pterygopalatine fossa debridement, and radical mastoidectomy. Post-operatively he received 16 weeks of IV ertapenem and daptomycin, then was transitioned to indefinite oral clindamycin.
Actinomyces typically does not cause osteomyelitis; prior actinomycosis case series are mostly limited to soft tissue infection. Additionally, actinomyces species are almost universally susceptible to beta-lactam antibiotics. Duration of antibiotic treatment can range from 3 – 12 months; earlier operative intervention may shorten that period. Prolonged infection is thought to be secondary to the indolent growth of the bacteria rather than true drug resistance.

Conclusions
Though typically not an aggressive infection, this case illustrates the need for prompt recognition of persistent disease and early surgical intervention in cases of cervicofacial actinomycosis. We show that chronic actinomycosis can potentially cause significant morbidity requiring more aggressive surgery.

Poster #112

Bilateral nasolacrimal duct atresia with endoscopic dacrocystorhinostomy: A case report

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Introduction
Up to 20% of newborns are affected by nasolacrimal duct obstruction (NLDO). Of the 5% that do not resolve by age 12 months, additional anatomic variants must be considered. Approximately 20 cases have been reported of nasolacrimal duct atresia, about half of which are bilateral. Several are associated with other craniofacial anomalies/syndromes.

Methods
Case report and review of literature.

Results
An 11-month old girl with history of bilateral dacrocystitis refractory to two prior probing attempts was referred for further evaluation. Probing with nasal endoscopy was performed jointly by Ophthalmology and Otolaryngology. Bony obstruction at the distal nasolacrimal duct was encountered bilaterally. A computed tomography of the sinuses showed bilateral lacrimal ducts ending blindly into the maxillary bone above the alveolar ridges without drainage into the inferior meatus. Bilateral endoscopic dacrocystorhinostomy (DCR) with navigational system guidance and Crawford tube placement was then performed. Crawford tubes were removed after 7 months and the patient's symptoms have resolved on the right with occasional swelling of the left lacrimal sac which easily resolved with compression.

Conclusion
Our case confirms that imaging is necessary after failed probing attempts in children with NDLO. Endoscopic DCR with use of intra-operative navigational system is a very effective treatment with good results at 7 month follow up. The clinical workup, surgical treatment with intra-operative navigation and post-operative care may help direct future patient care.

Poster #113

Biphenotypic sinonasal sarcoma: a rare cause of nasal obstruction in a child evaluated for sleep apnea.

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COI: No Disclosure Reported

Introduction
To describe the first known case of biphenotypic sinonasal sarcoma in a pediatric patient and review the existing literature.

Methods
Case report; Data sources: Cochrane, PubMed and OVID databases

Results
A previously healthy, 6-year-old Latina female presented to the Otolaryngology clinic for evaluation of progressively worsening nasal obstruction and mouth breathing. Office assessment of tonsillar hypertrophy was made and the patient was scheduled for tonsillectomy and adenoidectomy. No nasopharyngeal exam was obtained preoperatively. At the onset of surgery, a mass was noted to be filling the nasopharynx. The case was aborted and imaging obtained revealing a 7cm right nasal cavity mass eroding the right middle and inferior turbinates, bowing of the maxillary wall and associated sinus opacification. She underwent endoscopic sinus surgery with complete resection of the mass. Surgical pathology revealed sheets and fascicles of spindle- shaped tumor cells consistent with low-grade biphenotypic sinonasal sarcoma. Whole body PET/CT two months postoperatively revealed no distant metastasis. In-office endoscopy at 1 week, 1 and 10 months revealed no further mass lesions. No adjuvant postoperative therapy was deemed necessary.

Conclusion
Biphenotypic sinonasal sarcoma is a newly described and rare tumor of the nasal cavity and paranasal sinuses. There is a paucity of published literature demonstrating low metastatic potential and possible loco-regional recurrence. To our knowledge, this is the first case report of this rare tumor in a pediatric patient. It is important to consider evaluation of the nasopharynx preoperatively in a child with predominant nasal obstruction and sleep apnea symptoms.

Poster #114

Clinical trials in rhinosinusitis: identifying areas for improvement

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Objectives/Hypothesis
To characterize trends in rhinosinusitis clinical trials in order to provide recommendations for therapeutic directions, highlight possible redundancy, and provide a framework for prioritization of future clinical trials.

Methods
Data were collected from Clinicaltrials.gov and included all clinical trials that focused on rhinosinusitis with the exclusion of trials withdrawn prior to enrollment. Variables recorded included study design, study population, pharmaceutical involvement, publication, and whether a trial was a medical or surgical intervention. Associated publications were identified using the PubMed database.

Results
There were 269 rhinosinusitis clinical trials, dating from 2003 – 2017 meeting inclusion. Of the studies included in this analysis, 31.6% had at least one scientific publication. Twenty-three clinical trials (8.5%) studied drugs already approved for rhinosinusitis, 113 (42.0%) trials studied drugs that were approved for other uses, 42 (15.6%) trials studied experimental drugs, and 102 (39.4%) studied surgical intervention. Of the trials studying drugs, the data showed many clinical trials that studied the same drug. The data demonstrate a steady decline in clinical trials with medical intervention and a rise in clinical trials with surgical intervention.

Conclusions
This analysis is the first to characterize rhinosinusitis clinical trials. This research highlights the overrepresentation of certain drugs and demonstrates the increased focus on clinical trials with surgical intervention. We provide a framework to discuss prioritization of future studies in order to guide clinical and research practice.

POSTERS

Poster #115

Combination of antidepressant and inhalational anesthesia: a cautionary tale of increased intraoperative bleeding during endoscopic endonasal surgery

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COI: No Disclosure Reported

Introduction

Antidepressant use has been associated with an increased risk of bleeding due to impairment of platelet aggregation. Studies evaluating bleeding risk with the use of antidepressants have been inconclusive and vary based on the surgical procedure being performed. Decreasing blood in the surgical field is critical when performing endoscopic surgery due to the proximity of critical structures. To date, there has been no reports of increased intraoperative bleeding with the use of antidepressants when performing endoscopic endonasal surgery(EES). We aim to describe cases of increased intraoperative bleeding in patients taking antidepressants while undergoing EES with general inhalation anesthesia.

Methods

Case series

Results

Three healthy patients (avg age:35) with no bleeding history or anticoagulation use underwent EES under general inhalation anesthesia. Diffuse increased intraoperative bleeding was observed in all cases (mean: 550 cc) that could not be controlled with topical 1:1,000 epinephrine or permissive hypotension (SBP<110mmHg). Upon discontinuation of inhalation anesthetics, bleeding ceased almost immediately. No additional packing materials were used. Postoperatively, all patients did not experience increased bleeding. All patients were noted to be taking bupropion at the time of surgery. There was no record for use of other medication/supplements known to cause increased bleeding.

Conclusion

This is the first documented report of the combined use of antidepressant (bupropion) and inhalational anesthesia causing significant intraoperative blood loss. In patients taking antidepressants, endoscopic surgeons should proceed with caution and consider consulting a psychiatrist for temporary discontinuation of antidepressants prior to proceeding with surgery under general inhalational anesthesia.

Poster #116

Combined multiportal transorbital and transnasal endoscopic resection of a pediatric fibro-osseous tumor: report and review of the literature

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COI: No Disclosure Reported

Introduction

Pediatric skull base tumors have previously been difficult to treat due to the surgical constraints of the developing skull. Additionally, further caution is warranted in the management of slowly progressing fibro-osseous lesions including osteomas, fibrous dysplasia, and osteochondromas; with surgery generally indicated for the prevention of neurologic or substantial craniofacial deformity. Anterior cranial fossa lesions are especially concerning with progression possibly leading to optic nerve injury and vison loss. In selct cases, a management of these tumors requires a combined, multiportal approach.

Methods

We report a case of a large bilateral fibro-osseous frontoethmoidal sinus tumor in a 12-year-old male causing left-sided proptosis, periorbital cellulitis, optic nerve compression, and afferent pupillary defect. A review of the literature is also performed.

Results

Surgical management was necessary to decompress the patient's grave neuro-ophthalmologic status. A combined multiportal endoscopic transnasal and transorbital approach to the skull base and optic nerve was undertaken. The tumor was largely debulked from the fovea ethmoidalis and medial rectus muscle. Skull base and orbital boundaries were reconstructed at the time of surgery. There were no intraoperative or post operative complications.

Conclusion

The combined transnasal and transorbital approach is an uncommonly used technique. This report highlights an expanding armamentarium detailing multiportal approaches to the skull base.

Poster #117

Comparison of ambulatory surgical centers to hospital based facilities in outcomes of endoscopic sinus surgery

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Introduction
Endoscopic sinus surgery (ESS) is used for treating patients with chronic rhinosinusitis (CRS). Major complications occur in 1-3% of procedures. While studies show that surgeries performed at ambulatory surgical centres (ASC) are not inferior to those performed at hospital-based facilities (HBF) in mortality and unexpected hospitalization, no study demonstrates data on the safety of ESS performed at an ASC, when compared to a HBF. This study compares the complication and revision rates of ESS performed in HBF and ASC.

Methods
A retrospective review of patients who had ESS for CRS with one rhinologist (between January 2013-May 2015) in both HBF and ASC settings was conducted. Only patients classified as American Society of Anaesthesiologists I and II were included. Major complications occurring during the surgery, rates of revisions, and duration of the procedure were recorded. T-tests and logistic regression were used to compare the outcomes of both groups.

Results
Charts of 458 patients (Mean age:49.4 years) were reviewed. Of these, 218 had their surgeries in a HBF and 240 in an ASC. The complication rate was 1.1%(1.4% in HBF, 0.8% in ASC). The surgical revision rate was 4.8%(4.6% in HBF, 5.0% in ASC). The mean duration of the procedure was 118.7 and 125.7 minutes in HBF and ASC respectively. There was no statistically significant difference in any of the three outcomes of interest (p-values=0.58, 0.99, 0.06 respectively).

Conclusion
There is no significant difference in complication rates, revision rates, or procedure duration between ESS conducted in HBF compared to ASC.

Poster #118

Comparison of open and endoscopic surgery outcomes of sinonasal squamous cell carcinoma

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COI: No Disclosure Reported

Objective
To compare and contrast open and endoscopic surgery for sinonasal squamous cell carcinoma (SNSCC).

Study Design
Retrospective cohort study.

Methods
The National Cancer Database was queried for SNSCC cases without cervical or distant metastases that were treated surgically between 2010 and 2014. They were split into two groups based on surgical approach: open and endoscopic. Demographics, facility and insurance type, stage, tumor characteristics, postoperative treatment, 30 day readmission rate, and overall survival (OS) were compared between the two groups. Cox proportional hazard analysis was performed. Propensity score matching was performed to mimic a randomized controlled trial.

Results
1,483 patients were identified; 353 (23.8%) received endoscopic, and 1,130 (76.2%) received open surgery. Age, gender, race, geographic region, tumor size, surgical margins, postoperative chemoradiation, and 30 day readmissions did not vary significantly between the two groups. Open surgery was more common in academic centers (62.8% vs. 54.2%, p=0.004); for tumors of the nasal cavity (78.7%), maxillary (81.6%) and frontal (81.0%) sinus (p<0.0001); and was associated with increased duration of hospitalization (mean: 4.67 days vs. 2.50 days, p<0.0001). OS was not significantly different between the two approaches (p=0.953; Open: 5-year OS=56.5%, 95% CI=51.3%-61.6%; Endoscopic: 5-year OS=46.0%, 95% CI=33.2%-58.8%). In a propensity score matched cohort of 652 patients, there was also no significant difference in OS (p=0.850).

Conclusion
Endoscopic surgery seems to be an effective alternative to open surgery even after accounting for confounding factors which may favor its use over open surgery. It may also be associated with a shorter hospital stay.

POSTERS

Poster #119

Complementary and alternative medicine approaches for the treatment of chronic rhinosinusitis: a systematic review of randomized and non-randomized trials

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COI: No Disclosure Reported

Introduction
Chronic rhinosinusitis (CRS) affects approximately one-tenth of the world-wide population and significantly impacts quality of life and healthcare costs. Conventional CRS treatments have variable published efficacy and known side effects. As such, complementary and alternative medicine (CAM) for CRS management has garnered increased interest. The purpose of this article is to provide a comprehensive, systematic review of CAM approaches for the treatment of CRS.

Methods
A systematic review utilizing MEDLINE, Embase, and Cochrane Library databases was performed. Articles published prior to May 2017, with at least 10 patients, which investigated CAM therapy as the sole or adjunctive treatment for CRS in humans were eligible for inclusion.

Results
This Review identified 1096 unique articles. After evaluation, including relevant cited references, 73 studies met our inclusion criteria, of which 31 were randomized controlled trials (RCTs). Although specific CAM approaches varied widely, 6 distinct categories were identified: topical nasal/inhalational therapies, herbal supplements, traditional Chinese medicine, Ayurveda, homeopathy, and integrative medicine.

Conclusion
CAM approaches for the treatment of CRS are frequently utilized with many RCTs and most non-randomized uncontrolled trials demonstrating positive clinical effects for both subjective and objective CRS related measures. This suggests that certain populations of CRS patients may benefit from CAM therapy. However, positive results must be interpreted with caution due to variable CRS diagnostic criteria, inconsistent inclusion/exclusion criteria and heterogenous outcome measures used in the published literature. Given their relatively low side effect profile and increasing usage among CRS patients, CAM treatment strategies deserve further study.

Poster #120

Correlation between patient specific factors and post-operative sinonasal debridements

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Introduction
Endoscopic sinus surgery (ESS) has become the treatment of choice for a variety of chronic inflammatory as well as neoplastic disease processes. The purpose of this study was to identify modifiable and non-modifiable patient risk factors that correlate with the number of in-office sinonasal debridements needed by the patient post-operatively.

Methods
Data on ESS performed from 2006 to 2016 were collected from a rhinology practice database at an academic center. The number of post-operative sinonasal debridements were identified for each patient and correlated with eight patient factors.

Results
There were 100 patients included in the analysis, 50 of whom had a surgical indication of chronic inflammatory disease and 50 of whom had a surgical indication of sellar mass. Surgical indication, tobacco history, and number of post-operative bacterial upper respiratory tract infections treated with antibiotics did not correlate with the number of post-operative sinonasal debridements needed ($p > 0.05$). Age, alcohol use, number of medications used by the patient, number of sinuses opened during surgery, and number of patient co-morbidities each positively correlated with the number of post-operative sinonasal debridements needed ($p< 0.05$).

Conclusions
Specific modifiable and non-modifiable risk factors positively correlate with the number of post-operative sinonasal debridements. This study helps establish a tool for otolaryngologists to counsel patients on risk factors that may increase the number of post-operative sinonasal debridements. These findings serve as an impetus for the development of a prospective study to validate our findings.

Poster #121

Dacryocystorhinostomy – what to do when everything else fails?

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Background
Conjunctivodacryocystorhinostomy (CDCR) is a procedure in which a Pyrex glass tube (Jones tube) is placed through an opening created at the inferior half of the caruncle. CDCR is usually performed when the canaliculi are severely obstructed and cannot be reconstructed, as the last resort. Although It is considered a well-known treatment method, there is a lack of consensus in the literature regarding its success rates.

Objective
To evaluate the efficacy of CDCR for the treatment of epiphora due to canalicular failure.

Methods
Patients who underwent endoscopic DCR and CDCR since September 2014 and completed a minimum of 3-month follow-up were included. All patients were interviewed through the phone. Those who were still complaining of epiphora were invited to the clinic for endoscopic examination to further investigate the cause of the tearing.

Results
During the study period 102 DCRs and 15 CDCRs were performed. Of these, 91 DCRs, 77 primaries and 25 revisions, and 13 CDCRs met the inclusion criteria with a mean follow-up of 15.9 ± 9.8 months. The success rate among the primary DCRs was 92.2% (71/77) and in the revision DCRs 84% (21/25). In the CDCR the success rate was 84.6% (11/13), ($p<0.05$). Three patients in the DCR group had nasal blockage due to adhesions and 2 patients in the CDCR group had tube extrusion. All were successfully repaired later. No other complications were found.

Conclusions
CDCR is an effective and safe procedure that should be considered in cases with proximal obstruction of the lacrimal system.

Poster #122

Delayed diagnosis of cystic fibrosis in a patient with chronic rhinosinusitis

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Introduction
Cystic fibrosis (CF) and primary ciliary dyskinesia (PCD) are systemic genetic disorders usually diagnosed in childhood. Both diseases disrupt mucociliary clearance and cause upper and lower airway disease. Data show that rarely PCD can co-exist with CF via uniparental isodisomy, DNAH11 (Chr7p) and CFTR (Chr7q). We report a patient with recidivistic sinus disease and preserved lung function, found to have multiple genetic mutations described independently in both CF and PCD but not in association.

Method
Case report and literature review

Results
A 56-year-old Caucasian male presented to Otolaryngology with lifelong chronic sinusitis requiring multiple sinus surgeries and recurrent bronchitis. Subsequent interviewing revealed idiopathic pancreatitis, osteopenia and infertility. Pulmonary function was within normal limits. Endoscopy revealed recurrent nasal polyposis and thickened mucus drainage. Despite aggressive medical treatment, continued sinus symptoms led to further workup. Genetic testing revealed positive: copy number gains in RPGR and OFD1 on X chromosome, heterozygous mutations of RSPH1, DNAH1, and TTC21B PCD genes and F508del and R117H intron 8 poly T alleles 5T/9T CF mutations. The sweat chloride test was significantly elevated. R117H is a class IV mutation which is characterized by a partially functional chloride channel and a less severe phenotype, explaining the late in life diagnosis. Audiology exam revealed bilateral high frequency sensorineural hearing loss, outer hair cell dysfunction possibly related to ciliary disease.

Conclusion
We present a case of severe recurrent chronic sinusitis that led to identification of rare genetic mutations consistent with both CF and PCD in a pentagenarian.

POSTERS

Poster #123

Determining the utility of standard hospital microbiology testing: comparing standard microbiology cultures with dna sequence analysis in patients with chronic sinusitis

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Introduction

Correctly identifying underlying pathogens in chronic sinusitis is critical for effectively treating these infections. Microbiology cultures are the gold standard for diagnosing pathogens in sinusitis. Even when patient history and nasal endoscopy demonstrate evidence of infection, standard culture results are often indeterminate - making it difficult to appropriately target antibiotic therapy. Our retrospective study compares results of standard aerobic, anaerobic and fungal cultures to DNA sequencing analysis (DNAsa) in patients with chronic sinusitis.

Methods

Sinus cultures were collected from 50 patients with the following criteria: history of endoscopic sinus surgery, and either purulence in a sinus cavity, mucosal erythema, or strong clinical history. Two classes of specimens were obtained from each patient: standard (aerobic, anaerobic, fungal) and DNAsa. DNAsa involved two steps: (1) quantitative PCR to detect bacterial load and (2) DNA sequencing to identify bacterial and fungal species. Culture results were then compared for each patient.

Results

Cohen's weighted kappa analysis showed agreement between the two testing methods in identifying predominant infectious pathogens (0.14, 95% CI: 0.0100.28). DNAsa detected 31.9% more pathogens compared to standard cultures ($p<0.05$). When multiple pathogens were detected DNAsa results yielded more positive results compared to standard cultures ($p<0.05$).

Conclusions

DNAsa detected all bacteria identified by standard microbiology cultures as well as predominant pathogens not detected by standard cultures. Our data demonstrates molecular pathogen identification may be more reliable for accurately diagnosing pathogens. Larger studies should be conducted to confirm these findings and consider making DNAsa the new standard of care.

Poster #124

Developing endoscopic sinus surgery simulator to optimize surgical outcome to olfactory losses

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Introduction

The etiology of olfactory losses may involve anatomical obstructions that block the air and odor flow to the olfactory region. Removal may improve function. Currently, surgeons make planning based on subjective assessment of CT imaging and endoscopic findings. Surgical outcomes, however, are variable and can result in no change or worse function. One reason is that predicting airflow path after surgery based on CT or endoscopy can be difficult.

Methods

A virtual planning tool was developed to simulate, predict and optimize surgical approaches on olfactory air/odor flow. The current prototype can load patient CT data and allow virtual endoscopic removal of obstructive tissue using both visual and haptic feedback. Pre-calculated airflow resistance, wall shear stress, pressure drop, etc., are displayed on the virtual anatomical views, to identify potential sites of obstruction. After virtual surgery, changes of olfactory air/odor flow can be computed and displayed and the process reiterated until an optimal result is reached. A normative range was established based on 22 healthy controls.

Results

A trial using this approach was performed on one patient with nasal obstruction and unilateral olfactory loss, confirmed through odor detection thresholds. Surgical options included nasal valve expansion, septal reduction and reduction of a middle turbinate concha. Virtual surgeries identified nasal valve expansion would worsen flow to the olfactory region. Septal and concha bullosa reduction significantly improved olfactory flow, with the latter being most effective.

Conclusion

This trial demonstrates the usefulness of the system to optimize the pre-operative plan based on objective benchmarks.

