



ARS 62nd ANNUAL MEETING

September 16-17, 2016

Manchester Grand Hyatt, San Diego, California

The ARS Welcomes Our 62nd Annual Meeting Guest Countries:
All European Countries



LIVE WEBSTREAMING!
ATTENTION OTOLARYNGOLOGISTS WORLDWIDE!

ATTEND THE AMERICAN RHINOLOGIC SOCIETY
2016 ANNUAL MEETING ONLINE

FREE WITH INTERNATIONAL MEMBERSHIP!
(\$50 registration for non-ARS international members)
Certificate of participation included

Friday, September 16, 2016
1:00 pm - 5:30 pm (US Pacific Daylight Time)

Saturday, September 17, 2016
8:00 am - 5:30 pm (US Pacific Daylight Time)

Learn more at: http://www.american-rhinologic.org/annual_webcast



PETER HWANG, MD, FARS

Presidential Welcome

Welcome to San Diego! It is my great honor and pleasure to welcome you to the 62nd Annual Meeting of the American Rhinologic Society. This year's Program Committee, led by Program Chair John DelGaudio, MD, FARS, has assembled a stellar program representing the very best of cutting-edge research, scientific innovation, and challenging clinical controversies. We have effortlessly and rapidly grown into our newly expanded one and a half-day format, a reflection of the continual growth of our field and the demand for broader venues for scientific and clinical exchanges in rhinology. Kudos to Dr. DelGaudio and his team for putting together a brilliant program.

I would like to extend a special warm welcome to our international delegates, especially to those of you attending the ARS meeting for the first time. We know you have traveled thousands of miles to join us, and we highly value your participation in our meeting. We hope you will not only enjoy the meeting offerings but also consider joining the ARS as an International Member, which entitles you to a free subscription to the International Forum of Allergy & Rhinology, among other member benefits. This year we are pleased to welcome our European colleagues as this year's guests of the Society. We are also delighted to welcome our colleagues around the world who are participating in the livestreaming webcast of the meeting. We are most grateful to the Pan-American Association of Otorhinolaryngology for co-sponsoring our webcast again this year.

I would also like to extend sincere thanks to our many corporate partners, who have generously supported the ARS for this meeting and for our events throughout the year. Our vital partnerships have enabled the Society to grow robustly in its programming, its reach, and its influence. Please take the opportunity to visit our corporate partners in the exhibit space and express your appreciation for their support.

Lastly, I would like to offer my deepest gratitude to the many individuals who work diligently week in and week out on behalf the Society. As a volunteer organization, our Society runs on the passion of rhinologists like you who desire to create impact on behalf of our specialty and our patients. Only through countless hours of hard work from the many individuals serving the ARS are we able to achieve our motto: "Pursuing Global Excellence in Rhinology." This meeting is evidence of the fruitfulness of such dedicated efforts.

Again, welcome and have a great meeting.

Sincerely,
 Peter H. Hwang, MD, FARS
President, American Rhinologic Society



JOHN DELGAUDIO, MD, FARS

President-Elect Welcome

As the President-Elect of the American Rhinologic Society it is my pleasure to serve as the Program Chair for the 2016 meetings. This year the ARS at the American Academy of Otolaryngology-Head and Neck Surgery Annual Fall Meeting will be held at the Manchester Grand Hyatt in San Diego on September 16-17, 2016. The program will provide one-and-a-half days of the highest quality educational content in Rhinology and Skull Base Surgery. The meeting will begin with an afternoon session on Friday September 16, and continue with a full day of content on Saturday September 17, including three breakout rooms in the afternoon.

Once again, I would like to thank the members of the program committee who reviewed and graded a record number of greater than 230 submissions from many countries. As with each of the ARS meetings, the highest rated abstracts will be presented from the podium, and those that are not presented orally will be presented in poster form.

We are honored to have Ricardo Carrau, MD as the 12th Annual David W. Kennedy lecturer. Dr. Carrau will present "Endoscopic Skull Base Surgery: State of the Art & Future Directions". Dr. Carrau is an Otolaryngologist/Skull Base surgeon from Ohio State University, and has been a pioneer in the rapidly advancing field of endoscopic skull base surgery.

I am also pleased to have Patricia Hudgins, MD, Chief of Head and Neck Radiology at Emory University, who will present "Radiologic Imaging of CSF Leaks" and "Pitfalls in Radiologic Workup of the Sinuses and Skull Base".

The ARS will continue the tradition of collaboration with the American Academy of Otolaryngic Allergy with a joint panel, "Pediatric Chronic Rhinosinusitis: Does it Really Exist?"

The following scheduled panels are guaranteed to be educational and controversial:

- Are you doing appropriate ESS? Who should have sinus surgery?
- The socioeconomic impact of CRS and FESS
- Skull base issues: When to resect skull base and orbit
- Timing of sinus surgery: How quickly should we intervene?
- Sinus disease and the immunocompromised patient
- The minimal disease patient: Do I operate and when?
- The recurrent nasal polyp patient: What now?
- Sinus surgery mulligan: A case I would now do differently
- What I learned in training but have abandoned in practice: Experience or evidence?
- Failed sinus surgery: Revise or advanced?

Back by popular demand will be the Fall Film FESStival, a contest for the most interesting video case of sinus or skull base surgery.

The Residents and Fellows Program Luncheon will feature the panel discussion "Five mistakes I made so you don't have to: How to succeed in your early career and the ARS". This is sure to be very informative for those who are early in their rhinology career.

The panels will feature nationally and internationally renowned Rhinologists, making this a truly international meeting. I am excited and confident that this program will again provide excellent practical and scientific content for Otolaryngologists and Rhinologists regardless of the stage of your career. If you are not a member of the ARS I invite you to join and take part in the best educational content available in Rhinology.

Thank you for the privilege of serving the members of the American Rhinologic Society as the Program Chair for the ARS at AAO meeting, and I look forward to seeing you in San Diego.

John M. DelGaudio, MD, FARS
ARS President Elect & Program Chair

American Rhinologic Society Executives - 2015



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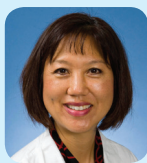


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John M. DelGaudio, MD, FARS
Program Chair

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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.

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 11.75 *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. Discuss the latest information on disease modifying agents available in the management of CRS and associated conditions.
2. Demonstrate an appreciation of developments in surgical techniques and technology used in nasal, sinus, and skull base surgery.
3. Show an appreciation of the postulated etiologies and factors related to disease progression in CRS and current directions of research.

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2015 - 2016	Peter Hwang, MD, FARS

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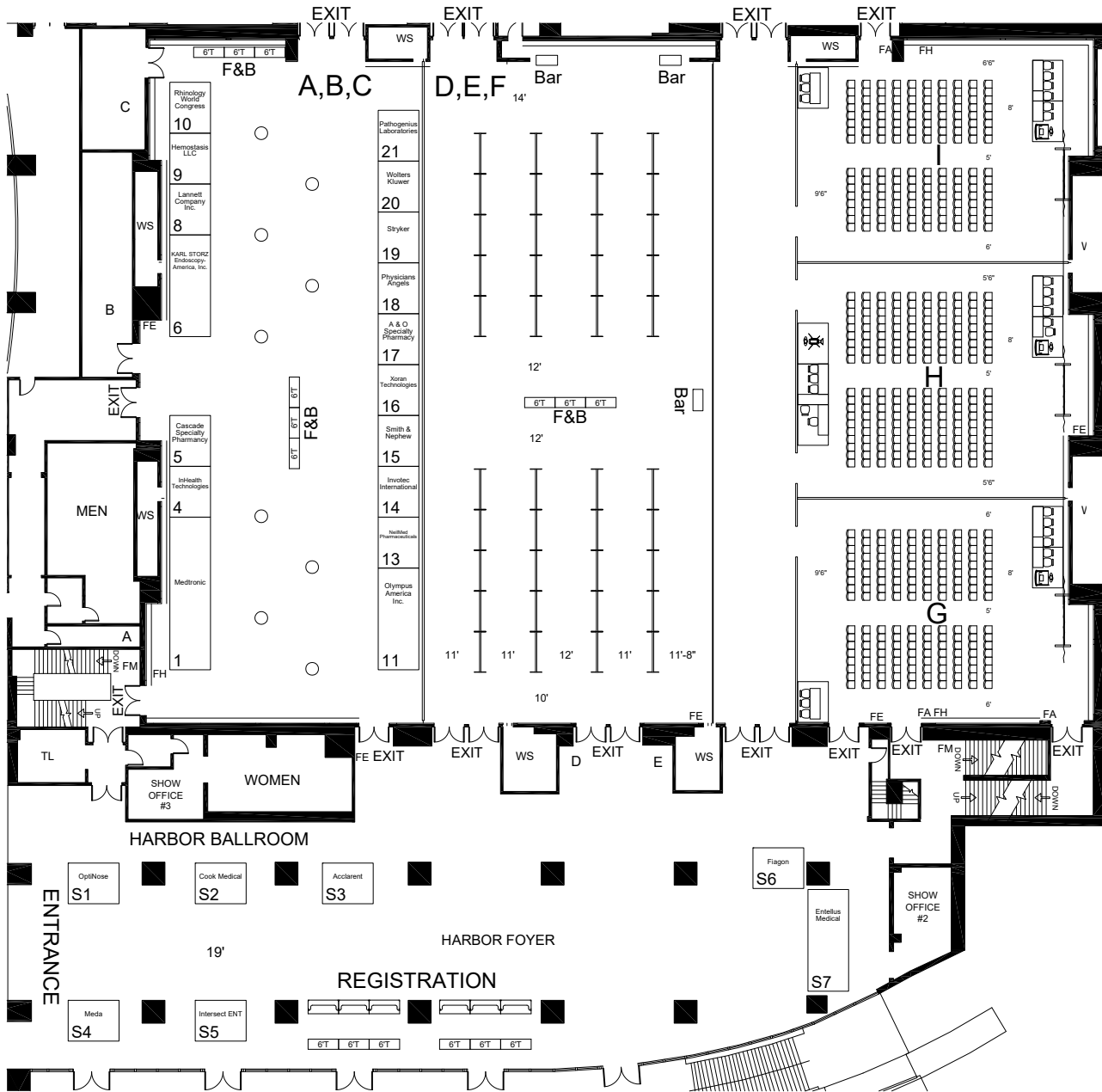
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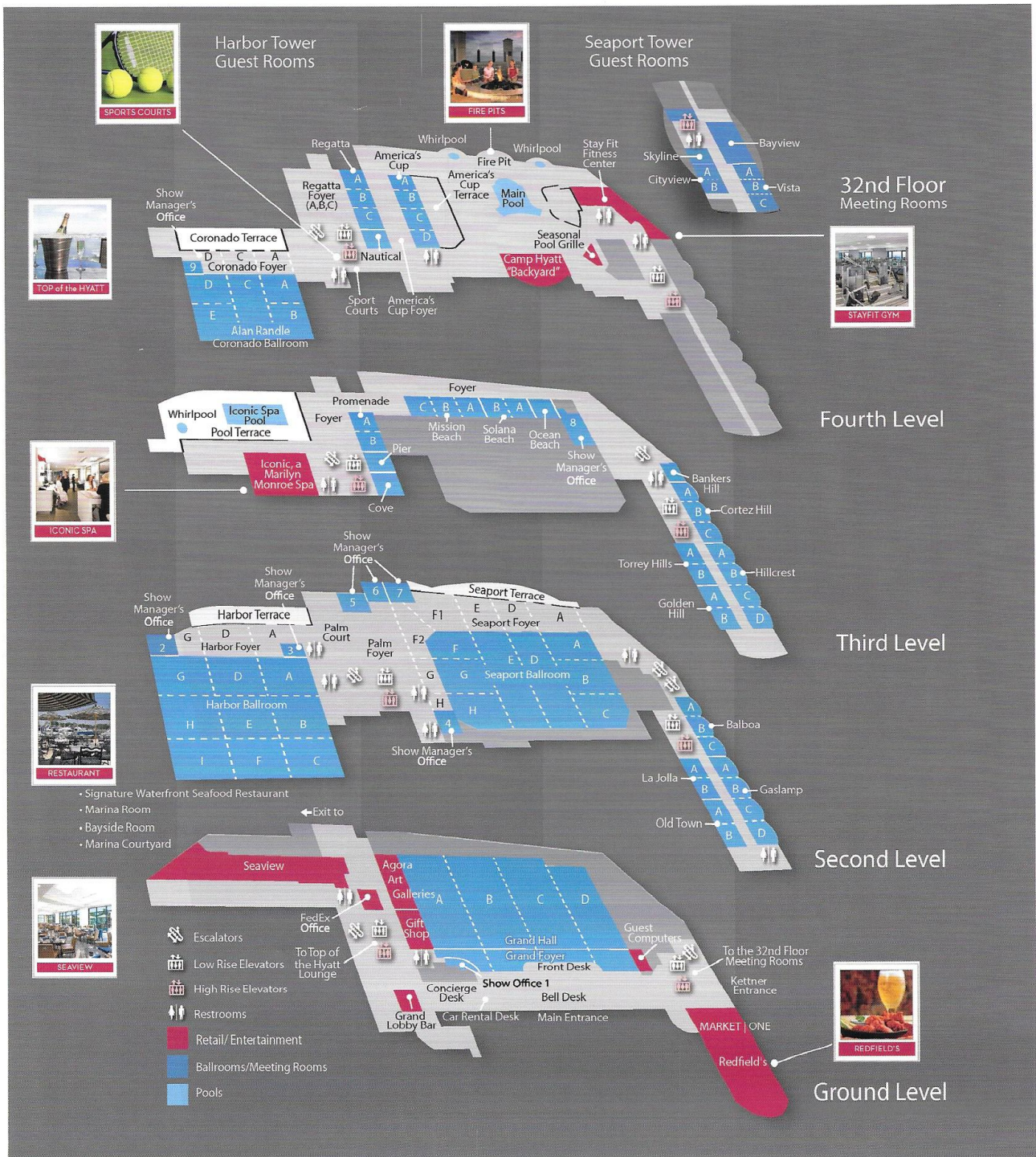
Floor Plan