Poster #125

Dimensions of the medial wall of the prelacrimal recess

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COI: No Disclosure Reported

Introduction

Addressing anterior maxillary sinus pathology endoscopically that is inaccessible with an endoscopic medial maxillectomy requires either an endoscopic Denker's approach (EDA) or a prelacrimal approach (PLA). The PLA involves removing the medial wall of the prelacrimal recess (PLR), which is the bone between the pyriform aperture (PA) and nasolacrimal duct (NLD), from nasal floor to orbital floor. The PLA preserves the inferior turbinate and NLD, whereas both are sacrificed during an EDA. The objective of this CT-based study was to determine the anteroposterior and superoinferior dimensions of the medial wall of the PLR, to better understand the bony anatomy encountered during a PLA or EDA.

Methods

One hundred triplanar sinus CT scans of patients with various rhinologic diseases, but intact bony PLR walls, were reviewed to assess dimensions of the medial wall of the PLR. The anteroposterior distances from the PA to the inferior-most, middle, and superior-most aspects of the NLD were measured. The height from the nasal floor to orbital floor was also measured. Combining left and right sides, there were 200 measurements.

Results

The anteroposterior distances between the PA and the NLD were as follows: inferior (mean=8.3 mm, SD=2.6, range=1.9-14.2), middle (mean=7.74 mm, SD= 2.71, range= 1.8-13.6), superior (mean=6.3 mm, SD=2.5, range=1.8-11.9). The mean height of the medial wall of the PLR was 26.5 mm (SD=2.9, range=18.5-34.7).

Conclusions

Anterior-to-posterior, the medial wall of the PLR is wider inferiorly and narrows superiorly, but varies between patients. Its dimensions should be evaluated preoperatively when performing a PLA or EDA.

Poster #126

Discordance in preoperative and postoperative histopathology of sinonasal tumors.

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Introduction

Head and neck pathology has been shown to be prone to erroneous diagnosis. Such errors can adversely impact patient care and contribute significantly to health care costs due to inappropriate management due to inaccurate pathology. Sinonasal tumors, in particular, present a significant diagnostic challenge given the relative rarity and diversity in histology, and, thus, may have higher rates of discordant histology.

Methods

Retrospective chart review was performed on patients treated for sinonasal tumors between January 2007 and December 2016. Initial diagnosis on preoperative biopsy was compared with postoperative diagnosis rendered at a single tertiary care referral center. A discrepant diagnosis was regarded as any change in diagnosis that would have resulted in modification or refinement of therapy or prognosis.

Results

Of 52 cases treated in the study period, 11 (21.2%) patients had discrepancy between the preliminary pathology and postsurgical diagnosis. Of these diagnoses, 4 (44%) involved a change from a benign to a more aggressive benign or malignant process, 3 (33%) involved reclassification of a malignant tumor to a more aggressive histology, and 4 (44%) involved change from an aggressive or malignant process to benign histology. In all 11 cases, a change in management plan was rendered. The majority of discordant diagnoses were of fibro-osseous lesions and small round blue cell tumors.

Conclusion

Sinonasal tumors exhibit a high degree of discordance from preoperative to postoperative diagnosis. Management decisions should be made after careful review of operative specimens in order to minimize patient morbidity and unnecessary interventions.

POSTERS

Poster #127

Discrepancies in patient perception of the meaning of "congestion"

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COI: No Disclosure Reported

Introduction

Effective communication between patient and caregiver is a cornerstone of optimal healthcare delivery. The meaning of certain terms may be a source of confusion, particularly when the discrepancy is unrecognized by the caregiver. The word "congestion" is commonly used to describe patient complaints during clinical otolaryngology encounters, yet ambiguity may exist regarding the intended meaning of this term.

Methods

A list of proposed synonyms and definitions for the word "congestion" covering 4 general categories were compiled and piloted in a focus group. The survey was then completed by 226 patients presenting to a tertiary rhinology clinic. Demographic information was obtained and patients were queried whether they were personally experiencing congestion at the time of the survey.

Results

The most common definitions for "congestion" were categorized as obstructive symptoms (199, 88.1%) and mucus-related symptoms (196, 86.7%), with less common description as pressure symptoms (146, 64.6%). Although overlap was present between symptom groups in a majority of responses, 19 (8.4%) respondents defined "congestion" as solely a mucus-related symptom. There was no significant difference in responses between patients with and without self-described congestion at the time of survey. Responses did not differ significantly when stratified by gender, race, age, or urban versus rural residence.

Conclusions

Patients carry varying perceptions of the meaning of "congestion" that are present across demographic groups and not strongly influenced by the symptoms they may be experiencing. Clinicians should be aware of ambiguous definitions in the vernacular and consider alternative questioning to facilitate effective communication and care.

Poster #128

Effect of high glucose on muc5b expression in human airway epithelial cells

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Objectives

Excessive production of mucus results in plugging of the airway tract, which can increase morbidity and mortality in affected patients. In patients with diabetes, inflammatory airway disease appears with more frequent relapse and longer duration of symptoms. However, the effects of high glucose (HG) on the secretion of mucin in inflammatory respiratory diseases are not clear. Therefore, this study was conducted in order to investigate the effect and the brief signaling pathway of HG on MUC5B expression in human airway epithelial cells.

Methods

The effect and signaling pathway of HG on MUC5B expression were investigated using RT-PCR, real-time PCR, enzyme immunoassay, and immunoblot analysis with specific inhibitors and small interfering RNA.

Results

HG increased MUC5B expression and epidermal growth factor receptor (EGFR) expression, and activated the phosphorylation of EGFR and p38 mitogen-activated protein kinase (MAPK). Pretreatment with EGFR inhibitor significantly attenuated the HG-induced phosphorylation of p38 MAPK, and pretreatments with p38 inhibitor or EGFR inhibitor significantly attenuated HG-induced MUC5B expression. In addition, knockdown of p38 MAPK by p38 MAPK siRNA significantly blocked HG-induced MUC5B expression.

Conclusion

These findings suggest that HG induces MUC5B expression via the sequential activations of the EGFR/p38 MAPK signaling pathway in human airway epithelial cells.

Poster #129

Emerging trends in sinus surgery; open, endoscopic, dilation

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Emerging practice trends in sinus surgery: open, endoscopic, or dilation?

Introduction

Prior studies have demonstrated an increasing frequency of endoscopic sinus surgery compared to open approaches. With the advent of the endoscopic balloon dilation procedures it remains unclear if this trend was due in part to the adoption of endoscopic techniques or increased utilization of balloon sinuplasty. The purpose of this study was to reevaluate the emerging trends in sinus surgery given the diversity of intervention options.

Methods

This was a retrospective population-based study, which utilized the Medicare Part B database from 2000-2015. Current Procedural Terminology (CPT) codes for maxillary, ethmoid, frontal, and sphenoid sinus surgery were analyzed including: open approaches, endoscopic approaches, and balloon dilations (introduced in 2011)

Results

The incidence of frontal sinus endoscopic procedures increased from 6,463 to 18,171 from 2000-2015, but annual growth rate slowed to 2.5% from 2011-2015. During this period, incidence of frontal sinus balloon dilations increased approximately 370% from 3,209 to 15,036. Maxillary sinus balloon dilations increased 400% from 2,910 to 14,568, while endoscopic maxillary antrostomy surgery peaked in 2009 at 14,740 and has decreased every year since. In 2015, reimbursement for endoscopic sinus surgery of the maxillary, frontal, and sphenoid sinuses was $1470 while balloon dilation of the maxillary, frontal and sphenoid sinuses was $5441.

Conclusions

Practice trends in sinus surgery continue to evolve. Endoscopic approaches have rendered open approaches nearly obsolete. Recently, the growth rate of balloon sinuplasty has outstripped that of endoscopic surgical procedures.

Poster #130

Endoscopic composite nasoseptal flap repair of spontaneous and revision cerebrospinal fluid leak: review of single institution outcomes

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Introduction

Endoscopic approach to repair of cerebrospinal fluid (CSF) rhinorrhea has become a fundamental practice in rhinology due to its success rates and low morbidity. The most effective management technique for type, size, and location of defect is undetermined and vary because of limited evidence-based guidance. We review the outcomes of the institutional technique, emphasizing the etiology, primary and secondary management, and post-operative outcomes.

Methods

Single-institution consecutive case series of patients who underwent CSF repair for spontaneous leaks and revision leaks subsequent to primary anterior skull base tumor resection between 2011 through 2016.

Results

Forty-five patients with an average age of 49.5 years were included in the study and underwent CSF leak repair for spontaneous leaks (n=20), revision leaks (n=22), and trauma (n=3). A composite graft involving multilayer fat/fascia lata, an overlay of pedicled nasoseptal flap, fibrin sealant, compressed gelatin, and bioresorbable nasal bolster was used in the repairs. Lumbar drain was used in majority of the patients (78%). The mean follow-up of the cohort was 1.5 years, at which the repair was successful in 96% of the patients requiring no further surgery. Post-operative complications included two with increased hydrocephalus requiring ventricular parietal shunt placement, one pedicled flap failure without recurrent leak, and one with meningitic symptoms, which resolved with intravenous antibiotics.

Conclusions

At our institution, endoscopic repair of CSF leaks using a composite graft of fat/fascia and nasoseptal flap was implemented with a high success rate. In our series, no specific risk factors for revision has been identified.

POSTERS

Poster #131

Endoscopic dacryocystorhinostomy for treatment of refractory chronic dacryocystitis due to systemic inflammatory conditions

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COI: No Disclosure Reported

Introduction
Granulomatosis with polyangiitis (GPA) and sarcoidosis are multisystem inflammatory conditions known to affect the head and neck. Nasolacrimal system involvement can lead to chronic epiphora and dacryocystitis. Refractory cases often require surgical intervention after failed medical management. However, the role of surgery is controversial, especially given the sparse representation in the otolaryngology literature. Additionally, there is concern regarding previously reported poor wound healing complications. Hence, we present three cases of refractory chronic dacryocystitis related to GPA/sarcoidosis that were successfully treated with endoscopic dacryocystorhinostomy (DCR) to illustrate its effectiveness in this setting.

Methods
Retrospective case series with chart review.

Results
Two patients with GPA and one with sarcoidosis were included. Patients were all treated with multiple courses of antibiotics preoperatively and continued to suffer from persistent recurrent epiphora. They were subsequently treated with endoscopic DCR by the senior author. One patient with GPA also had an external DCR performed by ophthalmology, which was complicated by recurrent dacryocystitis that eventually resolved with antibiotics. All patients at 6-12 months after surgery remained free of disease/symptoms at the endoscopic DCR site. There was no incidence of wound infection or fistula formation.

Conclusions
Endoscopic DCR can be an effective and safe option to manage refractory dacryocystitis related to systemic inflammatory diseases such as GPA and sarcoidosis. Optimal medical management is critical to successful utilization of adjunctive surgical treatment.

Poster #132

Endoscopic management of nasopharyngeal angiofibroma with orbital and intracranial extension in a 62 year old male.

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COI: No Disclosure Reported

Background
Nasopharyngeal angiofibroma is a rare, benign, highly vascular tumor that characteristically affects adolescent males. It is very rarely found in older adults, accounting for its traditional name of juvenile nasopharyngeal angiofibroma. Though benign, these tumors have been shown to have locally destructive growth and the current standard of care is surgical resection.

Case Report
We present a case report of a 62 year old male with a right sided skull base neoplasm, found to be a nasopharyngeal angiofibroma on final pathology. The patient initially presented with decreased sense of smell, unilateral nasal congestion, and epistaxis. Imaging revealed an aggressive, avidly-enhancing hypervascular mass in the right nasal cavity with extension into the masticator space, orbit, and intracranial involvement of the right middle cranial fossa and cavernous sinus. The patient underwent endoscopic approach for resection and reconstruction following vascular embolization.

Conclusion
We present a case of nasopharyngeal angiofibroma in a patient who is 62 years of age, the second oldest reported in the literature, and was resected via an endoscopic approach. Though it is extremely rare for presentation in advanced age, nasopharyngeal angiofibroma should not be disregarded in the older population.

Poster #133

Endoscopic management of paranasal sinus mucoceles: experience with 50 patients

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Introduction
Mucoceles are defined as benign pseudotumoral lesions located in the paranasal cavities. Its origin would probably be secondary to an obstruction of the ostium of the paranasal sinuses. Previous studies in our center have shown endoscopic marsupialization as a method of choice with a lower rate of recurrence and complications.

Objective
The purpose of this study is to determine the changes in the type of surgical treatment of patients with a diagnosis of paranasal sinus mucocele by analyzing the frequency and type of surgical procedure performed in a tertiary hospital unit.

Material and methods
A retrospective chart review of all patients with a diagnosis of paranasal sinus mucocele in the Department of Otorhinolaryngology and Head and Neck Surgery operated from January 2011 to August 2016. Demographic data were obtained from the patient, including localization of mucocele, associated symptoms, surgical approach, cultures, complications and relapses.

Results
A total of 50 patients were included, 26 women (52%) and 24 men (48%). The most frequent localization of this series comprised the mucocele of the frontoethmoidal complex (51%) followed by mucocele of maxillary localization (41.1%). 88% of the patients were treated with functional endoscopic surgery, Follow-up lasted between 6 months and 6 years. No major postoperative complications or cases of recurrence were reported.

Conclusions
This study confirms that in the last 15 years there has been a significant change in the surgical treatment of mucoceles of the paranasal sinuses, with an increase in endoscopic surgery from 32% to 88% in the present study.

Poster #134

Endoscopic repair of nasal septal perforation with septal cartilage autograft technique

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COI: No Disclosure Reported

Introduction
Nasal septal perforation is a bothersome problem for a patient and poses a unique reconstructive challenge for an otolaryngologist. The aim of this report is to expand upon the previous techniques of rotational flaps and introduce our own novel endoscopic technique in using the patient's native remnant anterior nasal septal cartilage to repair the perforation.

Method
Case Reports

Results
Two patients with a 1 – 2 cm anterior septal perforations underwent an endoscopic nasal septal perforation repair using a septal cartilage autograft. Postoperatively by day 14 one patient had complete closure and the other patient was left with a small 2mm perforation. Both patients were satisfied with the surgery and improved symptomatically.

Discussion
The unique use of the patient's own anterior septal cartilage as presented in this case provides specific advantages. Single incisions are required to raise bilateral mucoperichondrial flaps surrounding the perforation from the underlying cartilage. The septal cartilage can then be harvested within the surgical field for grafting without the need for secondary incisions. Utilization of a nasal septal cartilage autograft as opposed to a heterologous graft promotes the restoration of normal intranasal architecture and physiology while decreasing the incidence of foreign body reaction in the area. Cartilaginous grafts may also provide added benefit of greater stability and support when compared to fascial grafts.

Conclusion
The septal cartilage autograft technique for small and moderate sized perforations described in this report represents a viable option for endoscopic repair with theoretically minimal risk for postoperative morbidity.

POSTERS

Poster #135

Endoscopic resection of a nasoseptal teratoma: a case report

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COI: No Disclosure Reported

Introduction
Teratomas of the head and neck are exceedingly rare, and often present in neonates with airway obstruction. They are benign masses of pluripotent cells. This study describes a unique case of nasoseptal teratoma.

Methods
Case presentation of an 8-year-old boy with a mature teratoma arising from the nasal septum who underwent endoscopic and transoral resection, with review of the literature.

Results
The patient presented with airway obstruction at birth. He was diagnosed with congenital choanal atresia based on endoscopy alone and managed with a tracheostomy until decannulation at 2.5 years of age. He demonstrated persistent noisy breathing, and was evaluated for possible adenotonsillectomy. CT imaging obtained by the referring physician to re-evaluate the presumed choanal atresia revealed a posterior nasal cavity and nasopharyngeal mass and the patient was subsequently referred to our clinic. In office endoscopy revealed a submucosal mass emanating from the nasal septum with complete obstruction of the right posterior choana and partial obstruction of the left side. MRI revealed a 2.9x2.2x2.2cm predominantly fat containing lesion with focal calcification. We performed an endoscopic and transoral en bloc excision of the tumor. Pathological evaluation revealed skin, tonsillar tissue, cartilaginous and bony features, consistent with a teratoma.

Conclusions
Nasal obstruction in an infant gives way to a wide differential that should also include nasal teratomas requiring appropriate work up with imaging studies such as CT and MRI. This is the first case of a mature nasoseptal teratoma excised in a combined endoscopic and transoral fashion in a pediatric patient.

Poster #136

Endoscopic-assisted maxillectomy and infratemporal fossa resection for squamous cell carcinoma: a case report

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Introduction
Adequate access to the infratemporal fossa and hemostasis can sometimes be challenging when performing maxillectomies. We report the use of endoscopic assistance to provide improved access to the pterygopalatine and infratemporal fossae in a maxillectomy, and to reduce blood loss via endoscopic ligation of the internal maxillary artery (IMAX) prior to performing the palatectomy.

Case Description
A 77-year-old male with extensive cardiopulmonary disease presented with a 6-month history of progressive otalgia. Workup revealed a nasal cavity squamous cell carcinoma with extension into the posterior maxillary wall, infratemporal fossa, pterygopalatine fossa, and the hard and soft palate.
A medial maxillectomy and sublabial maxillotomy were performed to create 2 ports for instrumentation, as well as to gain lateral access within the infratemporal fossa. Early in the surgery, the IMAX was ligated with clips. The pterygoid muscles and pterygoid plates were resected to clear the infratemporal margins. During the palatectomy portion of the procedure, minimal bleeding was encountered.
Endoscopic transillumination through the nasal cavity was used to mark the anterior extent of the resection intraorally. A nasoseptal flap was then harvested on the contralateral side, and laid over the infratemporal and pterygopalatine fossae, with emphasis on coverage of the IMAX.

Conclusion
Endoscopic-assistance during maxillectomy has several benefits, including improved visualization of the infratemporal fossa for clearing the margin, early ligation of the internal maxillary artery to prevent blood loss during palatectomy, and assistance in planning intra-oral incisions through transnasal illumination.

Poster #137

Esthesioneuroblastoma: a comparison study of the eurocare and seer population databases

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Background
Esthesioneuroblastoma (ENB) is a rare form of cancer that arises from sinonasal neuroectodermal cells. The purpose of this study is to utilize European and American population-based datasets to estimate and compare outcomes and demographic characteristics for ENB.

Methods
The European Cancer Registry (EUROCARE) and the United States Surveillance, Epidemiology, and End Results (SEER) databases were utilized to query cases of ENB diagnosed between 2000 and 2007 were identified. Relative survival (RS) outcomes were grouped by demographics, subsite of tumor location, extent of disease, and treatment modality.

Results
In total, 447 and 306 cases of ENB were identified on EUROCARE and SEER, respectively. The majority of cases in Europe (54.6%) and America (56.9%) involved males. Younger individuals, aged 15-44 years were most commonly afflicted, with a decrease in incidence above the age of 75. Primary ENB tumors were also more likely to occur in the nasal cavity in European (82.6%) and American (75.5%) cases. Females demonstrated higher 5-year RS in America and all European regions excluding Central and Eastern Europe, which had the lowest 5-year RS compared to other regions studied (Central: 54.3%, 95% CI = [44.2%-63.3%)], Eastern: 50.9%, [35.3%-64.5%]). Aggregate 5-year RS was higher in the United States (77.3% [71.1%-82.4%]) as compared to Europe (65%, [59.4%-70%]).

Conclusion
This is the first study to investigate European outcomes for ENB and compare these findings to American outcomes. ENB cases in both populations involved mainly males and younger individuals. Aggregate survival was higher in the United States as compared to Europe overall.

Poster #138

Eustachian Tube Balloon Dilation: A 6-year Follow Up

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COI: No Disclosure Reported

Purpose
Eustachian tube balloon dilation (ETBD) was recently approved by FDA with a newly designed balloon (Aera:Acclarent) in the treatment of patients with chronic Eustachian Tube Dysfunction (ETD). The aim of this study is to evaluate the long-term efficacy of ETBD using subjective and objective measures of analysis.

Materials and Methods
The preoperative SNOT 22 and Eustachian Tube Dysfunction Questionnaire 7 (ETDQ 7) surveys were collected in a series of 22 patients who were included in the initial proof of concept study with an off label use of the sinus balloon. The same group was followed up at the completion of 6 years with the same data points . The patients also underwent impedence audiometry in the study. The survey scores and the objective data were compared.

Results
Of the 22 patients in the proof of concept study 1 patient failed and underwent bilateral tympanomastoidectomies and 1 patient required a repeat balloon dilation. Another group of 12 patients reported improvements at 1-3 year follow up and were subsequently lost in follow up. The remaining 8 patients all reported subjective improvements in symptoms. Their preoperative SNOT and ETD scores were an average of 32.5 and 13.6 respectively. All but one patient reported decreases in both SNOT and ETD, with a cumulative average of 13.5 and 2.1 respectively. There was a dramatic improvement in the impedence audiometry.

Conclusion
This study demonstrates the value of ETBD in both short- and long-term benefits to those suffering from ETD.

POSTERS

Poster #139

Evaluation of nasal microbiome association with chronic rhinosinusitis severity

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Introduction
Multiple factors contribute to the pathogenesis of chronic rhinosinusitis (CRS) with emerging data suggesting the importance of the sinus microbiome. The chronic inflammatory environment can lead to overgrowth of pathogenic microbes with resulting imbalance in the microbiome contributing to ongoing inflammation and increase in disease severity. The objective of the study was to evaluate the association between microbial composition of the paranasal sinuses with the severity of CRS as measured by Sinonasal Outcome Test (SNOT-22) and Lund Mackay CT score (LMS).

Methods
In a prospective cohort study, endoscopically guided nasal swabs were collected from the middle meatus in CRS patients. The bacterial composition of these nasal samples was analyzed using 16S DNA sequencing method. The abundance of each bacterial taxonomic unit at phylum and genus taxonomic classification levels was measured. The association between bacterial taxa abundance with SNOT-22 and LMS was assessed using Spearman correlation analysis.

Results
Eighty-nine CRS patients were included in the analysis. Overall, there was a significant positive correlation between higher LMS and greater relative abundance of enterobacteriaceae ($p=0.02$, $R=+0.31$). Further, there was a significant negative correlation between Prevotella species and total SNOT-22 scores ($p=0.007$, $R=-0.24$). None of the other bacterial taxa were correlated with SNOT-22 scores.

Conclusion
The positive correlation of higher LMS and abundance of enterobacteriaceae are suggestive of a potential link of this microbe in contributing to worsened disease in CRS patients. Further investigation is required to better elucidate how microbiome composition may play a role in increase in CRS severity.

Poster #140

Extracorporeal knot tying in endoscopic endonasal surgery: technical note

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Introduction
Reconstruction of posterior fossa and craniocervical junction defects following endoscopic endonasal surgery represents a significant challenge, due to the posterior location along the skull base which precludes typical endonasal reconstruction techniques such as the nasoseptal flap in many cases. As such, the authors propose vascularized reconstruction of the clivus and craniocervical junction with preserved longus colli (LC) muscles that are reapproximated using extracorporeal knot tying and the use of a single-hole arthroscopic knot pusher.

Methods
The authors describe 3 patients with posterior fossa pathology who had intraoperative preservation of the LC muscle for use in reconstruction of posterior fossa defects. The LC muscle was divided in the midline during the surgical approach, and then reapproximated at the end of the definitive portion of the surgery utilizing extracorporeal knot tying and advancement of knots with a single-hole arthroscopic knot pusher.

Results
Endonasal reconstruction with reapproximation of the LC muscle using endonasal suturing was performed to reconstruct clival defects in 3 patients. Pathology consisted of clival chordoma, inflammatory pseudotumor, and fibrous dysplasia. All 3 patients tolerated reconstruction with minimal nasal morbidity.

Conclusions
The endonasal knot tying technique provides a simple means to reconstruct posterior fossa defects with vascularized tissue. Further studies are required to assess whether this closure technique may prevent postoperative nasal morbidity and protect against potential adverse effects of adjuvant radiation therapy.

Poster #141

Fracture of the anterior nasal spine: a case report and systematic review

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COI: No Disclosure Reported

Introduction

The anterior nasal spine fracture (ANSF) is an uncommon mid-face fracture that is poorly described in the literature. Herein we report a rare case of ANSF and conduct the first systematic review on ANSFs to help guide clinical decision making.

Methods

A systematic review of PubMed, Ovid-MEDLINE, and EMBASE was conducted per PRISMA guidelines. Articles in English of all study designs were eligible for review.

Results

From an initial 53 articles reviewed, 6 met criteria for qualitative analysis (all case reports). We identified a total of 7 ANSF cases. Patients with ANSF were more often young (mean age, 24.3 years) and male (86%) with a history of facial trauma. Common clinical features included columellar tenderness (71%), mucosal ecchymosis (57%), and mucosal edema (57%). Lateral plain films definitively diagnosed ANSF in 3/4 patients (75%). Computed tomography (CT) scan definitively diagnosed ANSF in 4/4 patients (100%). Six of 7 patients (86%) experienced an ANSF with either no, mild, or unspecified displacement and were treated conservatively. One of 7 patients (14%) experienced ANSF with severe displacement and underwent open repair. Satisfactory outcomes were reported in 3/3 patients who underwent conservative treatment and in the 1 patient who underwent open repair.

Conclusion

Fracture of the ANS is a rare occurrence but should be included in the differential diagnosis of any mid-face trauma. While columellar tenderness and mucosal edema/ecchymosis raise suspicion for ANSF, CT scan is required for accurate diagnosis. ANSFs without significant displacement, functional compromise, or cosmetic deformity warrant non-operative treatment.

Poster #142

Gastroesophageal reflux disease is associated with nasal microbiome in chronic rhinosinusitis

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COI: No Disclosure Reported

Introduction

Gastroesophageal reflux disease(GERD)is commonly seen in patients with chronic rhinosinusitis(CRS)and is linked to more severe CRS symptoms, recurrent need for surgeries and higher duration of CRS. Nasal microbiome has been shown to be altered in CRS patients and further associated with certain phenotypes of CRS.The objective of the current study is to evaluate whether GERD is associated with changes in the nasal microbiome in CRS.

Methods

In a prospective cohort study of CRS patients, the nasal microbiome was assessed by 16S DNA analysis. Patients were evaluated for the presence of GERD based on the clinical diagnosis and response to therapy. The microbial diversity and abundance at different taxonomic levels were compared in CRS cases with and without GERD.

Results

We enrolled 72 CRS cases without symptom of GERD and 24 CRS cases with confirmed diagnosis of GERD.Although the bacterial alpha diversity indices were similar in the two groups,Patients with GERD had significantly increased relative abundance(RA)of genus Enterobacteriaceae compared with CRS cases without GERD(mean RA of 1049.8 vs.182.3,p=0.001.

Conclusion

Exposure of the nasopharyngeal mucosa to gastric acid in patients with GERD may lead to impaired mucociliary clearance and increased inflammation resulting in obstructing the sinus ostia and providing favorable conditions for anaerobic bacteria such as Enterobacteriaceae.Furthermore,increased levels of Enterobacteriaceae have been observed in the gastric fluid of patients with reflux esophagitis providing another possible link between this genus and GERD. Future studies are needed to investigate the underlying mechanism of increased Enterobacteriaceae in CRS patients with GERD.

POSTERS

Poster #143

Global inequalities in nasopharyngeal cancer: an analysis of socioeconomic disparities

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Objectives
Nasopharyngeal carcinoma is a unique head and neck cancer with variable racial and geographic distribution worldwide. Our objective was to evaluate socioeconomic disparities in the burden of nasopharyngeal cancer (NPC) on a societal scale between various regions.

Methods
To determine the relationship between societal burden of nasopharyngeal carcinoma and socioeconomic development, data on national disability adjusted life year (DALY) rates and human development index (HDI) between 1990 and 2015 were obtained. The countries were divided into three regions based on location and economic development, high HDI Asian countries, low HDI Asian countries and North American countries. Statistical analysis was performed with Mann-Whitney U and one-way ANOVA.

Results
Trending yearly DALY from 1990 to 2015 showed average value of 9.91 for North America, 61.07 for low-income Asian countries and 14.7 for high-income Asian countries. HDI data from 2015 showed an average HDI of 0.92 for North America, 0.69 for low-income Asian countries, and 0.90 for high-income Asian countries. There was no significant change in DALY from 1990 to 2015 in any individual region. However, there was a significant difference between low-income Asian countries, North America and high-income Asian countries ($p < 0.05$).

Conclusion
Although the burden of NPC has remained steady worldwide over the past 25 years, there is persistent inequality associated with socioeconomic disparities. NPC burden is more pronounced in countries with lower human development opportunities. These data reinforce the importance of increasing resources for developing countries and continuing inquiry into the screening, diagnosis, and management of NPC.

Poster #144

Head and bottle angles achieved by patients during sinonasal irrigations

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COI: No Disclosure Reported

Introduction
Certain head positions can optimize topical distribution to specific sinuses. However, no studies have assessed whether patients actually attain these positions when irrigating. The purpose of this study was to assess head and bottle angles achieved when patients irrigate based on instructions from an irrigation device, or from a Rhinologist.

Methods
Forty-two patients with various rhinologic conditions were divided into two equal groups based on type of irrigation instruction: written/pictoral instructions from an irrigation device, or written/verbal instructions from a Rhinologist. Both groups' instructions directed irrigations in a nose-to-floor position. Simulating home irrigations, patients irrigated 120 mL of saline into each naris using 240 mL squeeze bottles. Frontal and lateral views were captured during irrigations using video cameras. On frontal view, angles were measured between the following: 1. Nasal dorsum (ND) and bottle-tip (n=84), and 2. ND and vertical (n=84). On lateral view, angles were measured between the following: 1. line from nasion-to-pogonion (NTP) and horizontal (n=73), and 2. NTP and bottle-tip (n=73).

Results
On frontal view, the average angle between ND and bottle-tip was 24.5° (SD=12.0, 95%CI [21.9,27.0]), and between ND and vertical was 9.5° (SD=19.5, 95%CI [5.3,13.6]). On lateral view, the average angle between NTP and horizontal was 20.0° (SD=13.1, 95%CI [17.0,23.0]), and between NTP and bottle-tip was 59.4° (SD=15.8, 95%CI [55.8,63.1]). There were no significant angle differences between left/right sides or instruction types.

Conclusion
Patients rarely achieved a perfect nose-to-floor position regardless of instruction type, and varied considerably in head and bottle angles during irrigations.

Poster #145

High septal bleeders, a not so uncommon cause of refractory epistaxis

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COI: No Disclosure Reported

Background
Epistaxis is a common problem accounting for nearly one in every 200 emergency department visits, six percent of which result in inpatient hospital admission. While the most common site for epistaxis is noted to be Kesselbach's plexi, this is not necessarily the case in the patient requiring admission due to their nose bleed.

Setting
Tertiary care university hospital

Method
We present a series of cases where intermittent high-flow bleeding was noted to be from a difficult to visualize portion of the nasal septum opposite the insertion of the middle turbinate to the lateral wall. We also present a retrospective analysis from 2007 to present of sources of bleeding as identified in those patients who presented in consultation to the otolaryngology service requiring more than simple cautery for management of their epistaxis.

Results
When patients were noted to have an arterial bleeding source this was most easily controlled with local bipolar based cautery. Diffuse oozing, typically associated with anticoagulant use and/or prior attempts at control were managed with absorbable packing. Few patients required referral to interventional radiology.

Conclusions
Patients requiring otolaryngologic evaluation as inpatients for their bleeding do not generally require non-absorbable packing. When surgical intervention is required, a high septal artery should be considered for more efficient management of the patient's issue.

Poster #146

Hypertonic saline versus isotonic saline nasal irrigation for sino-nasal diseases: systematic review and meta-analysis

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COI: No Disclosure Reported

Background
Hypertonic saline nasal irrigation improves ciliary function and may be chosen for severe nasal congestion. Our study aims to compare the effects of hypertonic and isotonic saline nasal irrigation in treating sinonasal diseases.

Method
Systematic search (Ovid MEDLINE, Scopus ,PubMed ,Google Scholar) was conducted. Randomized controlled trials comparing hypertonic to isotonic saline nasal irrigation for treating patients with allergic rhinitis (AR), nonallergic rhinitis (NAR), chronic rhinosinusitis (CRS), acute rhinosinusitis (ARS) were included. Outcomes were disease-specific quality of life, symptom score and adverse effects.

Result
388 articles were screened and 7 studies with total of 597 patients were included. Hypertonic brought greater benefit over isotonic saline on symptom improvement (Standardized mean difference (SMD) -0.75; 95%CI -0.91, -0.58) in patients with AR/ NAR (SMD -1.28; 95%CI -1.56, -0.99), CRS (SMD -0.34; 95%CI -0.59, -0.09) and ARS (SMD -0.72; 95%CI -1.05, -0.40). Disease-specific quality of life was similar. This greater effect was not shown when the tonicity was greater than 5% (SMD 0.20; 95%CI -0.15, 0.55). When subgroup analyses were performed, the difference between hypertonic and isotonic was greater in pediatric subgroup (SMD -1.39; 95%CI -1.67, -1.11) than adult (SMD -0.29; 95%CI -0.51, -0.06) and greater in subgroup using high volume (SMD -1.28; 95%CI -1.56, -0.99) than low volume irrigation (SMD -0.37; 95%CI -0.59, -0.15). There was no major adverse effect reported.

Conclusion
Hypertonic saline has greater symptom improvement than isotonic saline nasal irrigation in treating AR/ NAR, CRS and ARS with no harm.

POSTERS

Poster #147
Immunotherapy compliance in an urban tertiary care center
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COI: No Disclosure Reported

Introduction
Reported adherence rates for allergen specific immunotherapy (SIT) have been low, ranging between 34-77%. This study sought to evaluate compliance to subcutaneous SIT in an urban "safety net", tertiary care center, and to evaluate differences in compliance based upon insurance.

Methods
A retrospective chart review of SIT patients between 2003-16 was performed. Demographic data, insurance carriers, and co-morbidities collected. Compliance was evaluated on treatment adherence (% injections/scheduled appointments). Patients were excluded from the study if they did not receive injections at our facility, or received sublingual immunotherapy. Statistical analysis was performed using R statistical software. Linear regression analysis was performed to compare compliance to the variables, asthma, duration of therapy, payor, and age. Analysis of variance was used to compare mean compliance between

Results
205 patients met our inclusion criteria and 28 were excluded. Insurance composition was Medicaid (67, 33%), Medicare (18, 9%), Health Safety Net Massachusetts (33, 16%), and commercial payors (82, 42%). Linear regression demonstrated that age, duration of therapy, and asthma status were not related to the percentage of missed doses ($p>0.05$). Payor status was statistically predictive of missed doses ($p=0.02$). When comparing percent of missed immunotherapy shots Medicaid patients missed the most 34.2%, followed by Medicare 24.4%, commercial insurance 19.9%, and Health Safety Net Massachusetts 18.5% ($p=<0.02$).

Conclusions
In a cohort of patients at a tertiary care "safety-net" center serving a low income population, compliance to subcutaneous SIT in was found to be overall high, but lower in the Medicaid population.

Poster #148
Improved patient care through lawsuit protection and prevention
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COI: N/A

Objectives
1. Maintaining focus on improved patient care rather than lawsuit defense.
2. Structuring practice for lawsuit protection and prevention.
3. Reducing liability insurance costs.

Course Description
This course teaches proven and effective strategies to prevent and protect against lawsuits, allowing rhinologists the peace of mind necessary to focus on improved patient care. You will learn lawsuit protection strategies most advisors are unaware of.
-Sources of lawsuits rhinologists are exposed to and how to protect against them: failure/delay to diagnose, failure/delay to refer, negligence by staff/employees, premise liability, etc.
-How rhinologists can protect 100% of their professional and personal assets from lawsuits.
-How rhinologists should structure their practice.
-How rhinologists can protect their practice, property, and personal assets in the event of a judgment in excess of liability insurance or an exclusion in a policy.
-How to avoid the most common asset protection mistakes made by rhinologists and their advisors, such as putting assets into a spouse's name.
-How rhinologists can avoid the serious problems that can result from operating as a sole proprietor.
-How rhinologists can minimize vicarious liability for the acts of other professionals and staff.

Poster #149

Interpretations of nasal polyp grade change scores differ significantly between studies

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COI: Yes, Some of the authors are employees or shareholders of OptiNose US Inc. or OptiNose AS

Background
Different endoscopic grading systems that appear similar are used to assess nasal polyps (NP) in clinical research studies. However, seemingly minor scoring differences may produce inappropriate numerical cross-trial comparisons and inaccurate conclusions.

Methods
A literature search was conducted and clinical trials describing NP grading were identified and evaluated. Validation studies of NP grading systems and articles comparing methodologies were analyzed.

Results
Multiple NP grading systems were identified. Recent studies used scales with polyp grades ranging from 0-3 or 0-4, which are based on single-dimension extension of polyps relative to the turbinates. All polyp grading scales measure unequal intervals in a vertical line (i.e., nonlinear scoring), and ignore the three-dimensional extent of polyp mass/volume and overall burden of multiple polyps. Subtle scale modifications with large potential numerical effect were sometimes incorporated. For example, dividing grade 3 into grades 3 and 4, making change in grade easier to achieve. The mean numerical change in polyp grade is highly dependent on baseline grade and specific scoring system. Studies with higher maximum possible grades permitted smaller changes to be reported as improvement. Therefore, consistency would be increased and susceptibility to bias reduced by routinely reporting distribution of baseline grades, change from baseline over time by baseline grade (unilateral/bilateral), and rates of polyp elimination (polyp grade=0).

Conclusions
Inconsistencies in polyp grading approaches makes comparisons between studies difficult and potentially misleading. Reporting of baseline grade, change from baseline by grade, and polyp elimination rates may improve transparency and help inform cross-trial comparisons.

Poster #150

Isolated Sphenoid Sinus Opacifications (issos): A Systematic Review And Meta Analysis

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COI: No Disclosure Reported

Objective
To further characterize the disease pathologies, associated symptoms and treatment outcomes for patients with isolated sphenoid sinus opacifications (ISSOs).

Data Sources
Medline, Embase, Web of Science and Cochrane databases

Review Methods
A systematic review for case series of ISSO patients was performed in accordance with PRISMA guidelines. Data of interest included disease pathology, associated symptoms, demographics and treatment outcomes.

Results
Of the initial 1,051 hits from the four databases, 17 articles with a combined 1,133 ISSO patients were ultimately included in the review. On a weighted analysis, the underlying pathologies were classified as inflammatory sinusitis (28.3%), mucoceles (20.3%), fungal sinusitis (12.5%), malignant neoplasms (7.7%), intracranial lesions (7.0%), benign neoplasms (5.7%), polyps (3.4%) and other lesions (4.7%). Cranial neuropathies were present in 11.5% (95% CI 5.9% - 17.1%) of ISSO patients. Infectious complications were uncommon, with a pooled rate of 0.5% (95% CI -0.4% - 1.5%). A favorable surgical complication rate of 0.5% (95% CI -0.5% - 1.6%) was found in patients undergoing surgery for an ISSO.

Conclusion
ISSOs are caused by diverse pathologies. Given the considerable rates of neoplastic disease and cranial neuropathies, patients affected by an ISSO should be monitored closely and treated aggressively. Prompt surgical intervention, with either diagnostic or therapeutic intent, is often indicated.

POSTERS

Poster #151

Knowledge and attitude regarding first aid management of epistaxis among medical specialties students in Al-madinah Kingdom of Saudi Arabia, 2016

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COI: No Disclosure Reported

Background
Epistaxis is a bleeding from inside the nose. It is one of the most common otorhinolaryngology emergencies presenting to the accident and emergency departments worldwide.
Objective
The aim of this study was to assess and to promote the adequate knowledge and attitude regarding first aid management of epistaxis among health related specialties students in Al-Madinah city, Saudi Arabia.

Methods
A descriptive cross sectional study was undertaken among medical specialties students, Data was collected from 201 participants using an online questionnaire with sum of 24 questions.

Results
Medical students were the most respondents (66.2%) while (33.8%) were other medical specialties. Majority of the respondents were Interns. 167(83.1%) respondents said that head trauma is one of the commonest cause to seek for emergency care. Regarding the attitude toward the first aid management of epistaxis, (80.6%) of the respondents demonstrated the correct position which is holding the head forward rather than backward and (73.6%) gave the correct duration of pinching the nose .Only (44.3%) of respondents demonstrated the correct site for pinching (tip), While (55.7%) demonstrated the incorrect site (bony part). The main source of the respondents knowledge was Medical curriculum (38.3%) followed by the General Practitioner (23.9%).

Conclusion
Health related specialties students have a relatively adequate knowledge on the standard first aid measures of epistaxis and good attitude to provided first aid to patients presenting with epistaxis.
Keywords: Epistaxis, first aid, health related specialties students.

Poster #152

Late ectopic recurrence of esthesioneuroblastoma in the nasopharynx

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Background
Esthesioneuroblastoma is a rare malignant lesion of the nasal cavity thought to arise from olfactory epithelium. Typically, they are found originating in the upper nasal cavity, but ectopic tumors have been located in the maxillary and sphenoid sinuses, the petrous apex, and the pituitary gland. While these tumors have been reported to have a high recurrence rate, the majority of recurrences occur within the first 2 years following initial treatment and oftentimes recur in the sinonasal cavity or as metastasis to the neck. Late recurrence after 5 years has also been reported; however, ectopic origin of recurrence is rarely described.

Case Report
We present a 60 year old male with late recurrence of esthesioneuroblastoma in the nasopharynx. The patient initially underwent endoscopic resection of a left skull base esthesioneuroblastoma followed by adjuvant external beam radiation therapy; however, he represented 78 months status post treatment with nasal discharge and congestion during routine surveillance. Endoscopy revealed a left nasopharyngeal mass and biopsy was positive for esthesioneuroblastoma. The patient subsequently underwent surgical resection via an endoscopic approach with plans for future reirradiation therapy. Post-operative MRI was negative for residual tumor.