ARS 2016 Annual Meeting

September 16-17, 2016
 GRAND HYATT SAN DIEGO
 HARBOR BALLROOM & FOYER
 SAN DIEGO, CA

Floor Plan



ARS 62nd Annual Meeting Industry Supporters

Acclarent / Olympus America Inc.
Residents Didactic Lectures & Cadaver Dissection Lab

Entellus Medical
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Women in Rhinology Program Luncheon

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Poster Presentations and International Countries Welcome Reception

Pan American Association
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ARS 62nd Annual Meeting Exhibitors

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InHealth Technologies	Rhinology World Congress
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PROGRAM AT A GLANCE

Friday, September 16, 2016, General Session - Harbor Ballroom GHI (Live International Webcast)

(Supported by the Pan American Association)

12:55 PM

Welcome

Peter Hwang, MD, FARS – ARS President
 John DelGaudio, MD, FARS – President-Elect /
 Program Chair

1:00 PM

Panel: Timing of sinus surgery: How quickly should we intervene?

Moderator: Richard Orlandi, MD, FARS
 Panelists: Zachary Soler, MD; Bruce Tan, MD;
 Timothy Smith, MD, FARS

Moderators: Timothy Smith, MD, FARS and
 Douglas Reh, MD, FARS

1:40 PM

Double-blind placebo-controlled randomized clinical trial of verapamil for chronic rhinosinusitis with nasal polyps: A pilot study

Marcel M. Miyake, MD
 (Presented by Benjamin Bleier, MD)

1:47 PM

Asthma quality of life and control in patients with chronic rhinosinusitis

Rodney Schlosser, MD, FARS

1:54 PM

Surgical therapy versus continued medical therapy for medically refractory chronic rhinosinusitis: Systematic review and meta-analysis

Zara M. Patel, MD

2:01 PM

Correlation between extent of sinus surgery, radiographic burden of disease, and post-operative quality of life outcomes

Noel F. Ayoub, BS
 (Presented by Peter Hwang, MD, FARS)

2:08 PM

Tolerance and pharmacokinetics of a ciprofloxacin-coated sinus stent in a preclinical model

Do-Yeon Cho, MD

2:15 PM

Q&A

2:20 PM

Presidential Address

Peter Hwang, MD, FARS

2:40 PM

Pitfalls in radiologic imaging of the sinuses and skull base

Patricia Hudgins, MD

3:10 PM

Break with Industry Partners

3:30 PM

Panel: Are you doing appropriate ESS? Who should have sinus surgery?

Moderator: Rodney Schlosser, MD, FARS
 Panelists: Donald Lanza, MD, FARS; Richard Douglas, MD; Parul Goyal, MD

Moderators: Noam Cohen, MD, FARS and
 Vijay Ramakrishnan, MD, FARS

4:10 PM

Differential innate immunity gene expression between corticosteroids responsive and non-responsive patients with chronic rhinosinusitis and nasal polyposis

Naif Fnais, MBBS

4:17 PM

Interepithelial transfer of exosomal P-glycoprotein promotes inflammation in chronic sinusitis with nasal polyps

Angela L. Nocera, MS

4:24 PM

Association between the Cdhr3 Snp (rs6967330) risk allele and chronic rhinosinusitis

Amanda L. Willis, MS

4:31 PM

WITHDRAWN

4:38 PM

Prevention of sinonasal inflammation by a synthetic glycosaminoglycan

Abigail Pulsipher, PhD

4:45 PM

Q&A

4:50

Film FESStival

Moderator: Adam DeConde, MD
 Panelists: Subinoy Das, MD, FARS; Martin Citardi, MD, FARS; Anne Getz, MD; Satish Govindaraj, MD; Stacey Gray, MD, FARS

5:30 PM

Closing Remarks and Meeting Adjourned

PROGRAM AT A GLANCE

Saturday, September 17, 2016, General Session, Harbor Ballroom GHI (Live International Webcast)

(Supported by the Pan American Association)

<p>7:55AM Welcome John DeIGaudio, MD, FARS – President Elect / Program Chair</p> <p>8:00 AM Panel: The socioeconomic impact of CRS and FESS Moderator: Michael Stewart, MD, FARS Panelists: Ralph Metson, MD, FARS; Michael Benninger, MD, FARS; Michael Setzen, MD, FARS</p> <p>8:35AM The 12th Annual Kennedy Lecture – Ricardo Carrau, MD Endoscopic skull base surgery: State of the art & future directions</p> <p>9:15 AM Break with Industry Partners</p> <p>9:40 AM Radiologic workup of CSF leak and skull base defects Patricia Hudgins, MD</p>	<p>10:10 AM Panel: Skull Base Issues: When to resect skull base and orbit Moderator: Adam Zanation, MD Panelists: Ricardo Carrau, MD; Patricia Hudgins, MD; Arturo Solares, MD</p> <p>10:50 AM Valuing rhinology procedures: Why RUC surveys should matter to you! Peter Manes, MD, FARS; Jenna Minton, JD</p> <p>11:20 AM Panel: AAOA combined panel: Pediatric CRS: Does it exist? Moderator: Sarah Wise, MD, FARS Panelists: David Clark, MD; Richard Harvey, MD, FARS; Whit Mims, MD; Kara Prickett, MD; Hassan Ramadan, MD, FARS</p> <p>11:45 am - 1:00 pm Women in Rhinology "Effective Communication: Translating Mission to Action" Location: Promenade AB Guest speaker: Nicole Boice, founder of Global Genes® (Supported by Intersect ENT)</p>	<p>12:00 pm - 1:00 pm Mentorship Program Luncheon "Medicare physician payment reform: What an otolaryngologist should know" Location: Cortez AB Moderator: Ameet Singh, MD Speaker: Howard Pitluk, MD, MPH, FACS Panelists: Robert Lorenz, MD, MBA, FACS; Michael Setzen, MD, FARS, FAAP</p> <p>12:00 PM Lunch with Industry Partners</p> <p>12:15-1:00 PM Residents and Fellows Program Luncheon "Five mistakes I made so you don't have to: How to succeed in your early career and the ARS." Location: Harbor Ballroom F Moderator: Jamie Litvack, MD, FARS Panelists: Ayesha Khalid, MD, FARS; Adam DeConde, MD; Spencer Payne, MD, FARS (Supported by Entellus Medical)</p>
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Saturday, September 17, 2016, Breakout Room A, Harbor Ballroom G

<p>1:00 PM Welcome Erin O'Brien, MD, FARS, Chairperson</p> <p>Moderators: David Poetker, MD, FARS and Jivianne Lee, MD, FARS</p> <p>1:05 PM Clinical interpretability of the empty nose syndrome 6-item questionnaire (ens6q) using office-based cotton testing Andrew Thamboo, MD, MHSc</p> <p>1:12 PM Computational fluid dynamics (cfd) and trigeminal sensory examinations of empty nose syndrome patients: Pre and post turbinate surgery Kai Zhao, PhD</p> <p>1:19 PM Arterial ligation versus embolization in epistaxis management: Counterintuitive national trends Michael J. Sylvester, A.B.</p> <p>1:26 PM Ergonomic analysis of the surgical position in FESS Benjamin Milam, MD</p> <p>1:33 PM Q&A</p>	<p>Moderators: Brad Mechor, MD, FARS and Anne Getz, MD</p> <p>1:40 PM Determinants and outcomes of upfront surgery vs. medical therapy for chronic rhinosinusitis in cystic fibrosis Noel F. Ayoub, BS</p> <p>1:47 PM F508del genotype in endoscopic sinus surgery: A predictor for improvement in pulmonary function tests after sinus surgery Ashleigh A. Halderman, MD</p> <p>1:54 PM Effect of viral infection on clinical severity of sinonasal disease and iron sequestration in cystic fibrosis patients Nicholas R. Rowan, MD</p> <p>2:01 PM Partial loss of cfr function in cf carriers leads to craniofacial sinus hypoplasia and increased incidence of chronic rhinosinusitis Joshua B. Calton, BS</p> <p>2:08 PM Sinus surgery improves quality of life, lung infections and lung function in patients with primary ciliary dyskinesia Mikkel C. Alanin, MD</p>	<p>2:15 PM Q&A</p> <p>2:20 PM Panel: Sinus disease and the immunocompromised patient Moderator: David Conley, MD, FARS Panelists: Zara Patel, MD, FARS; Erin O'Brien, MD, FARS; Andrew Lane, MD, FARS</p> <p>2:50 PM Break with Industry Partners</p> <p>Moderators: Praveen Duggal, MD and Mark Zacharek, MD, FARS</p> <p>3:20 PM Nrf2 activation restores house dust mite induced sinonasal epithelial cell barrier dysfunction Nyal R. London, MD, PhD</p> <p>3:27 PM Differential Cl neg secretory capacity in transepithelial ion transport properties in chronic rhinosinusitis Do-Yeon Cho, MD (Presented by Kyle Hoffman, BS)</p> <p>3:34 PM Liquid chromatography/tandem mass spectrometry profiling of eicosanoid and docosanoid metabolomes in chronic rhinosinusitis Thad W. Vickery, BA</p>
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PROGRAM AT A GLANCE