Conclusion
We present a case of late recurrence of esthesioneuroblastoma in an ectopic region. This has implications on surveillance following initial treatment supporting both long term follow-up and thorough evaluation, including comprehensive endoscopic exam, to assess for possible ectopic recurrence.

Poster #153

Leiomyomas of the sinonasal tract: a systematic review

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COI: No Disclosure Reported

Introduction

Leiomyomas are benign mesenchymal tumors of myogenic origin that may arise from any smooth muscle tissues in the body. Leiomyomas originating from the sinonasal tract are rare and may present a diagnostic challenge. The present study reviews all cases of sinonasal leiomyoma reported to date, focusing on diagnostic characteristics and treatment outcomes.

Methods

Using the PubMed and Google Scholar databases, a systematic review was performed identifying English-language articles reporting on cases of sinonasal tract leiomyomas. Diagnostic data and treatment outcomes were assessed.

Results

Seventy-one studies containing data on 117 patients were included in the analysis. Patient age ranged from 1 to 88 years old (mean, 54 years). Sixty-three tumors occurred in women. Only 7.7% of tumors originated from the paranasal sinuses. The most common primary site was the septum (32.7%), followed by inferior turbinate (28%), nasal vestibule (10.3%), middle turbinate (6.5%), lateral nasal wall (4.7%), nasal floor (2.8%), and superior turbinate (1.8%). Complete endoscopic surgical excision was reported in 57% of cases, whereas an open approach was described in 42% of cases. Only two cases of tumor recurrence were reported. There were no reports of malignant transformation.

Conclusions

Sinonasal leiomyoma most commonly occurs on the nasal septum and inferior turbinates. There are rare reports of tumors arising from the paranasal sinuses. Complete surgical excision is curative, with an endoscopic approach being amenable in the majority of cases.

Poster #154

Low-grade cribriform cystadenocarcinoma in the infratemporal fossa: Report of a case

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COI: No Disclosure Reported

Background

Low-grade cribriform cystadenocarcinomas are rare tumors that usually present in the major salivary glands. We report the first case of a low-grade cribriform cystadenocarcinoma manifested in the infratemporal fossa. The tumor was identified histopathologically and immunohistochemically after resection through an intranasal, endoscopic approach.

Methods

Single case report describing the clinical presentation, pre-operative assessment, surgical technique and post-operative follow-up.

Results

Patient presented with facial pain and trismus. MRI of the head and neck revealed T2 enhancing lesion in the right infratemporal fossa suspicious of benign tumor of the parapharyngeal space. The patient underwent operative resection of the tumor utilizing an intranasal, endoscopic approach. There were no complications resulting from the surgery and follow-up appointments have shown no signs or symptoms of disease recurrence.

Conclusion

The majority of low-grade cribriform cystadenocarcinomas are found in the parotid gland but have been shown to occur in other locations. This was the first report of the tumor being located in the infratemporal fossa. Identification of the tumor histologically and immunohistochemically is important due to the good prognosis the diagnosis brings.

POSTERS

Poster #155
Management of phantosmia: a systematic review
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COI: No Disclosure Reported

Interest in the pathophysiology and management of phantom smells has increased rapidly over the last decade. A Pubmed search for the term “phantosmia” demonstrated a near-doubling of articles published on phantosmia within the past 6 years. We aimed to systematically review the literature on the management of phantosmia.

The Pubmed, EMBASE, and Cochrane databases were searched for articles published since January, 1990 using terms combined with pertinent Boolean search operators. We included articles evaluating management of phantosmia written in the English language, with original data, and a minimum of 6 months of follow-up on at least 2 patients with well-defined, measurable outcomes.

A total of 2,162 titles were returned upon the initial search. Of these, 146 abstracts were then examined yielding 6 articles meeting inclusion criteria. All articles were predominantly level 4 evidence. One prospective level 3 study was included. The studies included a total of 82 patients, with follow-up ranging from 6 months to 11 years. Endpoints were primarily based on subjective patient responses. Management options included observation, medical, and surgical therapy. Olfactory mucosa excision was the only surgery performed on these patients with symptomatic improvement in 10 of 11 patients. Twenty-seven patients were treated medically, which included antipsychotic and anti-seizure medications, transcranial stimulation, and topical cocaine application.

Despite increasing interest in the treatment of phantosmia and reports of successful therapies, there remains a paucity of data and lack of consensus regarding the optimal management of this difficult condition.

Poster #156
Management strategies for chronic rhinosinusitis with nasal polyposis (crswnp) in a patient with hereditary hemorrhagic telangiectasia (hht): Optimizing surgical outcomes
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COI: No Disclosure Reported

Introduction
Hereditary Hemorrhagic Telangiectasia (HHT) is an autosomal dominant disease manifesting with telangiectasias causing life-threatening epistaxis and systemic arteriovenous malformations. Chronic rhinosinsusitis with nasal polyposis (CRSwNP) is a previously undescribed phenomenon in this patient population.

Methods
A case report (53-year-old-female with a history of HHT and CRSwNP presented with epistaxis, facial pressure, hyposmia and nasal airway obstruction) and discussion of management strategies.

Results
The patient presented with uncontrolled epistaxis (Epistaxis severity score 10/10) and on endoscopic exam, diffuse telangiectasias and stage 5 polyps. A maxillofacial CT demonstrated pansinusitis with a Lund Mackay score of 20. Her preoperative hemoglobin was 7.8 g/dL. Perioperative steroid therapy was initiated starting at 32 mg methylprednisolone daily for 7 days. Intraoperatively, hemodynamic parameters were optimized (systolic pressure 90-110 mmHg, diastolic pressure 70-90 mmHg, heart rate <85 bpm). Thirty degree head of bed elevation and warm water irrigation (40 degrees Celsius)) were utilized. The patient underwent treatment of telangiectasias using coblation unilaterally along the septum to prevent septal perforation with submucosal injection of 200 mg of bevacizumab (avastin) followed by functional endoscopic sinus surgery (FESS). The polyp tissue exhibited mixed neutrophilic and eosinophilic infiltrate without telangiectasias. She tolerated the procedure well with an estimated blood loss of 20 mls.

Conclusions
This is an unusual case of a patient with HHT and CRSwNP treated with concomitant coblation of telangiectasias and submucosal bevacizumab injection in conjunction with FESS. With appropriate peri- and intraoperative management, an optimal outcome can be achieved with the anticipation for staged telangiectasia treatment.

Poster #157

Medical vs. Surgical therapy in chronic rhinosinusitis patients: quality of life differences

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COI: No Disclosure Reported

Introduction

Patients diagnosed with chronic rhinosinusitis (CRS) generally undergo a trial of appropriate medical therapy (AMT) before pursuing surgery. If patients fail AMT, they may continue medical management or undergo endoscopic sinus surgery. There is some debate regarding which treatment option provides a greater improvement in quality of life (QoL). In this study, we compared the QoL improvement CRS patients experienced from medical vs. surgical treatment.

Methods

We performed a retrospective chart review on patients with a confirmed diagnosis of CRS treated with AMT for 3 or 6 weeks. We obtained baseline, post-medical and post-surgical QoL assessments, using the Rhinosinusitis Disability Index (RSDI), in those that elected to undergo surgery after AMT. We compared the change in RSDI from AMT to the change in RSDI from surgery.

Results

Twelve patients who underwent MMT and then elected to undergo surgery met inclusion criteria. After AMT, these patients experienced a total RSDI improvement of 1.8 [-5.3, 8.9]. After surgery, the same patients experienced a total RSDI improvement of 14.3 [4.5, 24.2] (p=.02). The emotional subscore improvement after AMT was 0.2 [-3.6, 3.9] and after surgery was 5.8 [1.3, 10.4] (p=.07). The functional subscore improvement after medical therapy was 0.5 [-1.8, 2.8] and after surgery was 4.8 [1.0, 8.5] (p=.04). The physical subscore improvement after AMT was 1.5 [-1.7, 4.7] and after surgery was 4.6 [-0.2, 9.3] (p=0.2).

Conclusions

In our CRS patients that failed AMT and subsequently underwent surgical therapy, surgical therapy offered a significantly higher QoL improvement compared to medical therapy.

Poster #158

Medically recalcitrant odontogenic sinusitis requiring sinus surgery: clinical characteristics

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COI: No Disclosure Reported

Introduction

The goal of this study was to characterize the clinical characteristics of patients with medically recalcitrant odontogenic sinusitis and to report outcomes after endoscopic sinus surgery (ESS).

Methods

Patients with odontogenic sinusitis requiring ESS at a tertiary care center from 2007 - 2017 by two rhinologists were included in this retrospective review. Demographic data, presenting symptoms, initial and postoperative 22-item Sinonasal Outcome Test (SNOT-22) scores, underlying odontogenic pathology, and intraoperative culture data were obtained.

Results

45 patients were included, 44% were male, median age was 59 years at time of surgery (range 24-83). 93.3% were symptomatic time of presentation while 6.7% of cases were asymptomatic and identified incidentally on workup for other conditions. For those who were symptomatic, symptom duration was highly variable: 35.6% had symptoms 0-3 months, 26.7% had symptoms 3-12 months, and 28.9% had symptoms for at least one year. For 30 patients presenting in November 2011 or later, SNOT-22 scores were available and analyzed. Patients presented with a variety of symptoms, with “need to blow nose” (93.3%) and “facial pain/pressure” (76.7%) the most commonly positive symptoms on the SNOT-22. The most common causes of odontogenic sinusitis included prior dental extraction (53.3%), oroantral fistula (26.7%), and root canal (15.6%). 22 types of bacteria were isolated, most commonly coagulase negative Staphylococcus aureus, diphtheroids and prevotella. Mean presenting SNOT-22 score was 30.3 and mean score 3-6 months after surgery was 14.5.

Conclusion

Patients with medically recalcitrant odontogenic CRS have highly variable clinical histories, but are effectively treated with ESS.

POSTERS

Poster #159

Middle turbinate manipulation and postoperative sinus obstruction after endoscopic skull base surgery

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COI: No Disclosure Reported

Introduction
Lateralization of the middle turbinate following endoscopic sinus surgery may lead to subsequent outflow tract obstruction of the paranasal sinuses. Turbinate lateralization is a common complication that may lead to obstructive sinonasal symptoms. Alternate management techniques of the middle turbinate may lead to a difference in risk of postoperative turbinate lateralization. The objective of this study is to compare the radiographic evidence of sinus outflow tract obstruction in patients with intraoperative middle turbinate lateralization versus resection during transsphenoidal skullbase surgery.

Methods
Retrospective review of pre- and postoperative Lund-MacKay (LM) scores in patients with pituitary tumors or craniopharyngioma. All patients underwent an endoscopic endonasal approach for resection of a pituitary tumor or craniopharyngioma (transsellar or suprasellar approach) between June 2012 and June 2014. Pre- and postoperative images were reviewed and binned into 3 categories: pre-operative, 3-6 months post operative, and >6 months postoperative. Side specific LM scores were calculated at each interval.

Results
Of the cases reviewed, 122 patients met inclusion criteria. There were no statistically significant differences in LM scores between resected middle turbinates as compared to surgically lateralized middle turbinates at 3-6 months or >6 months (p=0.109).

Conclusions
Postoperative radiographic sinus outflow obstruction is similar in patients at all measured intervals despite differences in technical management of the middle turbinate.

Poster #160

Middle turbinate resection versus preservation in cribriform cerebrospinal fluid leak repair

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Consultant - Medtronic
Consultant - Elron
No other authors have disclosures.

Background
Cribriform cerebrospinal fluid (CSF) leaks are challenging to repair secondary to poor visualization and narrow working space. Middle turbinate (MT) resection may be performed to facilitate repair and graft placement. However, the MT, which warms and humidifies air and assists in laminar airflow, may also be preserved in cribriform leak repair.

Methods
Consecutive patients undergoing cribriform repair were reviewed over 15 years. Patients requiring nasoseptal flap were excluded. Two methods of CSF leak repair were identified – middle turbinate resection (MTR) vs. middle turbinate preservation (MTP). In the MTP technique, a total ethmoidectomy was often performed, allowing temporary MT lateralization. The defect was identified, prepared for grafting, and subsequently grafted appropriately. The MT was then medialized to support the repair and ethmoid packing placed to maintain MT medialization. Chi-squared test was performed for demographics and failure rate.

Results
Of 68 patients identified, 42 underwent repair with MTP and 26 underwent repair with MTR. Skull base defect size and distribution of intracranial hypertension was statistically equal between the groups (p>0.05). Most bony defects measured 1-2 mm. Grafting materials included collagen matrix, mucosal graft or acellular dermis, with or without underlay. CSF repair failure was 4.4% overall, two in the MTP group and one in the MTR group (p=0.83). Average follow-up was 496 days (range 12 to 4,444 days). A subset of patients underwent repair with collagen matrix alone and MTP, with failure occurring in 3% (1/27 patients).

Conclusions
Cribriform CSF leak repair may be performed with or without MT resection.

Poster #161

Nasal patency increases after use of continuous positive airway pressure (cpap) therapy

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COI: No Disclosure Reported

Nasal congestion and obstruction are reported in the majority of CPAP users and are frequently cited as reasons for noncompliance. To our knowledge, no study has demonstrated a change in objective or subjective nasal patency in patients with obstructive sleep apnea (OSA) after starting CPAP therapy. This prospective non-randomized trial tested the hypothesis that CPAP therapy would result in both objective and subjective increases in nasal patency. Prior to initiation of CPAP, acoustic rhinometry was used to determine nasal volume and minimal cross-sectional area in the sitting and supine positions. Subjective nasal patency was assessed with the Nasal Obstruction Symptom Evaluation (NOSE) questionnaire. Both assessments were repeated at follow-up visits. Compliance was defined as use of CPAP for at least four hours per night for greater than seventy percent of nights in one month. Acoustic rhinometry data demonstrated a statistically significant increase in both nasal volume and minimal cross sectional area in OSA patients after an average follow up of 101 days. A subset of noncompliant patients demonstrated no significant change in objective nasal patency measurements. NOSE scores trended toward decreased symptoms of obstruction, however this change was not statistically significant.

Objective measurements of nasal volume and minimal cross sectional area increased after initiation of CPAP therapy in this prospective study. The strength of this relationship was proportional with CPAP compliance. Subjective feelings of nasal patency tended to improve, however a statistically significant difference was not present.

Poster #162

Nasal surgery with hypoglossal nerve stimulation for obstructive sleep apnea

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COI: Yes, This study was performed independently, research support is pending for future projects from Inspire Medical Systems, Inc. (Maple Grove, MN).

Objective

To determine the role of nasal surgery in conjunction with hypoglossal nerve stimulation in the management of obstructive sleep apnea (OSA).

Methods

Retrospective chart review at a single institution tertiary academic care center. Patients underwent hypoglossal nerve stimulator implantation with or without preceding nasal surgery for OSA. These included septoplasty, rhinoplasty, and all endoscopic sinus surgeries. Outcomes for both groups were compared. Primary outcome measures included apnea-hypopnea index (AHI) and nadir oxyhemoglobin saturation as measured by postoperative polysomnography. Secondary outcome measures included Epworth Sleepiness Scale (ESS).

Results

Fifty-eight patients underwent successful implantation with hypoglossal nerve stimulator. Of these, 18 patients had prior nasal surgery and 40 did not. Mean preoperative AHI and nadir oxyhemoglobin saturation were 38.7 ± 2.4 and 79% ± 1.1 for all patients, 40.6 ± 3.4 and 79% ± 1.9 for patients with prior nasal surgery, and 37.9 ± 3.1 and 79% ± 1.4 for patients without prior nasal surgery. Mean postoperative AHI and nadir oxyhemoglobin saturation were 3.8 ± 1.1 and 92% ± 0.3 for all patients, 1.4 ± 0.6 and 92% ± 0.6 for patients with prior nasal surgery, and 4.9 ± 1.5 and 92% ± 0.4 for patients without prior nasal surgery; p = 0.146 and 0.871, respectively.

Conclusions

All patients had significant improvement in AHI and nadir oxyhemoglobin saturation following implantation with hypoglossal nerve stimulator. There was no statistically significant difference for all outcome measures between patients with prior nasal surgery and those without.

POSTERS

Poster #163

Nasolacrimal duct marsupialization during endoscopic sinus & skull base surgery

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COI: No Disclosure Reported

Objective

To evaluate rates of epiphora after transection and marsupialization of the nasolacrimal duct (NLD) during endoscopic sinus & skull base surgery.

Introduction

The nasolacrimal canal forms part of the medial wall of the maxillary sinus and occasionally requires resection to provide full access1. With an external approach, concurrent management of the nasolacrimal system is necessary to prevent postoperative epiphora2. However, there is currently no consensus for optimal management of the NLD with the endoscopic approach when only the duct is transected without involving the nasolacrimal sac.

Methods

Medical records of 7 patients who underwent endoscopic sinus and skull base surgery that involved transection and marsupialization of the NLD were retrospectively reviewed.

Results: Mean age was 45 (range 14-74). Mean follow-up was 5 months (range 1-15). Pathology included juvenile nasopharyngeal angiofibroma (2), inverted papilloma (2), high-grade B cell lymphoma (1), metastatic melanoma (1), and erosive chronic sinusitis without nasal polyposis (1). No patients had epiphora postoperatively with Munk score of 03.

Discussion/Conclusion

Management after transection of the NLD varies widely. The duct may be simply transected or marsupialized, or a formal dacryocystorhinostomy can be performed. The surgeon must also choose whether or not to place a stent with each of these procedures. Nasolacrimal duct transection with marsupialization without stent is infrequently described5. Based on our small series, marsupialization of the NLD provides a low rate of postoperative epiphora and is an acceptable procedure for management of a transected duct during endoscopic sinus & skull base surgery.

Poster #164

Novel application of steroid eluting sinus implants stents in chronically inflamed sinonasal mucosa: safety and efficacy

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COI: No Disclosure Reported

Introduction

The mometasone furoate-eluting sinus stent is a cost-effective product designed to improve surgical outcomes by delivering localized steroid therapy directly to the ethmoid and frontal sinus mucosa. Currently, there is no study detailing the safety, efficacy, or application of drug eluting bioabsorbable implants for diseased sinonasal mucosa outside of these target locations following endoscopic sinonasal surgery.

Methods

Consecutive, single-cohort retrospective study of 10 patients evaluating steroid-eluting stents placed in sinonasal cavities other than frontal and ethmoid sinuses. Lund-MacKay, Sinonasal Outcome Test-22 (SNOT-22) questionnaire, and endoscopic findings were reported pre- and post-operatively. Efficacy was assessed by observing edema, polyp formation, ostium stenosis, and disease recurrence. Safety included intra- and post-operative complications.

Results

Stents (n=12) were successfully implanted in maxillary (n=6), sphenoid (n=5), and nasopharyngeal (n=1) locations. Revision surgery was performed in 8/10 patients with a cohort average Lund-Mackay score of 13.2±8.7, and SNOT-22 score of 57.3±27.5. No device-related adverse events occurred during introduction or following placement of stent. The postoperative prevalence of polypoid edema, need for surgical, or medical intervention, polyp formation, and ostium stenosis were minimal (0%, 0%, 12%, 0%, 0%) at follow up mean 21 ± 12 days. Changes in prevalence of polyposis post-operatively were statistically significant ($p<0.0001$).

Conclusion

This study demonstrates the safety, efficacy, and clinical utility of a steroid-eluting implant for use outside of the ethmoid and frontal sinuses.

Postoperative wound healing and complications were favorable at 1 month, portending a positive clinical impact without evidence of injury to nasal or paranasal structures.

Poster #165

Novel endoscopic approach to fibrous dysplasia of the anterior skull base: case series with literature review

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COI: No Disclosure Reported

Background
Fibrous dysplasia is a benign disorder of the bone characterized by replacement of normal bone and marrow by abnormal fibro-osseous tissue. Although a rare disease, the anterior skull base and paranasal sinuses are potential sites of occurrence. Traditional complete resection of tumors often requires craniotomy with skull base reconstruction and may cause significant morbidity to patients.

Objective
The objective of our study is to provide a novel conservative endoscopic approach to fibrous dysplasia lesions of the anterior skull base that would have been otherwise treated with a craniotomy.

Methods
Report of three cases and review of the literature

Results
We report 3 new cases of anterior skull base fibrous dysplasia with an average age 31 of that were successfully treated with conservative endoscopic subtotal curettage, and followed clinically for recurrence of symptoms. The lesions were located in the ethmoid, sphenoid and clivus, respectively. Progression of the lesions was successfully treated with revision endoscopic skull base surgery without complications. A review of the literature identified 3 additional cases of similar conservative endoscopic resection with no clinical recurrence after one year of follow up.

Conclusions
In select patients, conservative endoscopic subtotal resection of anterior skull base fibrous dysplasia successfully controls disease progression and is a less morbid alternative to aggressive complete resection that require craniotomy.

Poster #166

Objective vestibular findings in dizzy patients with chronic sinusitis.

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COI: No Disclosure Reported

Introduction
Chronic rhinosinusitis (CRS) is a highly prevalent disorder with substantial effects on quality of life and a diverse array of symptoms that may extend beyond the sinonasal tract. Patients who present with CRS often complain of dizziness and may describe this as related to their sinus condition. However, it is unclear if CRS can produce quantifiable effects on the vestibular system. We sought to characterize the objective vestibular findings on videonystagmography (VNG) among patients with a diagnosis of CRS.

Methods
Patients who underwent VNG at a tertiary medical center between 2008 and 2016 were retrospectively screened. Subjects were included who had a diagnosis of CRS assigned during a visit in the otolaryngology clinic, while those under the age of 18 were excluded. The presence and site of any vestibular lesion was recorded from quantitative VNG data.

Results
Seventy patients were included for study. The mean (SD) age was 58.7 (12.7) and 40 (57%) patients were female. Twenty (28.5%) patients had peripheral vestibulopathy, 5 (7.1%) demonstrated a central origin of vertigo, 4 (5.7%) had mixed peripheral and central dysfunction, and 3 (4.2%) had a positive but non-localizing study. Thirty-five (50.0%) patients had normal VNG. Sinus surgery was performed in 39 (55.7%) of subjects, including 21 (60.0%) with abnormal VNG and 18 (51.4%) with normal VNG.

Conclusion
Patients with CRS may manifest findings of vestibular dysfunction on objective testing, most commonly as a peripheral vestibular lesion. Prospective study is necessary to further characterize the relationship between CRS and vestibular dysfunction.

POSTERS

Poster #167

Oral corticosteroid regimens in the management of chronic rhinosinusitis

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COI: No Disclosure Reported

Background
Oral corticosteroids are often used in the medical management of Chronic Rhinosinusitis (CRS) with and without polyps. The purpose of our study is to review the literature for studies reporting the dosage of oral corticosteroids as part of the maximal medical management prior to surgery.

Methods
We reviewed the literature on oral steroids given to CRS patients from March 2012 to April 2017. Our inclusion criteria were studies that looked at oral steroids as part of maximal medical management of adult patients with CRS. We excluded studies that did not disclose the dose of oral steroids.

Results
Our search resulted in 7 articles with 4 studies of Level of Evidence (LOE) Ib, 2 studies with LOE III, and 1 study with LOE IV. We discovered a variety of regimens being given with daily doses ranging from 15mg to 1mg/kg, and total doses ranging from 150mg to 352mg. In addition, several studies gave the same regimen to both subtypes of CRS. There was no mention of side effects in most of the studies.

Conclusion
Given the discrepancy we found in the dosing habits of oral steroids in the management of CRS, high level randomized controlled trials are needed to determine the most effective treatment regimen.

Poster #168

Orbital complications from acute sinusitis in the pediatric population

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COI: No Disclosure Reported

Surgical intervention is generally avoided in the setting of pediatric orbital complications from acute sinusitis unless concerning ophthalmological signs necessitate urgent intervention. We aim to review our experiences, management practices and patient outcome data.

A retrospective review was performed from January 2007 through December 2016 of patients treated at a tertiary-care pediatric specialty care hospital for orbital complications related to sinusitis. Patients 18 years or older and those with intracranial extension beyond the cavernous sinus were excluded.
Of the 186 patients reviewed, a total of 109 cases were included. The average age was 6.6 years (SD=4.2) with a slight male predominance (M:F=1.6:1). There was no significant difference between the mean age of patients who responded to medical therapy and required surgical intervention (6.2 v 7.4 years; p=0.15). 41 patients underwent intervention including endoscopic sinus surgery (ESS), orbitotomy or both. Of patients ultimately undergoing ESS, earlier intervention within 2 days of admission was associated with a significant reduction in mean length of stay (10.5 v 4.6 days; p=0.01). There was no significant difference between intervention rates for patients with a “subperiosteal phlegmon” versus orbital cellulitis [?2(1, 52)=0.02, p=0.89]. When combining phlegmon and orbital cellulitis groups, there was a positive correlation between age and length of stay [r(50)=0.30, p=0.03].

Complicated sinus disease involving the orbit in the pediatric population may prompt surgical intervention by ESS. Earlier intervention may lead to a decreased length of stay. In regards to Chandler II pathology, older children may be expected to require a longer admission.

Poster #169

Osseous myxoma of the orbit and skull base presenting as sinusitis: a unique presentation of this rare head and neck tumor.

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COI: No Disclosure Reported

Introduction
Myxomas are rare tumors of mesenchymal origin arising in soft tissue or bone. Osseous myxomas typically occur in the mandible and maxilla and are thought to be odontogenic in nature. We describe the unique case of a supraorbital myxoma in a 53-year-old male presenting with chronic sinusitis. To our knowledge, only two similar cases exist in the literature.

Study Design
Case report and literature review

Methods
A case of intraosseous myxoma of the superolateral orbit and skull base is presented along with relevant literature review.

Results
A 53-year-old male presented with three months of sinusitis. Imaging revealed a 3-cm supraorbital mass with cortical thinning and dehiscence along the anterior cranial fossa. Biopsy via an external approach was done. Pathology revealed myxoma and definitive resection was performed. Only two prior cases of supraorbital osseous myxoma have been described. They presented with proptosis and eye pain, while our patient presented with sinus complaints. Although benign, myxomas are locally destructive. Unlike soft tissue myxomas, intraosseous myxomas occur almost exclusively in the facial skeleton and have high rates of recurrence with conservative surgical management. Complete resection of this myxoma, abutting both the periorbita and dura, was achieved with good functional and aesthetic outcome.

Conclusions
Myxomas are benign tumors of mesenchymal origin. Intraosseous myxomas occurring outside of the mandible or maxilla are rare. Presentation can include primary ocular issues or, as seen in our patient, sinusitis symptoms. Regardless of location, complete resection is indicated as recurrence rates are high with conservative surgical management.

Poster #170

Osteologic analysis of ethnic differences in supernumerary ethmoidal foramina: implications for endoscopic sinus and orbit surgery

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COI: No Disclosure Reported

Introduction
Knowledge of the position of the ethmoidal arteries is critical to enable safe endoscopic sinus and orbital surgery. The presence of a third or “middle” ethmoid variant has recently become more relevant as endoscopic intraconal surgery advances. The purpose of this study was to quantify the presence of supernumerary (ie. over 2) ethmoid foramina in different ethnicities and genders.

Methods
Morphometric osteologic measurements were performed in 163 orbits. The prevalence of supernumerary ethmoid foramina and orbital length were quantified in skulls of Asian(n=54), Caucasian(n=70) and African(n=39) derivation. Correlations between gender, ethnicity, symmetry, orbital floor and lamina papyracea length were analyzed by paired t-test and chi square.

Results
Supernumerary foramina were seen in 61/163 orbits (37.42%). A significantly higher prevalence was seen in Asian (42.59%) and African (41.02%) as compared to Caucasian skulls (25.71%; p=0.03; p=0.03 respectively). The length of the orbital floor was significantly greater in Africans (3.93 ± 0.96cm) than in Caucasians (3.55 ± 1.57cm) and Asians (3.35 ± 1.52cm, $p<0.001$; $p<0.001$).

Conclusions
Supernumerary ethmoidal foramina were common among all orbits studied. Orbits of Asian and African derivation had significantly greater numbers of ethmoidal foramina both unilaterally and symmetrically within a shorter orbital length suggesting a greater proximity between the ethmoidal vessels. The surgeon should be alert to the possibility of the presence of middle ethmoidal vessels during endoscopic sinus and orbital approaches.

POSTERS

Poster #171

Outcome after ess in crswnp patients: 10 years after

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COI: No Disclosure Reported

Outcome after ESS in CRSwNP patients : 10 years after.

Background
Hundred and thirty three CRSwNP patients have been operated by the same surgeon. Factors related to possible recurrence of nasal polyps (NPs) and developing asthma were prospectively analyzed with a minimum of 10 years follow-up.

Materials and Methods
Clinical symptoms, total nasal endoscopic score and quality of life were evaluated. Inflammatory profile was based on nasal tissue and nasal secretions.

Results
On endoscopy 51% (68/133) of the patients showed normal mucosa. Recurrence of nasal polyps (NPs) was correlated with allergy (p=0.010), asthma (p=0.005), prior recurrence of NPs (p< 0.001) and prior surgery (p<0.001). Initial asthma presence of 27 % (36/133) increased to 42.8% (57/133) over 10 years. New asthma patients showed more allergy (p=0.033) and underwent more frequently revision surgery (p<0.001).

Conclusion
Sustained medical care after surgery is mandatory. When present allergy treatment should be conducted firmly. The increasing number of late asthma seriously questions if current care provided in our guidelines is adequate. The need of more intense clinical follow-up and treatment based on clinical nasal endoscopy scoring should be debated.

Poster #172

Outcomes in pediatric and young adult skull base surgery in the endoscopic era

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Introduction
Skull base pathology is extremely rare in the pediatric (<19) and young adult population (<25). These patients make up 8.6% of the total skull base population at our institution. Reports of skull base tumors in the pediatric population have historically focused on open approaches, and more recently on primarily endoscopic approaches in limited series. We reviewed our institutional experience with skull base tumors in patients less than or equal to 24 years in order to describe pathology, compare endoscopic and open approaches, and assess complications.

Methods
We performed a retrospective review of pediatric and young adult patients who underwent skull base surgery at our institution from October 2004 to February 2017.

Results
144 pediatric (N=84) and young adult patients (N=60). 107 (74.3%) underwent an endoscopic procedure, and 37 (25.7%) underwent an open procedure. The average age was 15.9 years (range 2 weeks- 24 years). In the pediatric population, nonsellar benign tumors (N=25), skull base tumors (N=17), encephaloceles (N=15) and inflammatory processes (N=12) were the most common. In the young adult population, pituitary adenomas (N=13), malignant tumors (N=10) and trauma (N=8) were the most common. There were 3 intra-operative complications and 24 post-operative complications. There was no significant difference in complication rate between endoscopic and open surgery in both pediatric and young adult populations (p=.41). A discussion of limitations and complications by age stratification will be presented.

Conclusions
Endoscopic skull base surgery is a feasible and safe option in the young adult and pediatric populations.

Poster #173

Paranasal sinus deposition of high volume saline in postoperative fess patient by intranasal instillation in three head positions

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COI: No Disclosure Reported

Introduction
Retention of saline irrigation in paranasal sinus (PNS) and nasal cavities has been studied to be less than 6%. Nasal instillation with various head positions may increase the retention.

Objectives
To determine the deposition of saline in PNS at three head positions in postoperative FESS

Methods
15 adults, one month post-FESS were instilled intranasally with saline plus contrast media at one of the three head positions, Mygind (6 cases), Ragan (4 cases) and vertex-to-floor (VF) (5 cases). CT. PNS at those head positions were performed immediately after instillation. The deposition of fluid in each PNS were assessed independently by a rhinologist and a radiologist.

Results
Mygind position could deliver saline into anterior ethmoid sinus (AES) & posterior ethmoid sinus (PES) 12/12 sides, sphenoid sinus (SS) 10/12 sides and frontal sinus (FS) 9/12 sides.. Ragan position could deliver saline into maxillary sinus, PES & AES 4/4 sides, SS 2/4 sides and FS 0/4 sides, while VF position could deliver saline into PES 10/10 sides, AES 9/10 sides, FS 6/10 sides, SS 3/10 sides. Rare fluid was seen in maxillary sinus at Mygind and VF positions. Small FS and SS ostium (< 4 mm) including the formation of film covering the ostium might be a factor to decrease the deposition.

Conclusion
Head positions have the effect on the delivery of topical into specific paranasal sinuses and intranasal locations. It should increase the mucosal-medication contact time comparing with nasal irrigation.

Poster #174

Patient satisfaction and the use of biofeedback video goggles during nasal endoscopy in a rhinology clinic

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COI: No Disclosure Reported

Introduction
The use of biofeedback has been shown to improve patient outcomes in multiple non-otolaryngologic specialties. We have shown that patients who use video biofeedback goggles in an otology clinic during binocular microscopy have high levels of comfort, satisfaction, and understanding of their otologic disease. We hypothesize that the use of video biofeedback goggles during in-office postoperative debridement following endoscopic sinus surgery (ESS) will yield improvements in patient comfort, satisfaction, anxiety, and understanding of rhinologic disease.

Methods
Patients seen in our rhinology clinic for postoperative debridement after ESS were recruited for this study. Following the debridement, a survey with 10-point Likert scales was used to assess patient comfort, satisfaction, anxiety, and understanding of their disease.

Results
Twenty patients were recruited for this study. The average age was 45.3 years. On a 10-point scale, patients were neutral regarding their comfort (mean 5.54, SD 3.44), satisfaction (mean 4.9, SD 2.30) and anxiety levels (mean 4.45, SD 3.45) during their debridement. Patients however had a high level of understanding of their disease and anatomy following endoscopy (mean 8.18, SD 23.57).

Conclusion
This is the first study to describe the use of visual biofeedback for patients undergoing nasal endoscopy and debridement in an otolaryngology clinic. Direct visualization of nasal endoscopy may contribute to an improvement in patient understanding of their disease. However, benefits in terms of pain, anxiety, and satisfaction are unclear. Further investigation into this technology using a randomized clinical trial design is underway.

POSTERS

Poster #175

Pituitary and skull base lesions and the litigious patient

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COI: No Disclosure Reported

Objectives/Hypothesis
To evaluate litigation relating to the diagnosis and management of pituitary and ventral skull base lesions, and delineate allegations involved in the decision to pursue medicolegal proceedings.

Methods
Publically available federal and court records were accessed via the Westlaw Next database. Jury verdict and settlement reports relevant to pituitary and anterior skull base lesions were accessed, and litigation was reviewed for alleged injuries, defendant specialty, patient demographics, and other factors raised in proceedings.

Results
Of seventy-five cases included, 50.7% were resolved in the defendant's favor. The most frequent physician specialties cited as defendants included primary care (20%), neurosurgery (17%), and radiology (16%), while otolaryngologists were defendants in only 5% of cases. Fifty-two (69%) cases did not involve surgical intervention; the most common allegations in these proceedings were misdiagnosis, permanent injury (19%), requiring additional procedures as a result of misdiagnosis (17%), and permanent endocrine (14%) and vision (12%) dysfunction. Among surgical cases, the most common allegations raised included permanent injury (17%), post-operative complications (14%), intra-operative complications (13%), and death (10%). Among cases resolved with payment, there was no statistical difference in payment between surgical cases ($5.7m) and non-surgical cases ($4.8m).

Conclusions
Misdiagnosis of endocrinopathy, failure to appropriately workup patients with neurologic complaints, and radiologic misdiagnosis play important roles in the pursuit of litigation in nonsurgical cases. Sustaining permanent sequelae, including endocrine and visual injury, plays an important role in surgical cases. Post-operative management appears to play just as important a role in the decision to pursue litigation as intra-operative considerations.

Poster #176

Posterior ethmoid roof injury in endoscopic sinus surgery: pitfall of the medial orbital floor landmark.

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COI: No Disclosure Reported

Introduction
Endoscopic sinus surgery(ESS) consider a widely accepted surgical intervention in the management of chronic rhinosinusitis (CRS).The aim of this paper is to draw surgeon attention for posterior ethmoid(PE)/ maxillary height as risk factor for CSF leak.

Method
Retrospective chart review and computerized tomographic (CT) scan of 53 patients underwent ESS in the period between February 2011 and January 2015.The maxillary (M) height was measured in coronal plane at maximum height at level PE as well as the PE height. The patient was categorized according to PE height, if PE height is 1/3 of Maxillary; this is category 1, if the PE height more than or equal to maxillary height; category 2.

Result
Three patients develop CSF leak; one develop encephalocele, tow develop meningitis/encephalitis none of the patients develop chronic neurological sequelae.
All 3 patient had low PE/M ratio despite the medial orbital floor wall is not close to the PE roof.

Discussion
There are some anatomical variations that are considered risk factors for iatrogenic CSF leak.[3] In our study we report 3 cases with postoperative CSF leak secondary of low PE height compared with high maxillary height. Ramakrishnan et al found no correlation between keros classification and maxillary to PE height and to avoid PE roof penetration ; maxillar to PE height must be examined separately.

Conclusion
PE height to maxillary height ratio is important measurement to be assessed during preoperative CT scan review to avoid PE roof penetration and its more reliable than medial orbital floor.

Poster #177

Predicting postoperative sinonasal outcomes in a diverse population

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COI: No Disclosure Reported

Introduction
Surgical intervention for chronic rhinosinusitis (CRS) is established, but the clinical response on an individual level shows wide variety. Identifying comorbidities and underlying CRS endotypes may be key to identifying patients who will experience the greatest clinical response to surgery. Few studies have investigated these factors in the Hispanic community. CRS groups based on nasal polyposis and eosinophilic infiltrate were investigated with respect to nasal obstruction visual analog scores (VAS) and the SNOT-22 outcomes measures.

Methods
An IRB-approved, retrospective cohort study including 140 CRS patients who were unresponsive to medical treatment and underwent endoscopic sinus surgery was performed. We reviewed pre-operative demographic and medical comorbidity data as well as surgical findings and pathology. VAS and SNOT-22 scores were recorded at pre- and post-surgical follow-up visits. Univariate and multivariate regression analyses were used to model variance of demographic, comorbidities and CRS endotype markers on patient-reported outcomes.

Results
27% of patients were Hispanic and 40% were non-Hispanic. In univariate analysis, nasal polyposis was predictive of VAS score (p=0.021). Multivariate analysis further revealed significance for both Hispanic (p=0.018) and Non-Hispanic (p=0.005) ethnicities. No significant correlations were identified for univariate regression on SNOT-22 scores. However, multivariate analysis revealed non-Hispanic ethnicity (p=0.041), gender (p=0.039) and nasal polyposis (p=0.029).

Conclusion
In our population, both Hispanic and non-Hispanic populations in conjunction with nasal polyposis were predictive of VAS score change after sinus surgery. However, for regression on SNOT-22, Non-Hispanic ethnicity, gender and nasal polyposis showed significant predictive potential. No significant effect was identified from tested comorbidities.

Poster #178

Prevalence of chronic rhinosinusitis among adult re-attendees and its effect on quality of life in Mbarara, Uganda

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COI: No Disclosure Reported

Background
Worldwide, the burden of chronic rhinosinusitis (CRS) is variable. CRS has significant negative impact on quality of life, however, most of these studies have been done in the west, and there are no published studies of Uganda . The aim of this study was to determine the QOL among patients with CRS in Uganda, a resource limited setting.

Methodology
A cross sectional study was conducted at Mbarara Regional Referral Hospital Otolaryngology clinic. One hundred twenty six adult re-attendees were consecutively recruited. Data was collected using a structured questionnaire and the Sinonasal Outcome Test 22 (SNOT 22) questionnaire measuring QOL.

Results
The proportion of re-attendees with CRS was 39.0% (95% CI 30 – 48%). The majority of CRS patients had poor quality of life scores compared to non-CRS (88% versus 20% p<01). The poor quality of life scores on the SNOT 22 were almost solely as a result of the functional, physical and psychological aspects unique to CRS.

Conclusions
CRS is highly prevalent among re-attendees of the otolaryngology clinic at a hospital in a resource limited settings and has a significant negative impact on the QOL of these patients.
Key words: chronic rhinosinusitis, Health Related Quality of life, Sinonasal Outcome Test 22.

POSTERS

Poster #179

Rare presentation of progressive saddle nose deformity: challenges in diagnosis and treatment of progressive midline destructive disease

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Introduction
Midline destructive disease presents challenges for diagnosis despite extensive clinicopathologic workup. Sinonasal lesions may be severely disfiguring with decreased quality of life and psychosocial sequelae. This study describes a unique sinonasal presentation with overlapping diagnostic criteria, which may represent a new disease phenotype.

Methods
Case report (19-year-old female with bilateral nasal airway obstruction, synechiae and saddle-nose deformity) and review of the literature.

Results
Immune work-up demonstrated elevated complement C3 (200mg/dl) and CH50 (>60 U/mL) , with otherwise negative levels of C4, c-reactive protein, sedimentation rate, rheumatoid factor, Sjogren's Antibodies, angiotensin converting enzyme, antinuclear antibody, anti-neutrophil cytoplasmic antibodies, bullous pemphigoid IgG-antibodies, and quantitative immunoglobulins/IGG subclasses. Nasal endoscopy demonstrated mucosal inflammation with synechiae, erosion of the caudal septum and friable tissue localized along the cartilage and perichondrium. Cultures were positive for Methicillin-resistant Staphylococcus aureus. Surgical pathology demonstrated prominent lymphoplasmacytic infiltrate, angiocentric fibrosis with relative lack of eosinophils and increased IgG4 absolute count (up to 50/hpf), though only slightly elevated IgG4-IgG ratio (0.2). The differential diagnosis of sinonasal destructive lesions include autoimmune disease/vasculitis, neoplasia, infection, inhalational (drug abuse from cocaine, acetaminophen) and rare conditions of unknown etiology including IgG4-related sclerosing disease (IgG4 rSD), eosinophilic angiocentric fibrosis (EAF) and the more recently described chronic lymphoplasmacytic rhinosinusitis.