3:41 PM

Discordant frequencies of tissue-resident and circulating CD180-negative B-cells in chronic rhinosinusitis

Dijana Mijlkovic, MS

3:48 PM

Q&A

Moderators: Elina Toskala, MD, FARS and Justin Turner, MD

3:52 PM

Irrigation based corticosteroid therapy is more effective than simple sprays in managing post-surgical chronic rhinosinusitis

Richard J. Harvey, MD, FARS, PhD

3:59 PM

Comparison of single versus double strength budesonide irrigations in patients with chronic rhinosinusitis with polyposis after endoscopic sinus surgery

Paul D. Neubauer, MD

4:06 PM

The safety of long-term intranasal budesonide delivered via the mucosal atomization device for chronic rhinosinusitis

Jamil Manji, MSc

4:13 PM

Manuka honey sinus irrigation for the treatment of chronic rhinosinusitis: A randomized controlled trial

Victoria S. Lee, MD

4:20 PM

Q&A

4:25 PM

Panel: What I learned in training but have abandoned in practice: Experience or evidence?

Moderator: James Palmer, MD, FARS

Panelists: Jean Anderson Eloy, MD; Alkis Psaltis, MD; Justin Turner, MD; Eugenia Vining, MD

5:00 PM

Closing Remarks and Meeting Adjourned

5:30 PM

Poster and International Welcome Reception Harbor Ballroom DEF

(Supported by Medtronic and OptiNose)

Saturday, September 17, 2016, Breakout Room B, Harbor Ballroom H, (Live International Webcast)

(Supported by the Pan American Association)

1:00 PM

Welcome

Raj Sindwani, MD, FARS, Chairperson

Moderators: Douglas Reh, MD, FARS and Pablo Stolovitzky, MD, FARS

1:05 PM

Changing the surgical dogma in frontal sinus trauma: Transnasal endoscopic repair

Jessica W. Grayson, MD

1:12 PM

Efficacy and safety of endoscopically-assisted transblepharoplasty approach for frontal sinus pathology

Eric W. Wang, MD

1:19 PM

Cryosurgical posterior nasal nerve ablation for the treatment of rhinitis

Peter Hwang, MD, FARS

1:26 PM

Utility of intraoperative frozen sections in surgical decision making for acute invasive fungal rhinosinusitis

Peter Papagiannopoulos, MD

1:33 PM

Q&A

Moderators: Stephanie Joe, MD, FARS and Ashutosh Kacker, MD

1:40 PM

Temporal patterns of fdg pet/CT sinonasal uptake following treatment of sinonasal malignancy

Joseph B. Schwartz, MD, FRCSC

1:47 PM

A cost comparison of vascular flap and free tissue graft reconstruction of intradural skull base defects

Bryan Brandon, MD

1:54 PM

Failure pressures after repairs of 2x2.5 cm rhinologic dural defects in a porcine ex vivo model

Ryan P. Lin, MD

2:01 PM

Clinical outcomes of sinonasal squamous cell carcinomas based on tumor etiology

Carol Yan, MD

2:08 PM

Enlargement of meckel's cave in patients with spontaneous cerebrospinal fluid leaks

Geoffrey P. Aaron, MD

2:15 PM

Q&A

2:20 PM

Panel: The minimal disease patient: Do I operate and when?

Moderator: Jeremiah Alt, MD, FARS

Panelists: Raj Sindwani, MD, FARS; Spencer Payne, MD, FARS; Rick Chandra, MD, FARS

2:50 PM

Break with Industry Partners

Moderators: Justin Antisdell, MD, FARS and Jose Gurrola II, MD

3:20 PM

Inflammatory infiltrate and mucosal remodeling in chronic rhinosinusitis with and without polyps: Structured histopathologic analysis

Hannah N. Kuhar, BA

3:27 PM

Age-related changes in nasal mucosal histology of adult patients without inflammatory sinonasal disease

Patricia A. Loftus, MD

3:34 PM

The efficacy of a novel budesonide chitosan gel on wound healing following endoscopic sinus surgery

Thanh N. Ha, MD

3:41 PM

The effect of chitosan-dextran gel with budesonide and ropivacaine on pain and wound healing following endoscopic sinus surgery

Aaron Rayan, BMedSci (Hons)

3:48 PM

Q&A

PROGRAM AT A GLANCE

Moderators: Lori Lemonnier, MD and Charles Ebert, MD, FARS

3:52 PM

The development and validation of septoplasty surgical training model using three dimensional printing

Mahmoud A. AlReefi, MD

3:59 PM

The development and validation of a 3d printed ostiomeatal complex and frontal sinus training model for endoscopic sinus surgery

Abdulaziz Alrasheed, MD

4:06 PM

Use of the concentric tube robot in the maxillary sinus

Madeleine B. Samuelson, MD

4:13 PM

Development of a fully automated ct sinus auto-segmentation pipeline

Spencer Payne, MD, FARS

4:20 PM

Q&A

4:25 PM

Panel: The recurrent nasal polyp patient: What now?

Moderator: Amber Luong, MD

Panelists: Stilianos Kountakis, MD, FARS; David Poetker, MD, FARS; Jivianne Lee, MD, FARS

5:00 PM

Closing Remarks and Meeting Adjourned

5:30 PM

Poster and International Welcome Reception Harbor Ballroom DEF

(Supported by Medtronic and OptiNose)

Saturday, September 17, 2016, Breakout Room C, Harbor Ballroom I

1:00 PM

Welcome

Stella Lee, MD, Chairperson

Moderators: Troy Woodard, MD, FARS and Greg Davis, MD, FARS

1:05 PM

Examination of high-antibiotic users in a multi-institutional cohort of CRS patients

Vijay R. Ramakrishnan, MD, FARS

1:12 PM

WITHDRAWN

1:19 PM

Innate immune response of nuli-1 cells to staphylococcus aureus small colony variant infections

Judy Ou, MD

1:26 PM

A surgical hydrogel to combat MSSA and MRSA biofilms

Katharina Richter, MSc

1:33 PM

Q&A

Moderators: Zachary Soler, MD and Marc Dubin, MD, FARS

1:40 PM

Unsupervised network mapping of commercially available immunoassay yields three distinct chronic rhinosinusitis endotypes

Rohit Divekar, MBBS, PhD

1:47 PM

Measuring patient expectations regarding diagnoses and treatment for rhinosinusitis

Lauren Roland, MD

1:54 PM

Influence of interpersonal traits on patient outcomes in the treatment of chronic rhinosinusitis

Joshua M. Levy, MD, MPH

2:01 PM

Quality measures in rhinology: Results of a national survey

John S. Schneider, MD

2:08 PM

Association of olfactory dysfunction in chronic rhinosinusitis with economic productivity and medication usage

Rodney Schlosser, MD, FARS

(Presented by: Jose L. Mattos, MD)

2:15 PM

Q&A

2:20 PM

Panel: Sinus surgery mulligan: A case I would now do differently

Moderator: Roy Casiano, MD, FARS

Panelists: Peter-John Wormald, MD; Todd Kingdom, MD, FARS; Pete Batra, MD, FARS

2:50 PM

Break with Industry Partners

Moderators: Subinoy Das, MD, FARS and Philip Chen, MD

3:20 PM

The longitudinal impact of genetics and clinical interventions on the microbiome of patients with chronic rhinosinusitis

Amanda L. Willis, MD

3:27 PM

Sinonasal microbiome taxa and diversity differ in subjects with allergic rhinitis, chronic rhinosinusitis (CRS) without nasal polyps and CRS with nasal polyposis

Emily K. Cope, PhD

3:34 PM

Mapping microbiome variations in the noses of healthy and diseased subjects

Devyani Lal, MD

3:41 PM

Can a panel of serum inflammatory biomarkers predict endoscopic sinus surgery outcomes for chronic rhinosinusitis?

Marc-Henri Asmar, MD

3:48 PM

Q&A

Moderators: Adam DeConde, MD and Benjamin Bleier, MD

3:52 PM

Sinonasal epithelium produces nitric oxide in response to staphylococcus epidermidis products

Ryan M. Carey, BSE

3:59 PM

Stimulatory effects of histamine on migration of nasal fibroblasts

Heung-Man Lee, MD, PhD

4:06 PM

Bactericidal antibiotics promote oxidative inflammation and cell death in sinonasal epithelial cells

Michael A. Kohanski, MD, PhD

4:13 PM

Responsiveness and reliability of the sinus control test in chronic rhinosinusitis

Preeti Kohli, BA

4:20 PM

Q&A

4:25 PM

Panel: Failed sinus surgery: Revise or advanced?

Moderator: Kevin Welch, MD, FARS

Panelists: Alex Chiu, MD, FARS; Devyani Lal, MD; Brad Woodworth, MD, FARS

5:00 PM

Closing Remarks and Meeting Adjourned

5:30 PM

Poster and International Welcome Reception Harbor Ballroom DEF

(Supported by Medtronic and OptiNose)

PROGRAM ABSTRACTS

Friday, September 16, 2016 General Session Harbor Ballroom GHI (Live International Webcast)

(Supported by the Pan American Association)

12:55 PM

Welcome

Peter Hwang, MD, FARS – ARS President
John DelGaudio, MD, FARS – President-Elect/Program Chair

1:00 PM

Panel: Timing of sinus surgery: How quickly should we intervene?

Moderator: Richard Orlandi, MD, FARS
Panelists: Zachary Soler, MD; Bruce Tan, MD;
Timothy Smith, MD, FARS

Moderators: Timothy Smith, MD, FARS and Douglas Reh, MD, FARS

1:40 PM

Double-blind placebo-controlled randomized clinical trial of verapamil for chronic rhinosinusitis with nasal polyps: A pilot study

Marcel M. Miyake, MD (Presented by Benjamin Bleier, MD)
Angela E. Nocera, MS
Stacey E. Gray, MD, FARS
Eric Holbrook, MD, FARS
Nicolas Busaba, MD, FARS
Benjamin Bleier, MD
Boston, MA
USA

Background

P-glycoprotein(P-gp) is an efflux pump which promotes type 2 helper T-cell polarizing cytokine secretion in Chronic Rhinosinusitis with Nasal Polyps(CRSwNP). Verapamil is a well-tolerated inhibitor of P-glycoprotein.

Objective

To assess the effect of low dose systemic Verapamil as monotherapy for the treatment of CRSwNP.

Methods

Randomized, double-blind, placebo-controlled pilot study of Verapamil (80mg TID) in patients with CRSwNP(n=10 per group) following a 4-week washout of oral and systemic corticosteroids. The primary endpoint was SNOT-22 along with 10cm Visual Analog Score(VAS) score reduction at 8 weeks. Secondary endpoints included final Lund-Mackay computed tomography and change in Lund-Kennedy endoscopy scores (LMS and LKS). Body mass index(BMI) and baseline mucus P-gp concentrations were recorded.

Results

Verapamil monotherapy resulted in a least squares mean(LSM) difference in SNOT-22 of -27.7(95%CI, -49.36 to -6.05; p=0.01) and VAS of -37.97(-60.01 to -15.93; p=0.001), relative to placebo. A mean difference in final LMS of -5.02(-8.15 to -2.27; p=0.02), week

4 LSM difference in LKS of -2.80(-4.73 to -0.98; p=0.003), and week 8 LSM difference in LKS of -1.05(-2.88 to 0.77; p=0.25) were observed in the Verapamil group relative to placebo. The interaction between BMI and mucus P-gp concentration with treatment was significant (p=0.01 and 0.01; respectively). Higher values were associated with lower Verapamil related improvement.

Conclusions

Verapamil represents a promising novel therapy for the treatment of CRSwNP. Our results implicate P-gp inhibition as the likely mechanism and suggest the effect size was limited by dose. Future studies will require higher doses or more potent inhibitors of P-gp.

1:47 PM

Asthma quality of life and control in patients with chronic rhinosinusitis

Rodney J. Schlosser, MD, FARS
Jess C. Mace, MPH, CCRP
Timothy L. Smith, MD, MPH
Zachary M. Soler, MD, MSc
Charleston, SC
USA

Introduction

Patients with chronic rhinosinusitis (CRS) often have comorbid asthma. Prior studies have not examined the impact of CRS or surgical treatment upon asthma quality-of-life (QOL) and asthma control using validated outcome metrics.

Methods

Patients with CRS and comorbid asthma completed the Mini-Asthma QOL Questionnaire (miniAQLQ) and the Asthma Control Test (ACT) at baseline and at least 6 months after endoscopic sinus surgery (ESS) as part of a multi-institutional, prospective study.

Results

Baseline metrics were available on 118 patients. After adjustment with linear regression, baseline miniAQLQ scores were worse in patients with comorbid allergy (p=0.017) and chronic obstructive pulmonary disease (COPD; p=0.008). Adjusted baseline ACT scores were worse in patients with nasal polyposis and COPD (p<0.028). Patients undergoing ESS reported improved miniAQLQ (0.47[±1.08], 95% CI: 0.20-0.74; p=0.002) and ACT scores (1.30[±4.00], 95% CI: 0.24-2.42; p=0.018). Covariates associated with significantly less improvement in miniAQLQ scores were diagnosis of obstructive sleep apnea (OSA) or corticosteroid dependency (p<0.022). Covariates associated with significantly less improvement in ACT scores were diagnosis of OSA and primary ESS (p<0.022). Poorly controlled baseline asthma (ACT<20) was present in 54% of patients undergoing ESS. Surgery resulted in 59% achieving a minimal clinically important difference (MCID) in miniAQLQ scores (0.5 points).

Conclusions

Patients with CRS often present with asthma, yet there are few CRS-specific factors associated with asthma quality of life or control. Endoscopic sinus surgery improves both miniAQLQ and ACT scores. The majority of patients with poorly controlled asthma at baseline improve after ESS.

1:54 PM

Surgical therapy versus continued medical therapy for medically refractory chronic rhinosinusitis: Systematic review and meta-analysis

Zara M. Patel, MD
 Andrew Thamboo, MD
 Luke Rudmik, MD, FARS, BSc, MSc
 Jayakar Nayak, MD, PhD
 Timothy Smith, MD, FARS, MPH
 Peter H. Hwang, MD, FARS
 Stanford, CA
 USA

Background

The currently accepted treatment paradigm of treating chronic rhinosinusitis (CRS) first with appropriate medical therapy (AMT) and then with surgery if patients are refractory to AMT, has been criticized for lack of evidence. The objective of this study was to reassess the literature and establish the highest level of evidence possible regarding further management of CRS patient's refractory to AMT.

Methods

Systematic Review (SR) with Meta-Analysis (MA). Adult CRS patients who received AMT and then underwent either medical or surgical therapy in moderate to high level prospective studies were included. Outcomes assessed were disease-specific QOL, nasal endoscopy, health-state utility, missed work days, change in cardinal symptoms of CRS, economic impact and adverse events.

Results

970 manuscripts were identified and six studies ultimately included in the SR with five included in the MA. Compared to continued medical therapy, endoscopic sinus surgery (ESS) significantly improved patient-based QOL scores ($p < 0.00001$) and nasal endoscopy scores ($p < 0.00001$). Difference in missed work days depended heavily on patient choice of intervention. Unpooled analysis showed improvements in olfaction, health utility scores and cost-effectiveness.

Conclusions

On meta-analysis, for CRS patients refractory to AMT, ESS significantly improves objective endoscopic scoring outcomes, versus continued medical therapy alone. In patients with refractory CRS who have significant reductions in baseline QoL, ESS results in significant improvements. Continued medical therapy appears to maintain outcomes in patients with less severe baseline QoL. Unpooled analysis demonstrates improvement in health utility, olfaction, and cost-effectiveness following ESS compared to continued medical therapy alone, in medically refractory CRS.

2:01 PM

Correlation between extent of sinus surgery, radiographic burden of disease, and post-operative quality of life outcomes

Noel F. Ayoub, BS
 Evan Walgama, MD
 Andrew Thamboo, MD, MHSc
 Zara M. Patel, MD
 Jayakar V. Nayak, MD, PhD
 Peter H. Hwang, MD, FARS
 Stanford, CA
 USA

Introduction

The extent of endoscopic sinus surgery (ESS) required for optimal outcomes in chronic rhinosinusitis (CRS) is undefined. We evaluated whether concordance between the extent of surgery and magnitude of radiographic disease affects postoperative outcomes.

Methods

250 CRS patients who underwent ESS were retrospectively assigned a concordance score reflecting the similarity between the extent of surgery and extent of radiographic disease. For each sinus, 0 points was assigned when sinusotomy was performed on a diseased sinus, or no sinusotomy was performed on a nondiseased sinus; +1 was assigned for sinusotomy on a nondiseased sinus; and -1 when a diseased sinus was left unopened. Counting the anterior and posterior ethmoid sinuses separately, the total possible score ranged from -10 (least aggressive) to +10 (most aggressive). 5 subgroups were established by degrees of variance, and SNOT-22 scores were compared at 6 and 24 months.

Results

All five subgroups had similar preoperative SNOT-22 scores (mean=42, $p=0.082$) and showed significant improvement at 6 months postoperatively (mean 22.0 point decrease, $p < 0.001$). At 6 months postoperatively, the least aggressive cohort (concordance < -3) and the most aggressive cohort (concordance > +3) achieved equivalent improvements in SNOT-22 as the cohort of completely concordant approaches (concordance = 0) (19.4 vs. 19.8 vs. 21.0 point decrease, respectively, $p=0.241$). At 24 months postoperatively, equivalent improvement across all cohorts was again noted ($p=0.258$).

Conclusions

Improvement after ESS appears to be independent of the extent of surgery relative to the extent of radiologic disease. More extensive surgery in ESS confers neither greater symptomatic improvement nor long term detriment.

2:08 PM

Tolerance and pharmacokinetics of a ciprofloxacin-coated sinus stent in a preclinical model

Do-Yeon Cho, MD
 Daniel Skinner, BS
 Kyle J. Hoffman, BS
 Calvin Mackey, BS
 Ho-Wook Jun, PhD
 Bradford A. Woodworth, MD
 Birmingham, AL
 USA

Objectives

Bacterial biofilms are a major contributing factor to medically recalcitrant chronic rhinosinusitis (CRS). An antibiotic delivery system with effective local concentrations, prolonged mucosal contact time, minor systemic absorption, and minimal depletion are the desired properties necessary to eradicate biofilms. The objective of the current study is to analyze the in vivo drug delivery pharmacokinetics and tolerance of a ciprofloxacin-coated sinus stent (CST).

PROGRAM ABSTRACTS

Methods

The CST (2mg) was created from biodegradable poly-D/L-lactic acid. After analyzing in vitro release profile, CSTs were placed unilaterally in maxillary sinuses of 14 rabbits via dorsal sinusotomy. Animals were sacrificed between 1 and 3 weeks postoperatively. Ciprofloxacin concentrations in the sinus tissue and plasmas were assessed using high-performance liquid chromatography. Radiological and histological evaluations were performed.

Results

In the in vitro release profile, an initial burst release was observed over the first 24hr, followed by sustained release through the 14-day time point. In the rabbit model, ciprofloxacin was continuously released from the stent up to 3 weeks at doses > 50 ng/ml. Histologic examination found no evidence of inflammation, epithelial ulceration or bony reaction upon sacrifice of the animals at 21 days. Computed tomography also demonstrated no signs of mucosal edema or opacification in the sinus.

Conclusion

The CST was exquisitely safe in this preclinical model and sustained release was observed in both the in vitro and in vivo analyses. The innovative stent design coated with ciprofloxacin provides a unique therapeutic strategy for eradicating recalcitrant bacterial infections in persistent CRS.

2:15 PM

Q&A

2:20 PM

Presidential Address

Peter Hwang, MD, FARS

2:40 PM

Pitfalls in radiologic imaging of the sinuses and skull base

Patricia Hudgins, MD

3:10 PM

Break with Industry Partners

3:30 PM

Panel: Are you doing appropriate ESS? Who should have sinus surgery?

Moderator: Rodney Schlosser, MD, FARS

Panelists: Donald Lanza, MD, FARS; Richard Douglas, MD;

Parul Goyal, MD

Moderators: Noam Cohen, MD, FARS and

Vijay Ramakrishnan, MD, FARS

4:10 PM

Differential innate immunity gene expression between corticosteroids responsive and non-responsive patients with chronic rhinosinusitis and nasal polyposis

Naif Fnais, MBBS

Simon Rousseau, PhD

Marc A. Tewfik, MD

Montreal, Quebec

Canada

Background

Chronic rhinosinusitis with nasal polyposis (CRSwNP) necessitates continuous therapy which is intended mainly to reduce symptoms and improve quality of life. While glucocorticoids (GC) are the cornerstone of maintenance treatment, some patients do not show a satisfactory response. In this study, we aim to identify biological markers that may contribute to GC resistance and CRS recalcitrance.