Conclusions
We report a rare presentation of a progressive destructive sinonasal lesion with findings suggesting a spectrum of IgG4-rSD with some overlap to EAF and chronic lymphoplasmacytic rhinosinusitis. It is critical to describe and classify these sinonasal etiologies to direct treatment, which may require immunomodulatory therapy.

Poster #180

Readability assessment of rhinosinusitis online patient education materials

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COI: No Disclosure Reported

Introduction
In today's current practice environment our patients have unprecedented access to online information about their diseases processes. Ensuring that the available online content is both accurate and of the appropriate complexity is of utmost importance. Institutions such as the American Medical Association and National Institutes of Health have recommended that the readability of patient information material should be between a 4th to 6th grade level. The goal of this study is to perform a readability assessment of the web-based education material in the topic of rhinosinusitis.

Methods
Online education materials in the topic of rhinosinusitis was downloaded from the websites of divisions of rhinology listed in the American Rhinologic Society fellowship listing on January 2017.The information was divided by category (general information, anatomy, definition, etiology, prevalence, pathophysiology, signs and symptoms, diagnosis and treatment). Assessment was performed using Flesch Reading Ease, Flesch- Kincaid Grade Level, Simple Measure of Gobbledygook (SMOG) Index, Coleman-Liau Index and Gunning-Fog Index. All analysis were performed using Readable.IO (www.readable.io).

Results
All analyzed material was found to at a minimum between 9th and 10th grade reading level, with some categories being up to college reading level.

Conclusions
Online patient education materials on rhinosinusitis is written above the recommended 4th to 6th grade level material. Modifying the complexity in which these materials are written might be necessary to better engage our patients.

Poster #181

Responsiveness of general quality-of-life versus disease-specific patient-reported outcome measures in patients undergoing endoscopic sinus surgery for chronic rhinosinusitis

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COI: No Disclosure Reported

Introduction

The 29-item PROMIS questionnaire (PROMIS-29) is a National Institutes of Health-supported standardized tool that evaluates general quality-of-life through seven short forms and a numeric pain intensity scale. Three of these short forms were previously found to be responsive in patients undergoing endoscopic sinus surgery (ESS) for chronic rhinosinusitis (CRS). The 22-item Sinonasal Outcome Test (SNOT-22) and 30-item Rhinosinusitis Disability Index (RSDI) are well-established, disease-specific CRS quality-of-life instruments. The responsiveness of the PROMIS-29, SNOT-22, and RSDI questionnaires were compared for CRS patients undergoing ESS at the University of Rochester Medical Center.

Methods

Charts of adult CRS patients undergoing ESS by the senior author between May 2015 and February 2017 were reviewed for PROMIS-29, SNOT-22, and RSDI questionnaires completed prior to and 3 months after surgery. Cohen's d and paired t statistics were used to evaluate responsiveness.

Results

Fifty-one subjects completed all three sets of questionnaires. Statistically significant (all $p<0.01$) responsiveness was noted in the five PROMIS-29 domains of Fatigue ($d = -1.10$; $t = -6.95$), Sleep Disturbance ($d=-1.03$; $t=-7.16$), Satisfaction with Participation in Social Roles ($d=0.93$; $t=5.75$), Pain Interference ($d=-0.73$; $t=-5.72$), and Pain Intensity ($d=-0.94$; $t=-5.47$). The disease-specific SNOT-22 ($d=-1.31$; $t=-9.59$, both $p<0.01$) and RSDI ($d=-1.12$; $t=-8.62$, both $p<0.01$) were more responsive to ESS than the PROMIS-29 domains.

Conclusions

The degree of responsiveness of certain PROMIS-29 domains approaches that of the SNOT-22 and RSDI instruments. PROMIS may be suitable for ESS outcomes measurement, allowing comparison of ESS outcomes to those of other medical conditions as well as the general population.

Poster #182

Rhinosinusitis in solid organ transplantation recipients: characteristics, course of disease, management and prognosis

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COI: No Disclosure Reported

Introduction

Survival rates of solid organ transplant recipients are steadily increasing. These patients receive chronic immunosuppressive therapy to sustain the transplanted organ. Rhinosinusitis (RS) is one of the most common infections. These patients may be at a higher risk for fulminant disease and severe complications.

Objective

Our objective was to analyze the characteristics and disease course of RS in solid organ transplant recipients.

Materials and Methods

Retrospective study. Medical records of all solid organ transplant recipients with a diagnosis RS treated at our institution between the years 2001-2016 were reviewed.

Results

Of 4571 solid organ transplant recipients, in 70 (1.5%) patients a documented diagnosis of RS was identified. 64 patients presented with post-transplantation RS, of them (58.7% had chronic RS with or without nasal polyposis. The remaining 41.3% patients were diagnosed with acute RS. Cultures showed mainly bacterial pathogen growth with a documented invasive fungal sinusitis in only 2 patients. A total of 32(45%) patients underwent endoscopic sinus surgery, the majority (29) for chronic RS. On subgroup analysis, surgical intervention was more frequent in lung transplantation recipients and cystic fibrosis patients ($p=0.005$, $p<0.005$ respectively). No specific disease nor surgical complications were found.

Conclusions

Interestingly, rhinosinusitis in solid organ transplantation patients was not frequent. Acute fulminant infection or sinusitis complications were much lower than expected. Whether chronic immunosuppression minimizes the likelihood for CRS deserves further investigation. A more surgically aggressive approach in CRS patients may be supported in light of these patients excellent outcomes.

POSTERS

Poster #183

Rhinovirus and sinusitis: a systematic review

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COI: No Disclosure Reported

Introduction

Rhinovirus (RV) is the most common virus in acute viral sinusitis, however the role of RV in progression to chronic sinusitis is not known. We performed a comprehensive systematic review to determine the association between RV and the epidemiology, pathophysiology, and clinical course of sinusitis.

Methods

We conducted an indexed literature search through April 26, 2017 of MEDLINE, Embase, Web of Science, and BIOSIS databases using the key words: rhinovirus, sinusitis, viral, and bacterial. We included all English-language articles and excluded studies that were primarily focused on lower airway pathology. Data regarding study design, population/setting, methods, and bias was collected.

Results

The initial search generated 608 titles/abstracts, of which 248 were duplicate records. After the primary review, a total of 174 articles were selected for secondary review, of which 76 (43.7%) were epidemiologic studies, 75 (43.1%) assessed pathophysiology, 28 (16.1%) examined treatment options, and 9 (5.2%) were prospective studies in which subjects were infected with rhinovirus and followed clinically.

Conclusions

Rhinovirus is frequently the sole pathogen isolated during acute rhinosinusitis, and can also be found co-occurring with bacterial infections. Rhinovirus is present in a large portion of patients with chronic rhinosinusitis, though may not be associated with symptomatic exacerbations. There is evidence to suggest that rhinoviral infection may induce changes in the histologic and immunologic functionality of the nasal mucosa and may alter the nasal microbiota, thus predisposing to bacterial infection. The pathophysiology of RV-induced sinusitis may lead to preventative therapies to slow the progression of chronic sinusitis.

Poster #184

Safety of exhalation delivery system with fluticasone (eds-flu) for treatment of chronic rhinosinusitis with nasal polyps (crswnp): Integrated safety results from navigate I and II

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COI: Yes, Study funded by OptiNose US Inc.

Background

Compared to conventional nasal sprays, EDS-FLU delivers steroid more broadly and in high/deep intranasal target sites, notably the ostiomeatal complex where sinus ostia drain/ventilate and polyps originate. We report on the safety of EDS-FLU in treatment of CRSwNP.

Methods

Two randomized, 24-week (16 double-blind+8 open-label), placebo-controlled studies were analyzed. Subjects (N=643, mean age=45.4, prior steroid treatment=90.5%, prior surgery=32.5%) with moderate-severe CRSwNP received EDS-FLU (93µg, 186µg, or 372µg bid) or EDS-placebo. Safety assessments included history/physical, adverse events (AE), serial nasoendoscopy and ocular examination.

Results

AEs were reported in 54% receiving EDS-FLU and 50% receiving placebo. AEs leading to study discontinuation were more common with placebo (3.7%) than EDS-FLU (1.7%). For EDS-FLU (vs. placebo), the most commonly reported AEs were nasal mucosal bleeding (either new or old) identified by nasal endoscopy (18.1% vs. 3.8%), subject report of nose bleed (8.7% vs. 2.5%), nasal mucosal disorder ('erythema'; 8.7% vs. 4.3%), and endoscopically-identified nasal septum erosion/ulceration (6.4% vs. 2.5%). Most epistaxis was 'mild' in severity (90.7% of patients); 'severe' epistaxis was not reported. Epistaxis typically resolved spontaneously (92.5%) with continued use of EDS-FLU (98.8%). Reported septal erosions/ulcerations were generally not persistent, with 97.8% endoscopically observed to resolve with continued use of EDS-FLU. There was no increased risk for intraocular pressure changes or cataracts with EDS-FLU. Serious AE reports were rare with EDS-FLU (3/482, 0.62%) and none were related to treatment. The AE profile did not change with increasing exposure time.

Conclusions

EDS-FLU is well tolerated with a safety profile comparable to conventional INS in patients with CRSwNP.

Poster #185

Single institution review of emergency functional endoscopic sinus surgeries (fess).

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COI: No Disclosure Reported

Introduction

Functional endoscopic sinus surgery (FESS) has become a well established method, and indeed the gold standard treatment for sinus surgical pathologies. This is an exhaustive review of all hospital records of FESS which are coded as 'emergency' in the operative notes. This is a review done in a single tertiary hospital.

Aim

The aim of this study is an audit, with statistical and descriptive reports of emergency FESS surgeries done in a tertiary hospital for three consecutive years.

Methods

All surgeries with the codes for FESS are extracted from the hospital database from 2010 to 2013. Cases which are coded as emergency are then sieved out. This database is consistent and intact from 2010 to 2013. There has been no change or migration of database or software during this period. All downtime periods are required to be entered into the system as per hospital policy.

Results

18 (0.0614%) emergency FESS were performed, out of the 293 recorded FESS. 10 were males.
6 were older than 60 years old. 9 were due to sinus complications, 6 were due to pituitary complications, the rest of the 3 were for others, for example prevertebral abscesses. Post operation, 10 had resolved, 3 had improved, 1 had no change and 2 passed away.

Discussion

This is the first such audit reported for emergency sinus surgeries in published literature. Emergency FESS are fairly rare. Most are in older persons. The most common reason is sinusitis related complications.

Poster #186

Sinogenic septic cavernous sinus thrombosis and the challenge of diagnosis: a case report

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COI: No Disclosure Reported

Introduction

Sinogenic cavernous sinus thrombosis (CST) is a rare and challenging diagnosis. This report describes the presentation, workup, and management of a patient with CST resulting from sphenoethmoidal sinusitis.

Methods

Case report.

Results

A 12-year-old female presented with a 1-month history of persistent headaches, nausea and new-onset diplopia. The headaches were also localized over the left side. She was previously diagnosed and treated for infectious mononucleosis and then viral meningitis two weeks prior to the development of the diplopia. On examination, the patient was noted to have a left CN VI palsy and purulence from the left sphenoethmoidal recess. Imaging showed left sphenoethmoidal sinusitis and a small abscess within the cavernous sinus. The patient was started on systemic antibiotics and underwent endoscopic drainage of the left ethmoid and sphenoid sinuses. Intraoperative sinus cultures grew multiple Staphylococcus species. The patient improved postoperatively, but continued to have residual CN VI palsy requiring close ophthalmology follow-up.

Conclusion

Infectious CST generally responds to a combination of antibiotic therapy and endoscopic sinus surgery, but full recovery of neurologic sequelae is rare. Prompt diagnosis and treatment are thus vital. This report highlights the diagnostic challenges for CST prior to the onset of neurologic manifestations.

POSTERS

Poster #187

Sinonasal hemangiopericytoma of the anterior skull base: a case report and literature review

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COI: No Disclosure Reported

Introduction
Hemangiopericytomas (HPC) are rare vascular neoplasms of pericytic myoid differentiation. Fifteen to 30% of all HPC arise in the head and neck, with the sinonasal variant (SNHPC) considered pathologically distinct from its soft tissue counterpart. With SNHPCs accounting for less than 1% of all sinonasal tumors, and with less than 200 cases reported in the literature, we herein report a rare case of a patient with SNHPC arising from the left posterior superior septum and skull base.

Methods
Case report and literature review.

Results
The patient is a 48-year-old man who presented with 4 months of left-sided facial pressure that he noticed after deep water diving. On nasal endoscopy, he had a cherry-red mass medial to the left middle turbinate and anterior to the sphenoid ostium. CT scan demonstrated a polypoid soft tissue mass in the left posterior nasal cavity with partial obstruction of the drainage pathways of the left sphenoid and posterior ethmoid sinuses. MRI showed a T2 hypointense, uniformly and avidly enhancing polypoid mass without intracranial extension. The patient underwent preoperative angiography, which demonstrated moderate tumor blush, and selective embolization of the left sphenopalatine artery was performed. This was followed by complete endoscopic resection. Immunohistochemical stains and morphologic findings on pathology were diagnostic of sinonasal hemangiopericytoma.

Conclusion
This report represents a rare case of a sinonasal hemangiopericytoma arising from the posterior septum extending to the skull base. As these tumors are known to be vascular in nature, management with preoperative embolization can aid in complete endoscopic resection.

Poster #188

Sinonasal inverted papilloma recurrence rates after endoscopic surgery: a retrospective review

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COI: No Disclosure Reported

Introduction
Sinonasal inverted papillomas (SNIPs) are benign epithelial growths with high recurrence rates after surgical management. This study primarily aims to evaluate SNIP recurrence rates after endoscopic surgery. Secondarily, potential associations, including a comparison of published staging systems, will be reviewed.

Methods
The chart review evaluated primary and revision SNIP patients treated from January 2008 to December 2016 at a tertiary sinus centre. Data was collected on patient demographics, origin site, surgical approaches, follow-up duration, recurrence, and smoking history. Cases were staged using Krouse, Oikawa's Modified Krouse, Kamel, Han, and Cannady systems.

Results
55 primary and 22 revision SNIP patients had a mean follow-up of 41.2 months (SD: 27.8 months). 11 primary cases (20.0%) and 5 revision cases (22.7%) had recurrences. Primary and revision cases had a mean time to recurrence of 24.0 months (SD: 17.7 months) and 14.6 months (SD: 4.3 months) respectively. Smoking history had an odds ratio of 0.68 (CI 95%: 0.20-2.39) for recurrence.
Patient groups defined by each staging system were compared by Kaplan-Meier survival analyses and logrank tests. Chi-squared values for Krouse, Oikawa, Kamel, Han, and Cannady systems were 7.05 ($p>0.05$), 7.06 ($p>0.05$), 1.62 ($p>0.05$), 9.14 ($p=0.028$) and 7.48 ($p=0.024$) respectively.

Conclusion
Recurrence rates found in this study are comparable to published literature. No statistical significance was found associating smoking with recurrence. Han and Cannady staging systems were found to define patient groups that correlated well with recurrence. SNIP recurrences post-surgical management are dependent upon experience, technique, and factors that warrant further research.

Poster #189

Sinonasal inverted papilloma: can we predict and prevent aggressives recurrences?

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COI: No Disclosure Reported

Objectives

Inverted papilloma (IP) is a sinonasal tumor well known for its high recurrence potential. Risk factors for recurrence are still debated in the literature. The aims of this study were to investigate risk factors for aggressive IP recurrence, and to highlight if the type of surgery can improved the risk of recurrence.

Methods

We present 55 cases of sinonasal inverted papillomas that were treated at our hospital from 2006 to 2015. The patients were studied by age, gender, clinical presentation, endoscopic findings, site of presentation of the tumor, histopathology, radiological studies, surgical treatment and evolution. Statistical analysis with univariate and multivariate models as well as Kaplan-Meir and Cox regression models were performed.

Results

Thirty-five of the patients were males (64%) and twenty were females (36%). Bony erosion in the CT scan was found in 25,8% of patients and was a significant risk factor for IP recurrence ($p<0,05$). Recurrence was observed in eight patients (14%) in our sample and all of them were associated with maxillary sinus or internal canthus invasion. Two other patients had had malignant transformation.

Conclusion

Bony erosion on a CT scan was a significant strong associated factor of IP recurrence. Maxillary sinus or internal canthus and lacrymal duct invasion at presentation were related to aggressive IP recurrence. Performing dacryocystorhinostomy when indicated and/or bone excision of the papilloma attachment site minimize recurrences. As recurrent inverted papilloma can develop after many years, long follow up time of the patients is mandatory for the early detection of recurrence.

Poster 190

Sinonasal manifestations of Igg4-related disease: Case report of an orbitonasal fistula

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COI: N/A

Introduction

IgG4-related disease is an uncommon but increasingly recognized rheumatological disorder which can affect multiple organs including the salivary glands, orbit, pancreas, and kidney. IgG4-positive plasma cells are predominant in dense lymphoplasmacytic infiltrations. While this disease is overall more common in men overall, in disease involving the head and neck men and women are affected equally. We present a case report of a patient with an orbitonasal fistula. In addition, we review the literature regarding IgG4-related disease manifestations in the head and neck, especially sinonasal symptoms.

Methods

Case report and literature review

Results

A 78-year-old man with a history of chronic sinusitis treated with previous sinus surgery and bicoronal frontal sinus obliteration had a left enucleation for orbital inflammatory pseudotumor which was unresponsive to steroids and methotrexate. On pathology, he was found to have posterior necrotizing scleritis with plasmacytic infiltrate suggestive of IgG4-related disease. Evaluation by rheumatology confirmed the diagnosis. Two years later, he presented with left eyelid necrosis and acute sinusitis. He was found to have a large fistula from the orbit to the ethmoid cavity. Biopsy of the sinus mucosa showed severe sinusitis with increased IgG4-positive plasma cells. Progression of the wound ceased with medical management of his sinusitis, wound debridement, and wound care.

Conclusions

IgG4-related disease can manifest with head and neck involvement, especially orbital, but may also involve the paranasal sinuses. While management of the underlying disease may be difficult, sinusitis in this population can respond to standard medical treatment.

POSTERS

Poster #191

Sinonasal mucosal melanoma: A population-based comparison of the eurocare and seer registries

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COI: No Disclosure Reported

Objectives/Hypothesis
Sinonasal melanomas are rare tumors, with no comparative survival studies between Europe and United States (U.S.). The aim of the study is to provide the first population based survival analysis between the two continents.

Study Design
Retrospective population-based survival analysis.

Methods
The EUROpean CAncer REgistry (EUROCARE) database and the United States Surveillance, Epidemiology, and End Results (SEER) database were queried to identify patients diagnosed with sinonasal melanoma between 2000 and 2007. Relative survival (RS) data were grouped by age, gender, geographic region, extent of disease, and treatment modality.

Results
1,294 cases of sinonasal melanoma were identified from both databases between the years 2000 and 2007 (935 from EUROCARE-5 and 359 from SEER). Females were most commonly identified in Europe (56.4%) and the U.S. (54.9%). Patients over the age of 65 years were comprised the greatest proportion of patients in Europe (70%) and the U.S (71%). By region, Southern Europe had the highest 5-year RS (31.6%, 95% CI = [21.3%-42.5%]) and Eastern Europe had the lowest 5-year RS (16.5%, [7.5%-28.5%]). The aggregate European 5-year RS was 25.4% [21.8%-29.1%], as compared the U.S. (29.7%, [23.6%-36%]).

Conclusions
This study represents the first report of European survival data with comparison to the US for sinonasal melanomas. No significant differences in 5-year RS between Europe overall and the United States were identified.

Poster #192

Sinonasal squamous cell carcinoma: a comparison of european and american populations

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COI: No Disclosure Reported

Objective
Sinonasal squamous cell carcinomas are rare tumors, with no comparative survival studies between Europe and United States (US) reported to date. The aim of this study is to provide a side-by-side comparative population-based survival analysis between the two continents.

Study Design
Retrospective population-based survival analysis.

Methods
The EUROpean CAncer REgistry (EUROCARE) database and the United States Surveillance, Epidemiology, and End Results (SEER) database were queried to identify patients diagnosed with SNSCC between 2000 and 2007. Relative survival (RS) data were grouped by age, gender, geographic region, extent of disease, and treatment modality.

Results
A total of 6,743 cases of SNSCC were identified, 5,005 from EUROCARE-5 and 1,738 from SEER. Males were most commonly identified in Europe (65.2%) and the US (65%). Patients over the age of 55 years comprised the greatest proportion of patients in Europe (78.4%) and the US (73.9%). Females demonstrated favorable 5-year RS in all regions except for the US. By region, Central Europe had the highest 5-year RS (57.9%, 95% CI = [54.2%-61.5%]) and Eastern Europe had the lowest 5-year RS (32.9%, [28.3%-37.6%]). The aggregate 5-year RS for Europe and the US were 50.3% [48.4%-52.2%] and 53.7% [50.8%-56.6%], respectively.