Method

In this prospective case-control study, ethmoid mucosa of 20 CRSwNP patients were collected and compared to ethmoid mucosa of 10 control patients. Cases were classified as GC responder and non-responder using the Adelaide Disease Severity Score. Preoperative paranasal sinus CT scans were used to assess disease severity. The tissue explants were treated with dexamethasone and stimulated with *Staphylococcus aureus* (SA) for six hours. A quantitative polymerase chain reaction (qPCR) was used to measure expression level of a panel of inflammatory cytokines covering Th-1, Th-2 and Th-17 pathways, pre- and post-stimulation.

Result

Non-responder CRSwNP patients showed persistent elevation of TNF- α in response to SA stimulation despite dexamethasone administration compared to responder CRSwNP and control group ($P < 0.05$). Moreover, a trend toward increased Th-1 pathway cytokines (IL- β 1 and IFN- γ) was noted in non-responder group but not in responder or control groups. Such trend was not demonstrated when comparing Th-2 pathway cytokines.

Conclusion

Non-responder CRSwNP patients exhibit mixed inflammatory profile that is unusual for CRSwNP. Moreover, persistent elevation of TNF- α may contribute to GC resistance and CRS recalcitrance. Modulation of the TNF- α and IL-1 β pathway may serve as a novel therapeutic target in CRSwNP.

4:17 PM

Interepithelial transfer of exosomal p-glycoprotein promotes inflammation in chronic sinusitis with nasal polyps

Angela L. Nocera, MS
 Marcel M. Miyake, MD
 Xue Han, PhD
 Benjamin S. Bleier, MD
 Boston, MA
 USA

Background

Exosomes are 30-150nm vesicles capable of intercellular membrane protein transfer. P-glycoprotein(P-gp) is a membrane efflux pump which promotes epithelial cytokine secretion in Chronic Rhinosinusitis with Nasal Polyps(CRSwNP).

Objective: To determine 1) Whether CRSwNP mucus exosomes are enriched with P-gp, 2) Whether exosomal P-gp can be functionally transferred to autologous epithelial cells, and 3) Whether exosome transfer enhances P-gp dependent cytokine secretion.

Methods

IRB approved study in CRSwNP and control patients (n=10 per group). P-gp content of purified mucus exosomes was characterized by flow cytometry, transmission electron microscopy, and enzyme linked immunosorbent assay(ELISA). Epithelial transfer of exosomal P-gp was determined by time lapse fluorescent microscopy and Calcein AM functional P-gp assay. Cytokine secretion was quantified by ELISA.

Results

CD63+/P-gp+ exosomes were detected in both groups. P-gp was significantly enriched in CRSwNP exosomes relative to control (median 198.5; Interquartile range(IQR) 123.6-270.5 vs. 74.4; 41.3-95.0 P-gp(pcg)/10⁹ Exosomes, p=0.002). Exosomes were absorbed by epithelial cells within 10minutes resulting in a significant increase in P-gp activity in CRSwNP patients relative to control(p=0.006). Exosomes significantly promoted P-gp dependent secretion of IL-6 (124.3%Baseline; IQR 105.2-143.4%) and IL-8 (942.6%; 344.2-1541.1%) in CRSwNP relative to control (67%; 63.7-70.3%; p<0.001 and 72.7%; 70.2-75.2%; p<0.001; respectively).

Conclusions

This is the first study to demonstrate the presence and differential P-gp enrichment of mucus derived exosomes in CRSwNP. These exosomes are capable of rapid intercellular transfer of P-gp leading to increased cytokine secretion. This represents a novel mechanism for the maintenance of inflammation in CRSwNP and suggests a novel druggable target.

4:24 PM

Association between the cdhr3 snp (rs6967330) risk allele and chronic rhinosinusitis

Amanda L. Willis, MS
 Joshua B. Calton, BS
 Hilary C. McCrary, MPH
 Noam Cohen, MD, FARS
 Fernando D. Martinez, MD
 Eugene H. Chang, MD
 Tucson, AZ
 USA

Introduction

The majority of individuals have complete resolution of symptoms after rhinovirus (RV)-mediated upper respiratory infections (URIs). However, it is unclear why in some individual's symptoms persist and progress into chronic rhinosinusitis (CRS). Investigators have recently reported that the CDHR3 SNP (rs6967330) risk allele in a novel CDHR3 gene is highly associated with the development of childhood asthma and increases RV-C binding in airway epithelial cells. We hypothesized that the rs6967330 risk allele would be a genetic risk factor for viral-mediated CRS and a potential genetic factor in unified airway disease.

Methods

Genetic screening for rs6967330 was performed in strictly defined control (n=468) and CRS (n=398) groups at two institutions (University of Arizona and University of Pennsylvania). We collected demographic, subjective (SNOT-20), objective (endoscopic and radiologic scores), and prevalence of co-occurring airway disease (allergic rhinitis/asthma) in the CRS groups. CDHR3 allele status, categorical variables (presence or absence of sinus disease), and subjective/objective measures of CRS were calculated using chi-square testing and linear regression models.

Results

The presence of rs6967330 was highly associated with CRS at both institutions (p=.0071/.0013), and equal to that of the general population in our control group. There were no significant correlations to rs6967330 and asthma in those with CRS, however there was a trend towards prevalence of allergic rhinitis.

Conclusions

We report a correlation between the CDHR3 SNP (rs6967330) risk allele and CRS, independent of asthma. Our results highlight a potential mechanism that could be responsible for viral-mediated pathogenesis in a specific endotype of CRS.

4:31 PM

Staphylococcus aureus extracellular proteases causes dysfunction of the airway epithelial barrier and impairs Il-6 production

Jae Murphy, MBBS
 Mahnaz Ramezanzpour, PhD
 Grzegorz Dubin, PhD
 Sarah Vreugde, MD
 Peter-John Wormald, MD
 Alkis J. Psaltis, PhD
 Woodville South, SA
 Australia

WITHDRAWN**Introduction**

Staphylococcus aureus (S. aureus) infection is known contribute to the severity and recalcitrance of chronic rhinosinusitis (CRS), and its secreted products have been shown to alter the airway barrier. Extracellular proteases of S. aureus are thought to be important in epithelial infection and immune evasion. We hypothesize that S. aureus mediates airway barrier dysfunction via an extracellular protease and aimed to investigate this using human nasal epithelial cell cultures.

PROGRAM ABSTRACTS

Methods

Ammonium sulphate precipitation and ion-exchange chromatography was used to purify V8 protease, staphopain A and B, exfoliative toxin-A, and serine-like proteases A-F from *S. aureus* strain 8325-4. These proteases were applied to human nasal cell air-liquid interface (ALI) cultures. Transepithelial electrical resistance (TEER) and permeability (Papp) were used to assess barrier integrity. Supernatants were measured for inflammatory response via interleukin-6 (IL-6), and cell viability. Expression of tight junction proteins claudin-1 and ZO-1 were examined with immunofluorescence.

Results

V8 protease applied to ALI cultures caused a concentration and time dependent decrease in TEER compared to control ($p < 0.05$), and a reciprocal Papp increase of 20.14 fold higher than the control ($p < 0.05$). IL-6 production was significantly reduced by V8 protease 153.5(73.67) pg/ml against the control 548.3(23.08) pg/ml ($p = 0.0069$). No difference in cell viability was observed. Tight junction expression in V8 protease exposed cells was discontinuous.

Conclusion

S. aureus V8 protease causes dysfunction of airway tight junctions and a subsequent "leaky" barrier. A reduction in cytokine IL-6 suggests that the mucosal immunity is impaired by this protease, and hence contributing to CRS recalcitrance.

4:38PM

Prevention of sinonasal inflammation by a synthetic glycosaminoglycan

Abigail Pulsipher, PhD
Xuan Qin, MS
Andrew J. Thomas, MD
Glenn Prestwich, PhD
Siam Oottamasathien, MD
Jeremiah A. Alt, MD, PhD
Salt Lake City, UT
USA

Introduction

Glycosaminoglycans (GAGs) are linear polysaccharides that are distributed on respiratory epithelial cells and submucosal glands. Uniquely positioned, GAGs serve important roles in repairing mucosal surfaces and modulating mucociliary clearance and have exhibited anti-inflammatory properties in respiratory diseases. We therefore hypothesized that two novel synthetic GAGs (GM-0111 and GM-1111) could prevent sinonasal inflammation in a mouse model of rhinosinusitis (RS).

Methods

To test our hypotheses, C57BL/6 mice were intranasally administered fluorescent GM-0111 or GM-1111, and sinonasal tissues were examined for GAG penetration efficiency and retention. To test therapeutic feasibility, mice ($n = 6$) were given GM-0111, GM-1111, or hyaluronic acid (HA, GAG control) (800 μ g dose) prior to inducing RS with the inflammatory molecule LL-37 (115 μ g dose). After 24 h, sinonasal tissues were harvested for cell death analysis and histological and biochemical examination of the following inflammatory biomarkers: inflammatory cell infiltration,

lamina propria (LP) thickening, mucous secretion, and neutrophil enzyme myeloperoxidase (MPO).

Results

(1) GM-0111 and GM-1111 were observed within sinonasal tissues 24 h after intranasal administration, indicating efficient penetration and retention. (2) GM-0111 prevented sinonasal tissues from developing inflammation, with reduced mast cell infiltration (5-fold decrease), LP thickening, mucus secretion, and MPO levels (10-fold decrease) when compared to tissues challenged with LL-37 alone and to those pre-treated with GM-1111 or HA. (3) GM-0111 reduced cell death within sinonasal tissues in contrast to LL-37-challenged tissues.

Conclusions

Synthetic GAGs have excellent penetration and retention in the sinonasal mucosa. GM-0111 prevents sinonasal inflammation and cell death in a mouse model of RS.

4:45 PM

Q&A

4:50 PM

Film FESStival

Moderator: Adam DeConde, MD
Panelists: Subinoy Das, MD, FARS; Martin Citardi, MD, FARS; Anne Getz, MD; Satish Govinderaj, MD; Stacey Gray, MD, FARS

5:30 PM

Closing Remarks and Meeting Adjourned

5:30 PM

Poster and International Welcome Reception

(Supported by Medtronic and OptiNose)

Saturday, September 17, 2016 General Session, Harbor Ballroom GHI (Live International Webcast)

(Supported by the Pan American Association)

7:55 AM

Welcome

John DelGaudio, MD, FARS – President-Elect / Program Chair

8:00 AM

Panel: The socioeconomic impact of CRS and FESS

Moderator: Michael Stewart, MD, FARS

Panelists: Ralph Metson, MD, FARS; Michael Benninger, MD, FARS; Michael Setzen, MD, FARS

8:35 AM

The 12th Annual Kennedy Lecture – Ricardo Carrau, MD Endoscopic skull base surgery: State of the art & future directions

9:15 AM

Break with Industry Partners

9:40 AM

Radiologic workup of CSF leak and skull base defects

Patricia Hudgins, MD

10:10 AM

Panel: Skull base issues: When to resect skull base and orbit

Moderator: Adam Zanation, MD

Panelists: Ricardo Carrau, MD; Patricia Hudgins, MD; Arturo Solares, MD

10:50 AM

Valuing rhinology procedures: Why RUC surveys should matter to you!