Conclusions
This study represents the first report of SNSCC comparison of outcomes between Europe and US. In the European population, survival was higher in females while no gender disparities were observed in the US. No significant differences in 5-year RS between Europe and the US were observed.

Poster #193

Sinonasal symptoms following laryngectomy: A cross-sectional analysis

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COI: No Disclosure Reported

Introduction
After total laryngectomy, the severe reduction in nasal airflow alters the function and physiology of the nasal cavity, which can result in sinonasal symptoms. This study sought to characterize the degree of sinonasal symptoms experienced by laryngectomees.

Methods
Patients with a history of total laryngectomy underwent assessment of sinonasal symptoms using the Reflective Total Nasal Symptom Score (rTNSS), Sino-Nasal Outcome Test (SNOT-22), and visual analogue scales (VAS). Patients also underwent nasal endoscopy, and recordings of the endoscopies were graded by blinded reviewers using the Modified Lund-Kennedy (MLK) scale.

Results
36 laryngectomees and 12 controls who had a history of head and neck cancer without laryngectomy were enrolled. The mean time since laryngectomy was 6.4 years. Although the total SNOT-22 was similar between the two groups (27.3 vs. 20.3, p=0.158), the laryngectomy cohort had higher rhinologic (p<0.001), extranasal (p=0.011), and ear/face (p-0.014) subdomain scores. VAS scores were worse in the laryngectomy group for nasal congestion (p<0.01), rhinorrhea (p<0.01), postnasal drip (p<0.01), and sense of smell (p<0.001), but not for nasal/facial fullness (p=0.11). rTNSS (4.7 vs. 2.8, p=0.037) and MLK scores (2.8 vs. 0.8, p=0.01) were significantly higher in the laryngectomy group. Fifteen (44%) patients in the laryngectomy group believed their sinonasal symptoms were well controlled, compared to 10 (83%) in the control group.

Conclusions
Laryngectomy patients are likely to experience a higher degree of sinonasal symptoms and have more abnormal nasal endoscopic findings. Post-laryngectomy sinonasal dysfunction may be an important aspect of quality of life impairment in the laryngectomee population.

Poster #194

Spontaneous perforations of the nasal septum and tympanic membranes as a result of bevacizumab

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COI: No Disclosure Reported

Introduction
Bevacizumab is a vascular endothelial growth factor inhibitor widely used in the treatment of a number of cancers including colorectal, non-small cell lung, and glioblastoma. Because of its anti-angiogenic mechanism of action, adverse effects include spontaneous necrosis of tissue. For example, perforations of the nasal septum and bowel have been reported. We present the first case of a patient presenting with spontaneous perforations of the nasal septum and tympanic membranes (TM) associated with bevacizumab treatment after whole brain irradiation.

Methods
Case report and review of the literature
Results
We present the case of a 58-year-old man presenting with bilateral hearing loss and recurrent bilateral nosebleeds for 4 months. He had metastatic adenocarcinoma of the lung and had been on bevacizumab for 12 months with prior whole brain irradiation for metastases. On exam, he was found to have pale-appearing TMs with dry perforations bilaterally. Nasal endoscopy revealed a 1.5 cm anterior septal perforation. Repair of the TM and septum was not attempted due to the concern for compromised vascular supply of the surrounding tissue.

Conclusions
This is the first report of spontaneous perforations of the TM and nasal septum resulting from bevacizumab therapy with prior whole brain irradiation. Given the wide use of this chemotherapeutic agent for a number of common cancers, it is important for otolaryngologists to recognize adverse effects in the head and neck.

POSTERS

Poster #195

Study of anthropometric measurements of the anterior ethmoidal artery using three- dimensional scanning on 300 patients

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COI: No Disclosure Reported

Introduction
The anterior ethmoidal artery (AEA) is one of the main arteries that supply both the nasal mucosa and the ethmoid sinuses. The AEA shows variability regarding its distance from adjacent structures. Several studies have developed techniques to identify the AEA. Objective: This study aimed to compare the measurements from the AEA to the ethmoid bulla and to the frontal beak by using computed tomography of the face, while identifying their intraindividual and interindividual variations.

Methods
We analyzed 300 CT scans of the face performed at the CT scan Center at Hospital. The average age of subjects was 36 ` 15.1 years (range 4–84).

Results
We found that the average distance from the AEA to the ethmoid bulla was 17.2 ` 1.8 mm and the distance from the AEA to the frontal beak was 15.1 ` 2.2 mm. Regarding the average distance from the AEA to the frontal beak (AEA-frontal beak), there was a difference between the right and left sides, with the former being 0.4 mm higher on average than the latter. Among the age groups, there was a significant difference of distances between the AEA and the ethmoid bulla (AEA-ethmoid bulla), which were shorter in the 12 years group. There was a positive and significant correlation between both measurements analyzed, with low values (high) of AEA- ethmoid bulla distance corresponding to low values (high) of AEA-frontal beak distance.

Conclusion
The measurements obtained adds anatomical knowledge that can serve as a parameter in frontal and ethmoid sinus surgery.

Poster #196

Sudden asystole due to trigeminocardiac reflex during endoscopic sinus surgery

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COI: No Disclosure Reported

Background
Transient bradycardia hypotension and asystole arise from activation of the trigeminal reflex by direct stimulation of the trigeminal nerve. It is called the trigeminocardiac reflex (TCR), and is caused by autonomic nerve reflex. We report a case who had sudden asystole due to TCR during endoscopic sinus surgery under general anesthesia.

Case description
A 49-year-old man came to us complaining of the left nasal bleeding and stuffy nose. Tumor-like polyps in the left nasal cavity was observed. CT and MRI indicated that the mass lesion occupied the maxillary, the ethmoid, and the sphenoid sinus, and inverted papilloma (IP) was suspected.
ESS was performed under general anesthesia. The mass lesion was diagnosed as IP by frozen section, and was resected by micodebrider. The stoke of the tumor was at the sphenoid sinus. When we dissected the stoke adhered to the lateral wall of the sphenoid sinus, asystole had suddenly occurred. Heart rate was resumed a few seconds later. Sudden asystole again occurred by the same manipulation. Though tumor was not completely resected, we decided to stop the operation. Sudden asystole was considered to arose from activation of the trigeminocarduac reflex by direct stimulation of the second branches of the trigeminal nerve. After ESS, liver cancer was found by general examinations. IP was followed up without enlargement.

Conclusion
Although TCR occurs rarely and usually is self-limiting, surgeons should be cautious of its occurrence, especially when manipulating the sphenoid sinus.

Poster #197

Systemic exposure to fluticasone propionate with an intranasal exhalation delivery system with fluticasone (eds-flu) 186 ?g versus observed, dose-normalized and reported orally-inhaled Flovent® hfa 220 ?g

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COI: Yes, Study funded by OptiNose US Inc.

Background
EDS-FLU delivers fluticasone propionate (FP) more deeply/broadly in the nasal cavity with less loss to drip-out and swallowing than conventional nasal sprays, resulting in increased intranasal on-target exposure. We evaluated if increased on-target exposure increases systemic exposure to FP compared to an approved FP product by comparing exposure from EDS-FLU and Flovent® HFA.

Methods
FP pharmacokinetic (PK) data was obtained following single doses of EDS-FLU 186µg and 372µg in healthy subjects (n=90) in Part A of a randomized, crossover study. In Part B, EDS-FLU 372µg and Flovent 440µg single-dose PK data were obtained in patients with mild-to-moderate asthma (n=27). A population PK model was fit to the EDS-FLU data to allow simulation of EDS-FLU 186µg under repeat-dosing conditions for comparison to the repeated-dose exposure reported for Flovent 220µg.

Results
Single doses of EDS-FLU 186µg produced lower FP Cmax (16.03 vs. 19.89 pg/mL, geometric mean ratio [GMR]=80.6%) and substantially lower FP AUC0-8 (100.50 vs. 200.05 hr·pg/mL, GMR=50.2%) in healthy subjects compared to single doses of Flovent 220µg (dose-normalized from 440µg) in mild-to-moderate asthmatics. Population PK data for repeat-dose AUC0-12 and Cmax following EDS-FLU 186µg BID was much lower than the steady-state exposure reported for Flovent 220µg BID (Cmax 22.71 versus 45.8-80.6 pg/ml, GMR=28.2-49.6%; AUC0-12 123.8 versus 191.0-463.6 hr·pg/mL, GMR=26.7-64.8%).

Conclusions
EDS-FLU 186µg produces much lower systemic FP exposure than Flovent 220µg following single doses. Population PK exposure estimates for EDS-FLU 186µg BID at steady state show FP exposures that are low and below orally inhaled FP exposures previously proven to be safe.

Poster #198

Test/re-test reliability of smell identification testing

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COI: No Disclosure Reported

Background
Recent investigations have examined the impact of olfactory function on quality of life in patients with rhinologic disease and after various surgical or medical interventions. Smell identification testing (SIT) is a standard component of these test batteries. The present report assesses test/re-test reliability of the 40 item SIT (SIT-40).

Methods
Post hoc analysis of prospectively collected data where normal volunteers were administered SIT-40 at a screening visit. Those who were normosmic received a second SIT-40 after one week, during which no interventions were performed. Results of the serial SIT-40 evaluations were compared statistically.

Results
Overall 39 subjects, who considered themselves normosmic, underwent screening. This revealed 6/39 (15.4%) were hyposmic, while normosmia was confirmed in 33/39 (84.6%). Follow-up testing was done in the latter group, in which mean (SD) age was 35.7 (9.7) and 28/33 were female (84.8%). Mean (SD) SIT-40 change was 0.09 (1.99) points (p=0.79). A change of at least 4 points was observed in 4/33 subjects (12.1%), where improved and declined scores were seen in 2 cases each.

Conclusions
Subjects perceiving themselves as normosmic may manifest reduced smell acuity upon objective testing. Healthy individuals likely experience subclinical fluctuations in olfaction. Across a series of subjects enrolled in clinical research, these variations appear to counterbalance one another. The present findings are relevant to investigators utilizing olfaction to study disease pathophysiology or clinical outcomes.

POSTERS

Poster #199

The effect of maxillary sinus size on post-operative endoscopic scores and bacterial content

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Background
The surgical management of maxillary sinusitis ranges from minimal ostial dilation to total medial maxillectomy. We hypothesized that the surgical maxillary antrostomy size would have an effect on post-operative endoscopy scores and microbiome of the maxillary sinus.

Methods
Five individuals diagnosed with acute recurrent sinusitis were consented and randomized to receive minimal maxillary ostial dilation via balloon sinuplasty (mini-antrostomy) on one side versus a mega-antrostomy on the contralateral side. Intra-operative endoscopic and radiologic Lund-Mackay scores were calculated to ensure there were no initial differences between the mini- and mega-antrostomy maxillary sinuses. During surgery (intra-op) and at their post-operative visit (>3 weeks) microbiome swabs were obtained from each maxillary sinus, and 16S DNA extracted. The use of each patient as their own control allowed us to minimize confounding variables.

Results
There were no statistical differences in intra-operative and post-operative endoscopic scores between each individuals' maxillary sinus. The bacterial content of the swabs post-operatively between the mini-antrostomy (mean 19.5 ng/sample, SEM 14.7) and mega-antrostomy (mean 8.27 ng/sample, SEM 3.6) were not statistically significant (p=0.40 by paired student's t-test).

Conclusions
The surgical size of the maxillary sinus opening does not appear to affect post-operative endoscopic scores or total bacterial burden. Additional subject enrollment is ongoing and 16S sequencing will be performed to determine if there are alterations in the composition of the sinus microbiome between mini- and mega-antrostomy.
This research was conducted with support from the Investigator-Initiated Study Program of Acclarent, Inc.

Poster #200

The effectiveness of endoscopic sinus surgery for pediatric nasal polyp

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COI: No Disclosure Reported

Introduction
Chronic rhinosinusitis with polyp in pediatric population is an uncommon pathology and continues to be a challenging problem. In children inflammatory polyp associated with frequent infection is more common than eosinophilic polyp. This study aims to assess the clinical features and surgical outcome of endoscopic sinus surgery (ESS) in pediatric nasal polyp.

Method
Thirty patients younger than 19 years who had ESS for nasal polyp from 2010 to 2015 were available for analysis by medical records. The patients were classified into two groups:23 cases of chronic rhinosinusitis with nasal polyposis (CRSwNP) and 7cases of antrochoanal polyps (ACP). The outcome of ESS was evaluated through endoscopic examination and medical record.

Results
The mean age of patients were 15 years with an age range of 6 to 18 years. Among patients treated for nasal polyps, there were 22 boys and 8 girls and 24 patients (80%) had bilateral disease. Twenty six patients were treated with ESS and four patients with ESS with concomitant adenoidectomy. Four patients (13.3%) showed recurrence after ESS . CRSNP groups (13.0%, 3/23) and ACP(14.3%, 1/7) groups had no significant difference in recurrence rate. CRSwNP group showed higher CT Lund-Mackay scores than ACP group. Four patients have allergy and two patients have asthma.

Conclusion
Nasal polyps in children are more common in teenagers, are usually bilateral, and had good surgical outcome by ESS. The results of this study suggest that pediatric ESS is a safe and efficacious therapy for management of chronic rhinosinusitis with polyp in children

Poster #201

The effects of battlefield exposure on respiratory and sinonasal disease

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COI: No Disclosure Reported

Background
There is increasing awareness of respiratory illness following deployment of soldiers to the Middle East and Southwest Asia. Scrutiny has been given to effects of battlefield exposure on the lower respiratory tract, while effects on the upper respiratory tract, including sinonasal manifestations, have not been widely reported. With over 300,000 United States Armed Forces members deployed overseas, a large population is at risk for unknown adverse health effects.

Methods
A literature review was conducted using PubMed and Google Scholar with the terms “exposure,” “deployment,” “military,” and “respiratory.” Additional terms were used to focus on the broad categories of environmental factors and chemical weapon exposures, with specific attention toward the upper respiratory system including rhinitis and sinusitis.

Results
Postdeployment respiratory pathology has been the subject of inconsistent study, comprising mostly retrospective reports of patient-reported symptoms. A multifactorial cause has been proposed, ranging from exposure to environmental dust and debris to increased respiratory illness from close living quarters. Furthermore, there is anecdotal and retrospective data suggesting that exposure to chemical agents may have lasting respiratory effects. Reported upper respiratory manifestations include rhinorrhea, congestion, and acute sinusitis. Limited evidence suggests that deployment is linked to development of sinonasal disease through mechanisms similar to those responsible for lower respiratory disease.

Conclusions
Additional pathophysiologic and epidemiologic research is necessary to determine a relationship between military deployment and the development of sinonasal disease. Practicing otolaryngologists should be aware that battlefield exposures among their patients may contribute to rhinologic symptomatology.

Poster #202

The effects of spirulina on allergic rhinitis

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COI: No Disclosure Reported

Introduction
With present medical means, allergic rhinitis still remains inadequately controlled. Effects of spirulina were investigated on allergic rhinitis in just very few investigations. The aim of this study was to determine the therapeutic effect of spirulina platensis in allergic rhinitis.

Methods
This randomized clinical trial was done in Mashhad, Iran. Fifty four patients with allergic rhinitis were randomly allocated into groups. The intervention group was treated with spirulina (2g per day) and control group with cetirizine (Twice a day) for two month. Symptoms of patients based on a standard questionnaire SNOT-22 and inflammatory mediators was assessed and compared before and after treatment.

Results
There was no significant difference between the two groups in the demographic and clinical presentation on the first day. After treatment, sniff ($P = 0.009$), sneezing ($P = 0.014$), runny nose ($P = 0.001$), cough ($P = 0.016$) and ear fullness ($P = 0.024$) in the spirulina group were significantly lower compared to the control group. Also there was no significant difference between the two groups in the inflammatory mediators on the first day but after two month of treatment, IL1A ($P < 0.001$), IL1B ($P < 0.001$) and IL4 ($P = 0.008$) were significantly lower and IL10 levels were significantly ($P = 0.049$) higher in the spirulina group compared to the control group.

Conclusion
Spirulina is more effective than cetirizine in improvement of both clinical presentation and inflammatory mediators of patients. Spirulina could be considered as an alternative treatment in allergic rhinitis patients.

POSTERS

Poster #203

The efficacy of middle turbinate shave for improving middle meatal access

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COI: No Disclosure Reported

The efficacy of middle turbinate shave for improving middle meatal access

Introduction
Bulky middle turbinates (MT) may narrow the middle meatal (MM) space, impeding surgical access intraoperatively and obstructing delivery of topical medication post-operatively. The lateral microdebrider MT shave is a new technique that may help increase MM space for intraoperative access and post-operative irrigation delivery.

Methods
Fifteen MT shave procedures were prospectively evaluated in ten patients with bulbous MTs undergoing endoscopic sinus surgery for chronic rhinosinusitis. Endoscopic measurements of MT width and MM width before and after shave were obtained in the operating room. Endoscopic image was recorded at 2 weeks post-operatively before and after nasal cleaning. Blinded reviewers reviewed the image to score for present of crusting, synechiae and lateralization. MT width and MM width were also recorded at this time.

Results
The mean pre-shave thickness of MTs was 5.03 mm (range 4-7 mm), while the pre-shave width of MM space was 2.23 mm (range 1-4 mm). Post-shave, the mean MT thickness was 2.57 mm (range 2-3 mm) and the width of MM space was 4.7 mm (range 3-6.5 mm). At the 2-week post-operatively, the improved post-shave MT thickness and the MM space was maintained. Blinded reviewers noted no synechiae formation with no lateralization and the mucosa were nicely healed.

Conclusion
The lateral microdebrider MT shave may help to create a wider MM space, allowing for better intraoperative access and post-operative irrigation/medication delivery.

Poster #204

The fate of the bone graft in cerebrospinal fluid rhinorrhea endoscopic repair for idiopathic intracranial hypertension: a retrospective case series analysis

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Introduction
Idiopathic intracranial hypertension (IIH) is a common cause of spontaneous cerebrospinal fluid (CSF) leaks necessitating surgical intervention, and grafting of septal, mastoid, or turbinate bone over the defect is increasingly performed to strengthen the repair of the primary defect. However, the postoperative fate of these grafted bone fragments is largely unknown.

Methods
We performed a retrospective study of patients at the University of Pennsylvania undergoing repair of spontaneous CSF leaks secondary to IIH. Preoperative and postoperative CT's were analyzed to determine the integration status of the transplanted bone.

Results
Fourteen patients with IIH and spontaneous CSF leak were analyzed, with a mean postoperative imaging follow-up period of four years. Thirteen patients (93%) had bone present on CT imaging, with 11 of these patients displaying evidence of bone integration. Two patients (14%) had a recurrent CSF leak in the same area, including the patient with absence of bone on imaging follow-up.

Conclusions
Bone grafts frequently incorporate when used for repair of spontaneous CSF leaks associated with IIH. The rate of incorporation is comparable to bone grafts used for other etiologies of CSF leak, despite the increased pressure on the repair site. Any rigid repair of the leak site should likely be accompanied by treatment of the underlying intracranial hypertension to avoid leak recurrence.

Poster #205

The maxillary sinus roof as a fixed anatomic landmark in endoscopic sinus and skull base surgery: a systematic review and meta-analysis

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COI: No Disclosure Reported

Background

Endoscopic sinus and skull base surgery can result in potentially devastating complications. Several studies have investigated various intraoperative anatomic landmarks to help the surgeon avoid complications. The objective of this study is to describe the medial maxillary sinus roof (MMSR), also referred to as the medial orbital floor (MOF), as a consistent and reliable fixed anatomic landmark in endoscopic sinus and skull base surgery.

Methods

Using PRISMA guidelines, two authors independently conducted a literature search using PubMed, EMBASE, and Cochrane to identify articles investigating the MMSR/MOF as an anatomic landmark. The quality of studies was assessed using the Methodological Index for Non-Randomized Studies (MINORS) scale. After exclusion criteria were applied, raw data were extracted from the included studies and pooled for meta-analysis and weighted means.

Results

Six studies were included in the meta-analysis. Key measurements with weighted means included a distance from the MMSR to the nasal floor of 34.3 + 3.2 mm [21.10 to 44.2], MMSR to the anterior sphenoid roof of 11.2 + 3.1 mm [3.90 to 21.70], and MMSR to the cribriform of 10.9 + 2.6 mm [4 to 18.4], among others.

Conclusions

This meta-analysis supports the use of the MMSR/MOF as an intraoperative fixed anatomic landmark for endoscopic sinus and skull base surgery to avoid surgical complications.

Poster #206

The readability of American Rhinologic Society patient education materials: A four-year update

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Background

The American Rhinologic Society (ARS) offers free patient education materials online. Our previous study in 2012 found that these materials were written at a higher reading level than that of the average American. Here, we assess the readability of current ARS patient education materials and investigate whether improvements in readability have been made in the past four years.

METHODS: Patient education articles related to rhinologic conditions were assessed for readability with various readability scales. Average readability scores were compared to NIH and AHA-recommended reading levels. For materials that had been assessed previously in our 2012 study, average readability scores were compared to those previous scores.

Results

By the FRE scale, all articles fell within the “difficult” readability range (scores from 35.8 to 41.4). These scores were not significantly different from our 2012 study. By all of the other scales, articles had readability levels ranging from grade levels 9.5 to 18.3, significantly higher than the 7th to 8th grade level recommended by the NIH and AMA. By these scales, there was no significant change in readability from 2012 versions for the articles overall, although certain individual articles had significantly increased or decreased readability.

Conclusions

Patient education articles provided by the ARS are written at levels much higher than the recommended 7th to 8th grade reading level. As a whole, the readability of these materials has not become more accessible in the four years since our previous study.

POSTERS

Poster #207

Title: does race play a role in variation in crs?

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COI: No Disclosure Reported

Background
Chronic rhinosinusitis (CRS) is an important public health problem in the United States. Although there is wide variation in disease severity, underlying factors that account for this are unknown. We investigated whether CRS disease parameters varied by race and whether demographic factors predicted symptom burden in a well characterized cohort.

Methods
At our urban, academic, tertiary care center, 182 adults who met research criteria for CRS (CT scan, endoscopy, symptoms) were enrolled in the Chronic Rhinosinusitis Integrated Studies Program (CRISP) (59.1% Caucasians; 32.8% African Americans). Sinonasal symptoms were scored (scale 0-5) using a standardized survey; we also collected pertinent clinical information on medical conditions (asthma and allergy, aspirin sensitivity) and demographics (age, race, sex, socioeconomic status by income). We compared basic demographic and clinical parameters by race and performed linear regression to determine factors that predicted increased symptoms in this cohort.

Results
Caucasians and African Americans with CRS did not differ by allergic rhinitis, nasal polyposis, hyposmia, asthma, aspirin exacerbated respiratory disease, or smoking status (P=0.05, all). Race and socioeconomic status did not affect symptom burden, but women (vs. men, ?=0.45, p=0.05) and younger patients (vs. older patients, ?=-0.017, p=0.05)) reported a high symptom score, in adjusted multivariate analyses.

Conclusion
Race does not appear to play a large role in mediating variation in CRS in this cohort, in terms of clinical factors and symptom burden. Younger patients and women, however, suffer from increased symptoms, suggesting that age and sex differences may be important factors in this inflammatory disease.

Poster #208

Transcriptional interaction between human epithelia and microbiota in asian chronic rhinosinusitis

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COI: Yes, The work was supported research fund of Pusan National University Yangsan Hospital and Ulsan National Institute of Science and Technology.

Backgrounds and objectives
Chronic rhinosinusitis (CRS) is one of the most common inflammatory diseases which diminish patients' quality of life. Although antibiotics are tried before decision of endoscopic sinus surgery, we still have limited information about the role of both commensal and pathogenic microbes in Asian CRS. We compared sinus microbiota and tissue of CRS with non-CRS to find out thes microbe inflammatory response which is related to Asian CRS.

Material and Methods
Two types of samples were collected from each sinus of CRS patients (experiment group) or septoplasty patients (control group) during the surgery. Culture samples were obtained by swabbing the sinus mucosa and the tissue samples were collected by cutting the sinus mucosa. Total RNSs were extracted from each sample and cDNAs were made by reverse transcription. The 16S rRNA region of microbiome (25+8 cycles) were amplified using Illumina V34 primers and amplicons were sequenced using MiSeq (2x250 bp run).

Results
Samples from patients with CRS showed greater bacterial abundance and lower diversity compared with non-CRS samples. While Proteobacteria increased in the CRS group, Bacteroides were decreased. Staphylococcus aureus and was higher in samples from CRS with nasal polyps compared with CRS without nasal polyps.

Conclusions
Asian CRS showed greater bacterial abundance and decreased diversity compared to healthy sinus. Decreased diversity of commensal bacteria might act as the key inflammatory reaction of CRS and further analysis on genus/family-specific host responses are needed.

Poster #209

Trans-inferior turbinate approach to the maxillary sinus

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COI: No Disclosure Reported

Objectives

1) Propose the trans-inferior turbinate approach to the maxillary sinus for intractable diseases such as massive polyps, fungus, and inverted papilloma.
2) Demonstrate the surgical procedure and the long-term outcome.

Materials & Methods

Between 2009 and 2015, we have operated on 55 patients with severe maxillary sinus diseases, using trans-inferior turbinate approach. The maxillary sinus diseases included 28 massive polyps, 18 fungus, 9 inverted papilloma (Klouse; T3). The patients consisted of 24 males and 31 females, and their age ranged from 17 to 71. To access whole the maxillary sinus interior, a new approach via the inferior turbinate was employed prior to the conventional ESS. Submucous resection of the inferior turbinate bone was first done, and then the inferior part of the uncinate process and the lacrimal bone connecting to the horizontal inferior turbinate bone was removed through the conchotomy wound. Inferior meatal antrostomy was added if necessary.

Results

Patients were periodically followed from 10 to 72 months postoperatively. Nasolacrimal duct stenosis occurred in 2 patients but immediately improved by nasolacimal tubing. Other complications were not seen. Polyp recurrence was found in 2 cases. They were easily treated in the office.

Conclusion

Conventional ESS approach seems technically difficult to eradicate such intractable maxillary sinus diseases. We believe that our new approach to the maxillary sinus is useful, and is less invasive than other extended maxillary sinus approaches.

Poster #210

Transoral robotic and endoscopic endonasal surgery for resection of a massive clival chordoma: a case report

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COI: No Disclosure Reported

Introduction

The goal of this case report is to describe the use of transoral robotic surgery in combination with endoscopic endonasal surgical technique in the resection of a massive clival chordoma as a follow up to a previous cadaver study at our institution of transoral robotic surgery of the craniocervical junction.

Methods

Case Report.

Results

We present the case of a patient who presented with a massive clival chordoma with extension along the atlantoaxial spine. Previous cadaveric studies at our institution have shown that transoral robotic surgery is of potential use in combination with endoscopic endonasal surgery for operations at the craniocervical junction. This combined technique was used for resection of this patient's tumor. This is one of the first case studies to use transoral robotic surgery as part of the surgical technique for management of skull base neoplasms.

Conclusions

This case report builds on previous cadaver studies to show that the combination of transoral robotic and endoscopic endonasal surgery can be a useful technique for operations at the craniocervical junction.

POSTERS

Poster #211

Treatment of an epithelial barrier dysfunction can lead to resolution of crswnp: clinical proof of concept

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COI: No Disclosure Reported

Introduction

While the pathophysiology of CRS remains elusive, it is believed that CRS pathophysiology involves interaction between the host immune system, sinus microbiome, and epithelial barrier. To date, CRS therapy centers only on the first two elements, and not the epithelium.

Cystic fibrosis (CF) is a genetic disorder where dysfunction of the CFTR gene leads to epithelial inflammation, thickened secretions and dysfunctional epithelial regeneration and repair. New CF medications enhancing CFTR activity and function target the epithelial barrier, it would be of interest to determine whether these help resolve CRSwNP. A recent patient presentation suggests a potential.

Methods

A 40 year old patient with F508/ F508 CF was initially assessed in 9/2013 and followed annually. Pansinusitis confirmed by CT and CRSwNP endoscopically assessed at Grade I/IV R and II/IV L. These scores persisted despite continued management with budesonide irrigations.

From January-December 2016, patient participated in a trial of CFTR-enhancing medication for CF, and in Jan 2017 entered an open-label extension phase where he continued to receive the medication.

Result

Seen for the first time after study participation April 2017, nasal polyps had almost completely regressed, with no polyps detected on R and a single small polyp detected on L. (endoscopic scores of 0/IV R and I/IV).

Conclusion

Treatment of barrier disorder can result in CRSwNP improvement and may thus represent an novel therapeutic target. Further studies targeting epithelial dysfunction in CRS and means for correcting are warranted to better explore this exciting area.

Poster #212

Treatment outcomes of skull base osteoradionecrosis: retrospective analysis

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COI: No Disclosure Reported

Background

Published clinical outcomes of skull base osteoradionecrosis (SBORN) are scarce. We present treatment outcomes of SBORN from what is, to our knowledge, the largest known series.

Methods

A retrospective review was performed for all patients with SBORN treated between 2003-2017 at a single center. Demographics, symptoms, and treatment data were collected. Patients were staged for severity (0, 1, or 2) using a modified published scale for mandibular ORN. Treatment modalities studied included surgical (operative debridement) and non-surgical (oral antibiotics, intravenous antibiotics, medicated nasal irrigation, pentoxifylline-vitamin E, and hyperbaric oxygen). Treatment success was defined by patient-reported symptom improvement after single modality therapy, while failure was defined as unimproved or worsened symptoms. Duration of symptom relief was extracted for each treatment episode.

Results

Thirty-four patients were identified: 6 stage 0 patients, 15 stage 1, and 13 stage 2. There were 70 non-surgical treatment episodes and 8 surgical debridements. Overall success rate of any single modality was 51.3%. Success rates were comparable between non-surgical and surgical treatments (53% vs. 38%, respectively, p=0.48). Duration of symptom relief was comparable between non-surgical treatment (average 6.6+/-3.3 months) and surgical treatment (7.5 months+/-3.8 months), p=0.98. There were no differences in duration of benefit between any of the non-surgical modalities assessed (p=0.209).

Conclusion

Although the overall success rate for treatment SBORN is barely over 50%, both non-surgical and surgical treatment options have comparable success rates and duration of symptom benefit. A variety of non-surgical modalities are equally viable alternatives to surgical treatment.

Poster #213

Trends in endoscopic orbital surgery in the medicare population: temporal, geographic, and comparative analyses

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COI: No Disclosure Reported

Background
Endoscopic surgical techniques have been used to address many orbital conditions once only treatable via open approaches. We analyzed the temporal and geographic trends in endoscopic orbital surgery (EOS), and compared trends in EOS to that of open orbital surgery (OOS) and endoscopic sinus surgery (ESS).

Methods
Medicare-Part-B National Summary data files were analyzed from 2000 to 2015 for temporal trends in EOS, OOS, and ESS procedures using CPT codes. We included dacryocystorhinostomy (DCR), orbital decompression, and optic nerve decompression as relevant orbital procedures. The Medicare-Part-B Carrier Summary data file from 2015 was evaluated for geographic trends. The 2015 U.S. Census population estimate was used to obtain regional populations of individuals = 65 years old.

Results
Between 2000 and 2015, the number OOS remained relatively unchanged (8287 to 7666, -0.4% average annual growth), while the number of EOS steadily increased (1027 to 1932, 4.5% average annual growth). The majority of EOS consisted of DCR. The greatest number of EOS was performed in the South Atlantic region, whereas the Mountain region had the greatest number when controlling for population. Allowable charges paid to physicians from 2000 to 2015 have increased by 117%, 50%, and 195% for EOS, OOS, and ESS, respectively.

Conclusion
Otolaryngologists perform the vast majority of EOS. The number of EOS slowly increased over the last 15 years, especially compared with the rapid increase of ESS. Furthermore, the number of OOS remains stable and continues to far surpass EOS. Differing allowed charges may be a contributing factor.

Poster #214

Update on postnasal drip syndrome in childhood

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COI: No Disclosure Reported

Introduction
Discuss the clinical features and the disease curing methods for the chronic cough caused by postnasal drip syndrome.

Methods
Twenty seven children who were diagnosed with postnasal drip syndrome were given systemic cure such as giving antibiotics, adopt a nasal decongestant, part system using glucocorticoid very carefully.

Results
All above of children follow-up three months. With subjectivity, if symptoms improve action appraises an index, cough of twelve children had different improve. Nine cases did not feel their symptom improve obviously.

Conclusion
The postnasal drip syndrome is complicated. Cough is ?n important clinical feature of postnasal drip syndrome. The treatment is difficult and requires combinative thinking and accurate diagnosis.

POSTERS

Poster #215

Use of a cadaver dissection course for resident education in otolaryngology

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COI: No Disclosure Reported

Introduction

Many constraints pose challenges in surgical education including time pressures in the operating room and limited experience in performing challenging procedures on patients. In this study we sought to determine whether a cadaver dissection course could improve Otolaryngology-Head and Neck Surgery (OHNS) resident surgical knowledge.

Methods

Fourteen otolaryngology residents of varying levels of training completed a two-day cadaver dissection course. Training included instruction by local and national otolaryngology faculty on simulations of various surgical procedures. A self-rated ten-point Likert scale survey and pre- and post-tests were administered to measure the efficacy of the course.

Results

Eight residents completed both the pre and post course surveys and tests. There were significant differences in the median residents' self-reported Likert scores before and after the course in knowledge of sphenoidotomy (4.5 vs 7; p=0.046), endoscopic frontal sinusotomy (Draf II B) (1 vs 5.5; p=0.032), Draf III (1 vs 5.5; p=0.027), dacryoscystorhinostomy (DCR) (3 vs 6; p=0.032), and endoscopic sphenopalatine artery ligation (3 vs 6.5; p=0.046). There were no significant differences in knowledge of septoplasty, and basic endoscopic sinus surgery. There was no significant difference between the pre- and post-tests (p=0.56).

Conclusions

The course resulted in self-reported knowledge increase in advanced sinus techniques such as Draf III, DCR and endoscopic sphenopalatine artery ligation. There was no significant increase of knowledge in basic techniques such as septoplasty and basic endoscopic sinus surgery, suggesting that the cadaver course could be valuable training for more advanced procedures.

Poster #216

Use of steroid-eluting stents in the management of nasopharyngeal stenosis: Case series and literature review

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Objectives

Acquired nasopharyngeal stenosis (NPS) is a rare clinical entity which can significantly affect the quality of life of the patients suffering from this condition. NPS is typically a complication of pharyngeal surgical procedures, radiation therapy, and autoimmune inflammatory disease. The management of NPS is difficult due to its high rates of recurrence. The Propel steroid-eluting stent (Intersect ENT, Menlo Park, CA) has been introduced for its FDA-approved application in the ethmoid cavity and frontal recess following endoscopic sinus surgery and has shown promising results in preventing scarring and restenosis. We present three patients who underwent repair of NPS with off-label use of the steroid-eluting stent at the repair site.

Methods

Retrospective review was performed of three patients who underwent nasopharyngoplasty with steroid-eluting stent placement at a tertiary academic medical center. Review of the literature was also performed to discuss previously published techniques for management of nasopharyngeal stenosis.

Results

The etiologies of NPS for the three patients were radiation therapy for nasopharyngeal carcinoma, uvulopalatopharyngoplasty in a patient with sarcoid, and robotic pharyngectomy with adjuvant radiation therapy for oropharyngeal carcinoma. All three patients had successful recanalization of the nasopharynx following their procedures, with follow up of up to 9 months.

Conclusions

The off-label use of a steroid-eluting stent in nasopharyngeal stenosis is an effective option for management of this traditionally complex condition. This technique is simple, the stent is not bulky or uncomfortable, and it thus offers benefits over more complex surgeries and larger palatal appliances used in previously described reports.

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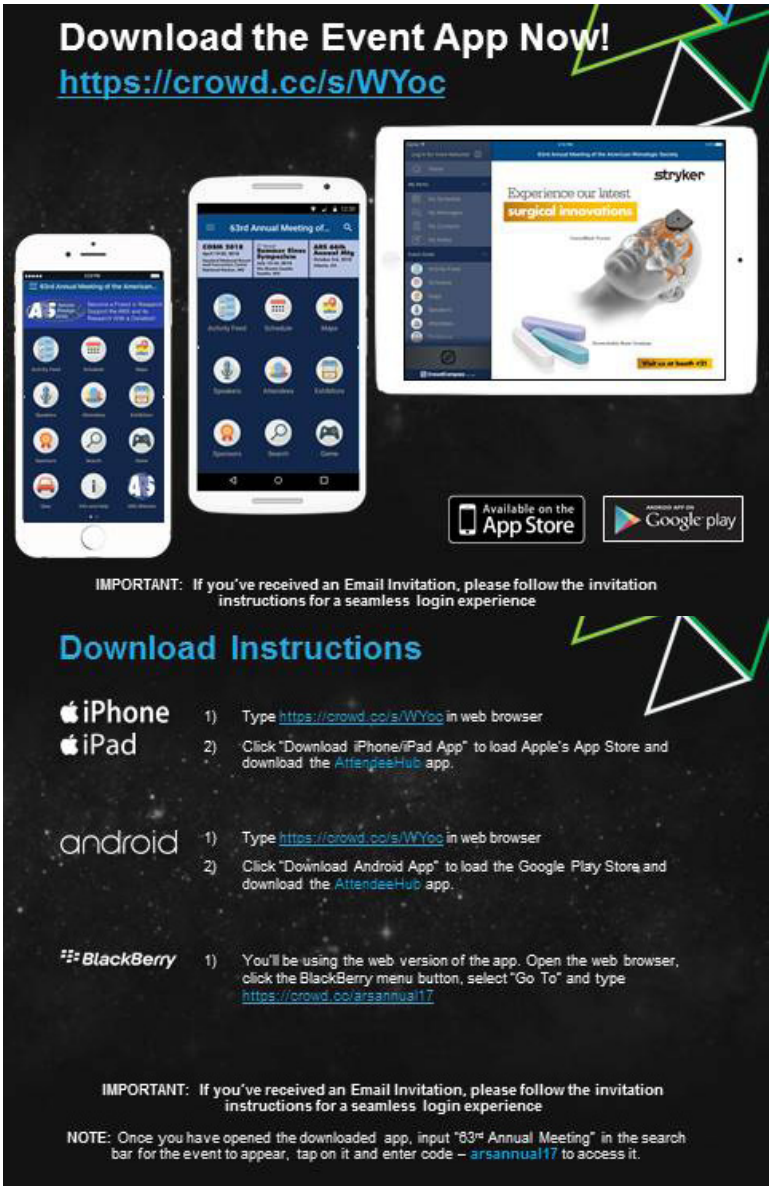

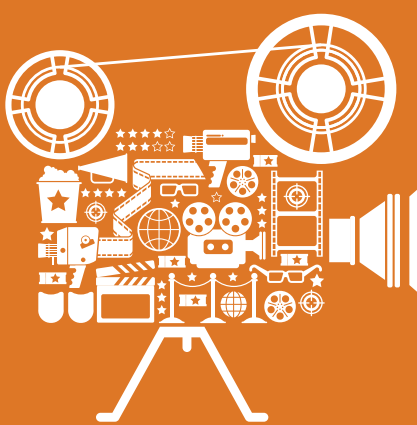

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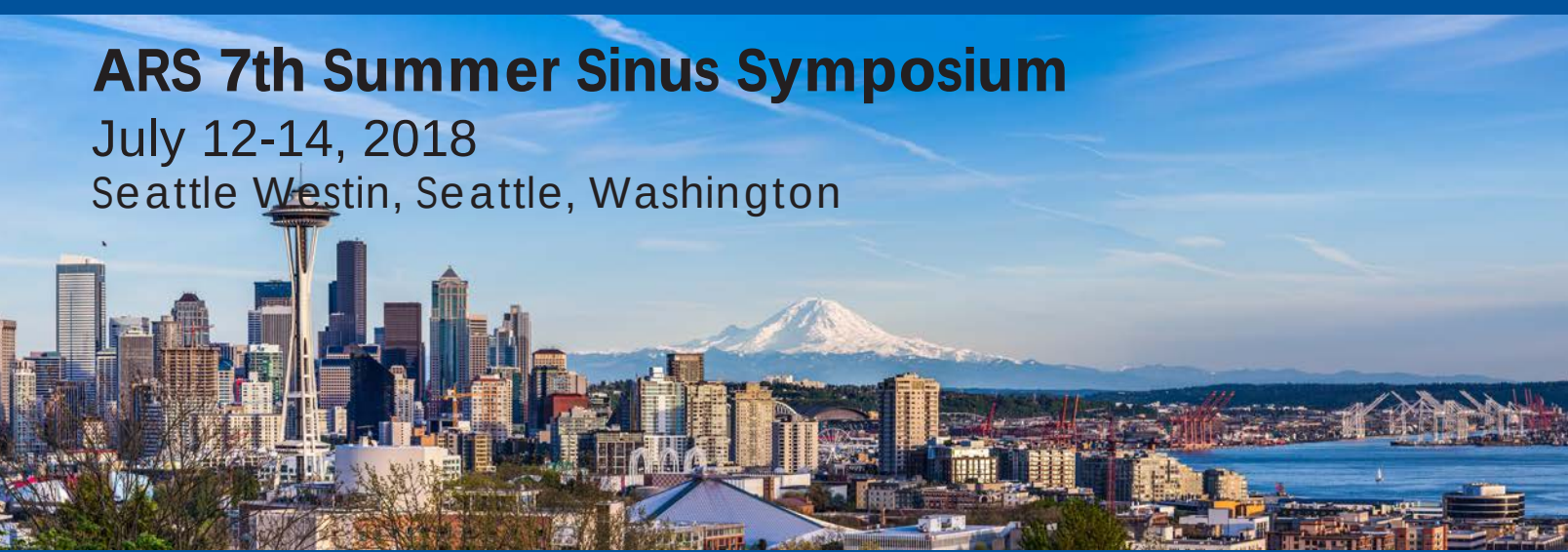

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