Peter Manes, MD, FARS; Jenna Minton, JD

11:20 AM

Panel: AAOA combined panel: Pediatric CRS: Does it exist?

Moderator: Sarah Wise, MD, FARS;

Panelists: David Clark, MD; Richard Harvey, MD, FARS; Whit Mims, MD; Kara Prickett, MD; Hassan Ramandan, MD, FARS

12:00 PM

Lunch with Industry Partners

11:45 AM-1:00 PM

Women in Rhinology Luncheon Promenade AB, 3rd Floor

"Effective Communication: Translating Mission to Action"

Guest speaker: Nicole Boice, founder of Global Genes®

(Supported by Intersect ENT)

12:00-1:00 PM

Residents & Fellows Program Luncheon

Harbor Ballroom F

"Five Mistakes I made so you don't have to: How to succeed in your early career and the ARS"

Moderator: Jamie Litvack, MD, FARS

Panelists: Ayesha Khalid, MD, FARS; Adam DeConde, MD; Spencer Payne, MD, FARS

(Supported by Entellus Medical)

12:00-1:00 PM

Mentorship Program Lunch

Location: Cortez AB

"Medicare Physician Payment Reform: What an Otolaryngologist Should Know"

Moderator: Ameet Singh, MD, FARS

Associate Professor of Surgery & Neurosurgery Director, Rhinology & Skull-Base Surgery George Washington University Medical Center

Speaker: Howard Pitluk, MD, MPH

Vice-President Medical Affairs & Chief Medical Officer, Health Services Advisory Group

Panelists: Robert Lorenz MD, MBA

Medical Director Payment Reform, Risk & Contracting

Michael Setzen, MD, FARS, FAAP

Past-President, American Rhinologic Society, Clinical Associate Professor, NYU School of Medicine, Chief Rhinology Section, North Shore Hospital

Saturday, September 17, 2016 Breakout Room A, Harbor Ballroom G

1:00 PM

Welcome

Erin O'Brien, MD, FARS, Chairperson

Moderators: David Poetker, MD, FARS and Jivianne Lee, MD, FARS

1:05 PM

Clinical interpretability of the empty nose syndrome 6-item questionnaire (ens6q) using office-based cotton testing

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Introduction

The Empty Nose Syndrome 6-item Questionnaire (ENS6Q) is a validated disease-specific questionnaire for patients with empty nose syndrome (ENS). Using cotton testing as a model, we assessed the minimal important difference (MID) score for the ENS6Q and threshold for clinically significant improvement.

PROGRAM ABSTRACTS

Methods

15 patients diagnosed with ENS and 18 controls with non-ENS sinonasal conditions (e.g. chronic sinusitis, nasal obstruction) underwent office cotton placement into bilateral inferior meatuses to increase nasal resistance and assess candidacy for turbinate augmentation. Both groups completed ENS6Q testing, along with a 5-item transition scale ranging from 'much better' to 'much worse', to rate changes in nasal breathing before and after cotton placement. Mean changes for each transition point, and the ENS6Q MID, were calculated.

Results

Prior to cotton testing, significant differences ($p < 0.001$) in all ENS6Q questions between ENS and controls were noted. Following cotton placement, virtually all ENS6Q differences normalized. On transition scale, all ENS patients reported feeling "much better" ($n=12$) or "a little better" ($n=3$) with cotton placement, reflecting a mean change in their ENS6Q scores of 14.83 (SD=7.01) and 6.33 (SD=4.93) respectively. Conversely, nearly all controls ($n=16$) reported feeling 'about the same' or worse with cotton placement. Including all participants, the mean change in the ENS6Q between the parameters 'a little better' and 'about the same' was 4.25 (SD=5.79) and -2.00 (SD=3.70), giving a MID of 6.25 for ENS6Q.

Conclusion

Cotton testing reliably discriminates ENS patients from controls. A 7-point reduction in ENS6Q scoring marks a clinically significant improvement in ENS symptoms.

1:12 PM

Computational fluid dynamics (cfD) and trigeminal sensory examinations of empty nose syndrome patients: Pre and post turbinate surgery

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Introduction

The pathogenesis of empty nose syndrome (ENS) remains unclear, with likely involvement of nasal aerodynamics and sensorineural factors. Yet, few studies examine them in patients.

Methods

We have the rare opportunity to enroll three ENS patients who have pre and post CT scans of the inferior turbinate surgery leading to their symptoms. Their symptoms were confirmed through SNOT22, ENS6Q, visual analogue scale, acoustic rhinometry and rhinomanometry findings. Nasal trigeminal sensitivity was assessed via menthol lateralization detection thresholds (LDT) and electric current perception thresholds (CPT) at the nasal valve septum.

Results

Contrary to the common belief, these patients had much of their inferior turbinates (IT) preserved. Post-surgical reductions in nasal resistance were observed, but still within normal range (0.28 ± 0.13

Pa/ml/s). CFD analysis showed that nasal airflow predominantly flow through the middle meatus above IT pre-surgery ($53\% \pm 12.24\%$), which increased after IT reduction (post-surgery: $65\% \pm 25.7\%$). Thus strikingly for all three patients, IT reduction didn't draw more airflow to the airway surrounding IT, but rather resulted in a reduction of surrounding airflow intensity (averaged airspeed pre 0.67 ± 0.41 vs post 0.64 ± 0.50 m/s). This implicates reduced airflow interactions with IT. Menthol LDT and intra-nasal CPT were mostly within normal range as compared to a healthy cohort ($n=10$), except for one patient who had slightly elevated Menthol LDT.

Conclusion

This is the first examination of both nasal aerodynamics and trigeminal sensory factors in actual ENS patients. The results indicated the need for better understanding of a combinatory of factors, including the potential pre-disposing conditions.

1:19 PM

Arterial ligation versus embolization in epistaxis management: Counterintuitive national trends

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Introduction

Arterial ligation and embolization are treatment modalities indicated in severe and refractory epistaxis. The purpose of this study was to explore temporal trends and compare outcomes in treatment of hospitalized epistaxis patients with ligation or embolization.

Methods

This retrospective cohort analysis utilized the 2008-2013 National Inpatient Sample to identify patients admitted with a primary diagnosis of epistaxis, and an associated procedure code for either ligation or embolization, but not both.

Results

1,866 cases met the inclusion criteria, with 55.5% undergoing ligation. During the study period, treatment with ligation has trended down, whereas treatment with embolization has remained constant. Overall, ligated patients were older (64.1 vs. 62.2 ; $P=0.013$) and had higher rates of congestive heart failure (15.1% vs. 10% ; $P=0.001$) and chronic pulmonary disease (23.5% vs. 19.4% ; $P=0.036$). No differences in rates of coagulopathy, liver disease, or hereditary hemorrhagic telangiectasia were observed between cohorts. No differences were observed in rates of blood transfusion, stroke, blindness, or in-hospital mortality, however, ligated patients had lower rates of intubation/tracheotomy (2.8% vs. 5.3% ; $P=0.008$). Ligated patients also experienced shorter hospital stays (3.6 vs. 4.1 days; $P=0.003$) and incurred fewer hospital charges ($\$33,030$ vs. $\$70,632$; $P < 0.001$).

Conclusion

Compared to embolization, ligation is associated with significantly

decreased hospital charges and shorter hospital stay, without an increase in complication rates. Counterintuitively, however, ligation appears to be trending down in its use, nationally, relative to embolization.

1:26 PM

Ergonomic analysis of the surgical position in FESS

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Background

Ergonomics is the methodological study of people's efficiency in their work environment and is based on anatomy, physiology, psychology, and engineering. Although highly studied in other work environments, little attention has been paid to surgeons until the landmark survey published by Park et al (J Am Coll Surg, 2009). Many unique aspects of endoscopic surgery amplify task-related physical discomfort, and because of these issues, we aimed to study the physical fatigue effects of FESS performed in the standing and sitting positions.

Methods

Bilateral FESS was performed in 8 cadaver heads (4 in the standing position, 4 in the sitting position), following established ergonomic principles. Physical fatigue was assessed using a 27-point physical discomfort questionnaire, surface EMG, and the NASA-TLX survey. Paired and unpaired t-tests were used for statistical analysis.

Results

Physical fatigue was noted after FESS performed in both positions. An overall similar task burden was seen between the two positions, although the sitting position was more "frustrating" ($p < 0.05$). Discomfort after FESS in the standing position was worse in the legs and low back, whereas in the sitting position was seen predominantly in the upper back and arms ($p < 0.05$). Mean power frequency EMG measurements demonstrated measurable fatigue of major muscle groups in both positions.

Conclusion

Significant physical fatigue is reported after a single FESS operation, with measurable EMG changes. Surgeons should be aware of the short-term and long-term physical implications of their daily tasks, and use this information to be proactive in decision-making for their longevity.

1:33 PM

Q&A

Moderators: Eric Holbrook, MD, FARS and Anne Getz, MD

1:40 PM

Determinants and outcomes of upfront surgery vs. medical therapy for chronic rhinosinusitis in cystic fibrosis

Noel F. Ayoub, BS

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Introduction

The indications for surgical management of chronic rhinosinusitis (CRS) in patients with cystic fibrosis (CF) are poorly defined. We compare outcomes of medical vs. surgical treatment and examine trends associated with the transition from medical to surgical therapy in CF patients.

Methods

136 patients with CF referred to a tertiary rhinology practice were retrospectively divided into three cohorts: medical management only, upfront surgery, or crossover if they converted from medical to surgical management. Sinonasal outcome tests (SNOT-22), and pulmonary function tests (PFTs) were assessed up to 48 months.

Results

Compared to patients initially managed medically ($n=90$), those who pursued upfront surgery ($n=46$) had a greater incidence of nasal polyposis ($p=0.0011$), prior sinus surgery ($p=0.0025$), lower %FEV1 ($p=0.0063$), and higher Lund-Mackay ($p=0.0025$) and SNOT-22 scores ($p=0.0229$). Within the medical treatment group, 35.5% converted to surgery after a mean of 11.9 months. Crossover ($n=32$) was associated with a 6.1-point increase in SNOT-22 scores and 4.5% deterioration in %FEV1. Despite worsened symptom severity, the crossover cohort ultimately achieved similar postoperative SNOT-22 scores ($p=0.831$) and %FEV1 ($p=0.114$) as those who underwent upfront surgery. Although the medical cohort had the lowest baseline SNOT-22 scores ($p < 0.001$), surgery at any time normalized scores to the same baseline level ($p=0.652$). Neither medical therapy nor surgery improved PFTs.

Conclusions

Surgery effectively reduces CRS-related symptoms in CF patients. In patients who first pursue medical therapy, symptomatic decline may prompt eventual conversion to surgery. Patients who delay surgery may achieve similar outcomes as those who pursue surgery upfront.

1:47 PM

F508del genotype in endoscopic sinus surgery: A predictor for improvement in pulmonary function tests after sinus surgery

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PROGRAM ABSTRACTS

Introduction

The impact of endoscopic sinus surgery (ESS) on pulmonary function in cystic fibrosis (CF) patients with chronic sinusitis remains unclear, as prior studies have demonstrated conflicting results. To date, no study has looked specifically at the impact of CF genotype on lung function after ESS. In this study, we reviewed changes in pulmonary function test (PFT) results following ESS in F508del homozygotes and heterozygotes.

Methods

The charts of 29 patients with CF without prior lung transplant who had ESS by one surgeon between the period of 2/2006-5/2015 were retrospectively reviewed. Data including genotype and PFT results was collected. Patients were grouped based upon genotype. Pre and post-operative PFTs were compared.

Results

In homozygotes, the mean FEV1 improved from 2.56L \pm 0.86 (SD) (73.2 \pm 21 (SD) % predicted) before surgery, to 2.68L \pm 0.88 (76.3 \pm 21% predicted) at 6 months post-op ($p=0.0069$ and $p=0.0139$), and at 12 months post-op 2.60L \pm 0.78 (71.7 \pm 17% predicted) ($p=0.0176$ and $p=0.0257$). Heterozygotes showed no significant improvements in FEV1 or FEV1% predicted at any time point.

Conclusions

Prior studies investigating the impact of ESS on pulmonary function in CF patients have shown conflicting results. To our knowledge, prior studies did not separate and compare different genotypes, which may have introduced heterogeneity in their patient populations. Our study suggests that patients homozygous for the F508del mutation may receive greater benefit in FEV1 and FEV1% predicted following ESS than heterozygotes.

1:54 PM

Effect of viral infection on clinical severity of sinonasal disease and iron sequestration in cystic fibrosis patients

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Introduction

Chronic, antibiotic-resistant *Pseudomonas aeruginosa* biofilms are associated with increased morbidity and mortality of cystic fibrosis (CF) patients. Recent pulmonary-based studies demonstrate that respiratory viral infections alter *P. aeruginosa* growth to an antibiotic resistant, biofilm-forming phenotype. The proposed mechanism of action is dysregulation of iron sequestration. The goal of this study was to examine the clinical severity of sinonasal disease in CF patients with incidence of respiratory viruses, pathogenic bacteria and iron levels.

Methods

Twenty-eight CF patients were enrolled prospectively over one year. Conventional cultures and molecular sequencing techniques were used to assess respiratory viral presence and the bacterial

microbiome. Iron levels were measured in sinus secretions every 3 months. SNOT-22 and modified Lund-Kennedy (mLK) scores were used to assess disease severity.

Results

Respiratory viruses were detected in 9 of 40 swabs (22.5%). Rhinovirus was the most commonly detected virus (88.9%). Iron levels were significantly higher in all patients in whom a respiratory virus was detected ($p=0.042$) and when controlled for interpatient variability ($p=0.003$). There were no statistically significant differences in SNOT-22 scores or mLK scores between viral presence and absence ($p=0.52$ and $p=0.37$ respectively).

Conclusions

The pulmonary literature demonstrates that viral infection in CF patients alters the growth of *P. aeruginosa* to a biofilm-forming, antibiotic resistant phenotype by dysregulation of iron sequestration. This study demonstrates that a similar mechanism may take place in the paranasal sinuses of CF patients, thereby providing a novel target to impede the formation of biofilm. Symptom and endoscopic severity did not correlate with viral infection.

2:01 PM

Partial loss of cfr function in cf carriers leads to craniofacial sinus hypoplasia and increased incidence of chronic rhinosinusitis

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Introduction

Cystic fibrosis (CF) carriers with a single mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) gene do not have CF, but are at significantly higher risk to develop chronic rhinosinusitis (CRS). One possible mechanism is decreased sinus size. We hypothesized that partial loss of CFTR function in CF heterozygotes would result in smaller sinus volumes than healthy controls. In order to exclude CRS as a confounding factor, we also assessed paranasal sinus volume in those with CRS, but without known CFTR mutations.

Methods

We screened the 9 CFTR mutations covering greater than 80% of the prevalence of CFTR mutations in 86 individuals diagnosed with CRS and 103 healthy controls. We matched seven individuals to age and gender with respect to CRS with a single CFTR mutation, CRS without CFTR mutations, and healthy controls. Those with CF were used as a positive control. We quantified sinus size using 3-d volumetric segmentation and standardized sinus volume to individual skull volumes.

Results

We identified 7 individuals who were CFTR carriers in our CRS population (8.14%), and none in our healthy controls. Those who were CFTR carriers with CRS had significantly smaller frontal and

maxillary sinus volumes than healthy controls.

Conclusion

Our findings support that CFTR carriers are at increased risk to develop CRS. Our data suggest that decreased sinus size may be one factor in the development of CRS, however further studies of CFTR carriers without CRS are necessary to exclude confounding factors.

2:08 PM

Sinus surgery improves quality of life, lung infections and lung function in patients with primary ciliary dyskinesia

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Background

Chronic rhinosinusitis (CRS) and bacterial sinusitis are ubiquitous in patients with primary ciliary dyskinesia (PCD). From the sinuses *Pseudomonas aeruginosa* can seed to and infect the lungs. Endoscopic sinus surgery (ESS) is effective in treating CRS and sinus infections in cystic fibrosis patients. We assessed the effect of ESS on symptoms of CRS and lower airway infections in PCD.

Methods

We performed a pre-post single arm intervention study comprising ESS and adjuvant therapy using nasal irrigation with saline, topical nasal steroids and two weeks' systemic antibiotics. *P. aeruginosa* sinusitis was treated with local colistin for six months.

Results

Twenty-four PCD patients underwent ESS, median age 24 years (range 10-65 years). The indication for ESS was search for an infectious focus in 16 patients and severe symptoms of CRS in 14 patients (overlapping). Sinonasal symptoms were improved at three, six and 12 months after ESS. Bacteria were cultured from preoperative sinus samples in 21 patients (88%) and simultaneous sinus and lung colonization with identical pathogens were observed in 13 patients (62%). Four patients with preoperative *P. aeruginosa* lung colonization (25%) had no regrowth of *P. aeruginosa* during follow-up for more than six months; two of these had *P. aeruginosa* sinusitis. We observed a trend toward improved lung function after ESS.

Conclusion

This study demonstrates an improvement in CRS related symptoms and a trend towards lung function improvement after ESS and adjuvant therapy. In selected PCD patients this regimen may postpone chronic lung infection with *P. aeruginosa*, but RCT's are warranted.

2:15 PM

Q&A

2:20 PM

Panel: Sinus disease and the immunocompromised patient

Moderator: David Conley MD, FARS
Panelists: Zara Patel, MD, FARS; Erin O'Brien, MD, FARS;
Andrew Lane, MD, FARS

2:50 PM

Break with Industry Partners

Moderators: Praveen Duggal, MD and Mark Zacharek, MD, FARS

3:20 PM

Nrf2 activation restores house dust mite induced sinonasal epithelial cell barrier dysfunction

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Background

Dysregulated sinonasal epithelial barrier function has been proposed to contribute to the pathogenesis of sinonasal inflammatory conditions such as allergic rhinitis and chronic rhinosinusitis. Allergens such as house dust mite (HDM) have been reported to disrupt sinonasal epithelial barrier integrity. We have recently identified Nrf2 activation via Sulforaphane (SFN) stimulation to stabilize sinonasal epithelial cell (SNEC) barrier function. The purpose of this study was to explore whether Nrf2 activation could ameliorate HDM-induced SNEC barrier dysfunction.

Methods

Human sinonasal epithelial cells (HSNECs) were grown from control patients at the air-liquid interface. HSNECs were stimulated with HDM with and without pharmacologic activation of Nrf2 with SFN. HSNECs were then stained for cell junction proteins zonula occludens-1 (ZO-1) and epithelial cadherin (E-cadherin) and cell surface localization was evaluated by confocal microscopy. Trans-epithelial electrical resistance (TEER) and paracellular FITC-dextran permeability was measured in response to stimulation with HDM and SFN.

Results

HDM stimulation caused a global disruption of epithelial junction proteins ZO-1 and E-cadherin along with an associated decrease in TEER ($p < 0.001$) and increased FITC-dextran paracellular permeability ($p < 0.0001$). Enhancing Nrf2 levels through treatment with SFN prior to stimulation with HDM was associated with increased localization of ZO-1 and E-cadherin levels at the cell surface and statistically significant increases in TEER ($p < 0.05$) and decrease in paracellular FITC-dextran permeability ($p < 0.001$).

Conclusions

This is the first study to demonstrate that HDM-induced sinonasal epithelial cell barrier dysfunction is reversible by Nrf2 activation. The Nrf2 antioxidant pathway may represent a potential therapeutic target for allergen induced sinonasal inflammation.

PROGRAM ABSTRACTS

3:27 PM

Differential Cl⁻ neg secretory capacity in transepithelial ion transport properties in chronic rhinosinusitis

(Presented by Kyle J. Hoffman, BS)

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Background

Epithelial ion transport regulates hydration of airway mucosal surfaces, which, in turn, promotes effective mucociliary clearance. Decreased transepithelial Cl⁻ transport may contribute to epithelial dysfunction by abrogating MCC and increasing mucus viscosity in chronic rhinosinusitis (CRS). The objective of the current study is to evaluate Cl⁻ channel transport properties from cultures of human sinonasal epithelia.

Methods

Human sinonasal epithelia (HSNE) from patients undergoing sinus surgery were cultured at an air-liquid interface to confluence and full differentiation. The epithelial monolayers were mounted in Ussing Chambers to investigate pharmacological manipulation of ion transport. Epithelial Na⁺ channel (via Amiloride), CFTR (via forskolin), and Ca²⁺-activated Cl⁻ channel (CaCC, via UTP) transport were investigated among three different patient groups: Control, CRS and CRS with polyposis. CFTR mRNA levels were evaluated with quantitative RT-PCR.

Results

HSNE cultures from 18 patients (Control = 10, CRS = 5, CRS with polyposis = 3) were evaluated in 142 experiments. Stimulated CFTR-mediated anion transport (? ISC) was significantly lower with CRS (7.58 +/- 2.24 μ A/cm²) compared to control (25.86 +/- 3.44 μ A/cm²) and CRS with polyposis (20.16 +/- 4.0 μ A/cm²) ($p=0.004$). No statistically significant difference was found for CaCC anion transport between groups ($p=0.39$). Significantly decreased mRNA was noted in CRS HSNE (40.83 +/- 1.76 vs. control, 96.48 +/- 17.27, $p=0.03$).

Conclusions

A substantial decrease in the Cl⁻ secretory capacity of HSNE monolayers was demonstrated in CRS subjects. Data suggest that CFTR may contribute more to abnormal ion transport in CRS than CaCC.

3:34 PM

Liquid chromatography/tandem mass spectrometry profiling of eicosanoid and docosanoid metabolomes in chronic rhinosinusitis

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Introduction

Current literature implicates arachidonic acid derived leukotriene and prostaglandin pathways in the pathogenesis of CRS subtypes, specifically in nasal polyps (CRSwNP) and aspirin sensitivity (AERD). Despite this awareness, these lipid mediator pathways have not been examined in depth. Here, we aim to characterize the arachidonic acid (AA) and docosahexanoic acid (DHA) metabolomes in CRS tissues to better characterize these inflammatory pathway disturbances in CRS subtypes.

Methods

IRB-approved cross-sectional study. Sinonasal epithelial tissue was collected from 27 patients undergoing endoscopic sinus surgery; 16 of these subjects had CRSwNP and 25% with AERD. 11% of subjects were control patients undergoing endoscopic nasal surgery without sinusitis. Lipid mediator containing fractions were isolated from frozen tissue using C18 solid phase extraction. Samples were analyzed using liquid chromatography/tandem mass spectrometry and a multiple reaction monitoring strategy was employed targeting 32 analytes from the omega-3 and omega-6 metabolomes. Metabolite concentrations were calculated using standard calibration curves, and data analyzed using the student's t-test.

Results

CRSwNP demonstrated significantly elevated concentrations of several AA-derived compounds [8-iso-15R-prostaglandin F2 alpha, thromboxane A2, lipoxin A4, and leukotriene B4] and the DHA-derived pro-resolving mediators Resolvin D1 and Resolvin D2 when compared with non-polyp patients ($p<0.05$). AERD patients demonstrated increased levels of 8-iso-prostaglandin F2 alpha and prostaglandin D2 when compared with non-AERD patients ($p<0.05$).

Conclusions

Lipid mediator pathways dysfunction in CRS and CRSwNP extends beyond the traditional descriptions of leukotrienes and prostaglandins. These pathways provide a novel approach to the study of inflammation in particular CRS subtypes.

3:41 PM

Discordant frequencies of tissue-resident and circulating CD180-negative B-cells in chronic rhinosinusitis

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Introduction

The unconventional Toll Like Receptor (TLR) CD180 is implicated in infectious and inflammatory diseases, however, its role in Chronic Rhinosinusitis (CRS) has yet to be investigated. Here we studied the expression of TLR4, MD2, MD1 and CD180 on mucosal tissue and mucosal and systemic immune cell populations.

Methods

Mucosal and peripheral blood samples were prospectively collected from CRS patients and non-CRS controls. The expression of TLR4, MD1, MD2 and CD180 was investigated using qRT-PCR, immunohistochemistry and flow cytometry. Serum IgG levels were determined using ELISA.

Results

70 patients were recruited to the study. CRSwNP patients had significantly increased mRNA expression of CD180, MD1 and MD2 compared to controls (5.54, 2.1, 2.38 fold respectively, $P < 0.01$). Flow cytometry showed increased mucosal B-cell numbers (3.82 +/- 1.35 vs 0.58 +/- 0.29, $P < 0.01$) The B-cells lacking CD180 were decreased in CRSwNP compared to CRSsNP and controls (21.07 +/- 6.41 vs 41.61 +/- 7.82 vs 40.06 +/- 8.06, $P < 0.01$ but higher in blood (39.18 +/- 8.3 vs 17.95 +/- 7.82 and 12.49 +/- 4.91 $p = 0.05$). There was a positive correlation between CD180 negative blood B-cell numbers and IgG levels ($r = 0.36$).

Conclusion

Differences in mucosal and blood CD180 expressing B-cells were identified in CRSwNP patients. A positive correlation between CD180 negative blood B-cell numbers and IgG levels indicates a role for these cells in the IgG-dependent immune response in these patients.

3:48 PM

Q & A

Moderators: Elina Toskala, MD, FARS and Justin Turner, MD

3:52 PM

Irrigation based corticosteroid therapy is more effective than simple sprays in managing post-surgical chronic rhinosinusitis

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Introduction

Corticosteroid nasal irrigations have become popular in order to deliver local therapy to the paranasal sinuses. The application of corticosteroid to the nose does not always imply 'sinus' delivery. The surgical state of the sinuses and the method or device used has been shown in experimental studies to heavily influence delivery to the sinus mucosa. The impact of corticosteroid delivered by either spray or irrigation in a cohort of patients with chronic rhinosinusitis (CRS) is described.

Methods

Patients with chronic rhinosinusitis, having failed medical therapy, underwent endoscopic sinus surgery and were then blind block randomized to a mometasone 2mg dose delivered in either a 240ml nasal irrigation solution or as 0.2ml nasal spray once a day. The solutions were compounded and all patients used both spray and irrigation with the active agent in one and placebo in the other. Patients and observers were blinded to the treatment group. Symptom scores (VAS), quality-of-life (SNOTT22) and Endoscopic

scores (LM) were assessed as baseline and 12 months.

Results

44 patients were recruited (age 50.3 ± 13.0 years, 59% female). Eosinophilic CRS was present in 69% and evenly distributed between groups. Groups comprised of spray (n=23) and irrigation (n=21), with 14 not completing and similar between groups. The groups differed by total VAS (1.92 fold change favoring irrigation, $p = 0.017$) and Endoscopic score (2.60 fold change favoring irrigation, $p = 0.028$). The SNOT22 scores were similar.

Conclusion

Corticosteroid therapy delivered by irrigation brought about a greater improvement compared to sprays despite a higher local dose exposed to the patient in the spray group.

3:59 PM

Comparison of single versus double strength budesonide irrigations in patients with chronic rhino sinusitis with polyposis after endoscopic sinus surgery

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Background

Nasal steroids are a critical part of the management of patients with chronic rhinosinusitis with nasal polyposis (CRSwNP) after endoscopic sinus surgery (ESS). Budesonide sinonasal irrigations are a frequently used off-label method of delivering topical steroids to the post-operative nasal cavity. There has been little research into the optimal dosing of budesonide irrigations.

Methods

A randomized controlled trial was performed on patients after ESS for CRSwNP in a tertiary care center. Patients were randomized into 2 groups. Group 1 received 0.5mg/2mL vial of budesonide in 240mL saline (single concentration) and group 2 received the budesonide in 120mL of saline (double concentration). Primary endpoints were Sino-Nasal Outcome Test (SNOT-22) and Lund-Kennedy endoscopic scores at 6 months.

Results

Thirty patients were enrolled in the study. There were no significant differences among groups 1 and 2 with respect to age, gender, asthma, aspirin sensitivity, or previous ESS. There were no significant differences in the change in SNOT-22 (46.63 vs 47.8, $p = .221$) or Lund-Kennedy scores (4.6 vs 3.87, $p = .299$) at 6 months. There was a significantly greater improvement in SNOT-22 at 1 and 3 weeks for Group 1 compared to Group 2.

Conclusion

Groups 1 and 2 had non-significant differences in SNOT-22 and Lund-Kennedy scores at 6 months after ESS for CRSwNP. The higher concentration of budesonide in a lower volume does not confer greater benefit in terms of endoscopic scores or patient symptoms. However, double strength budesonide irrigations can be used with no significant difference in SNOT-22 and Lund-Kennedy scores if patients prefer a smaller volume of irrigation.

PROGRAM ABSTRACTS

4:06 PM

The safety of long-term intranasal budesonide delivered via the mucosal atomization device for chronic rhinosinusitis

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Introduction

While short-term use (=2 months) of atomized topical nasal steroids has been shown to be safe and effective, the long-term safety has yet to be demonstrated. The objective of this study was to determine the impact of long-term treatment with topical budesonide via the mucosal atomization device (MAD) on the hypothalamic-pituitary-adrenal axis (HPAA).

Methods

A cross-sectional study of patients with chronic rhinosinusitis (CRS) +/- nasal polyposis managed with daily nasal budesonide via MAD was conducted at a tertiary rhinology centre. Patients using systemic steroids within 3 months of assessment were excluded. HPAA impact was assessed using the high-dose cosyntropin stimulation test for adrenal function and a survey of symptoms related to adrenal insufficiency. Patients also underwent tonometry to assess for elevated intraocular pressure (IOP) potentially related to corticosteroid use. Treatment adherence was subjectively assessed using a medication adherence scale (MMAS-8) to determine the validity of steroid exposure estimates.

Results

A total of 98 CRS patients were recruited with mean budesonide treatment duration of 23.7 months (range, 6-37 months). Stimulated cortisol response was abnormally low in three patients (3.1%). No patients with adrenal suppression experienced relevant symptomatology or abnormal IOP. The mean MMAS-8 score was 6.8, indicating moderate treatment adherence behavior among this population.

Conclusion

These findings suggest that the long-term use of topical budesonide via MAD is generally safe. However, given that a small proportion of patients exhibited signs of adrenal insufficiency, future studies should aim to generate surveillance guidelines for patients on long-term atomized intranasal budesonide treatment.

4:13 PM

Manuka honey sinus irrigation for the treatment of chronic rhinosinusitis: A randomized controlled trial

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Introduction

Bacterial persistence in recalcitrant chronic rhinosinusitis (CRS) has been partly attributed to biofilm formation. Manuka honey is thought to be effective against biofilm formation. This study assessed the effectiveness of Manuka honey as an adjuvant treatment for patients with recalcitrant CRS.

Methods

This prospective single-blinded (clinician only) randomized controlled trial recruited patients with active CRS and prior sinus surgery. Patients were randomized to receive either Manuka honey (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

Thirty-three patients have completed follow-up to date (MH n=17, SAL n=16). The SNOT-22 change score improved in both groups but was similar on MH (-14 [-22,-7]) compared to SAL (-16 [-25,-5]) (p=0.85). Post-treatment culture negativity was better on MH (6/16, 38%) compared to SAL (3/15, 20%), but this difference was not significant (p=0.28). Lund-Kennedy endoscopic change score was significantly better on MH (-3 [-5,-1]) compared to SAL (-1 [-2,0]) (p=0.04). Manuka honey was well-tolerated. No serious adverse events were reported.

Conclusions

In patients with recalcitrant CRS who had prior sinus surgery, Manuka honey irrigations resulted in significantly better endoscopic findings. Manuka honey also had better culture "cure" rates than saline though did not reach significance. These improvements, however, did not translate to better quality of life. Manuka honey has potential as a topical treatment for recalcitrant CRS, but further study is warranted regarding its impact on quality of life.

4:20 PM

Q & A

4:25 PM

Panel: What I learned in training but have abandoned in practice: Experience or evidence?

Moderator: James Palmer, MD, FARS

Panelists: Jean Anderson Eloy, MD; Alkis Psaltis, MD;
Justin Turner, MD; Eugenia Vining, MD

5:00 PM

Closing Remarks and Meeting Adjourned

5:30 PM

Poster Presentations & International Countries Welcome Reception

Harbor Ballroom DEF

(Supported by Medtronic and OptiNose)

Saturday, September 17, 2016
Breakout Room B,
Harbor Ballroom H
(Live International Webcast)

(Supported by the Pan American Association)

1:00 PM

Welcome

Raj Sindwani, MD, FARS, Chairperson

Moderators: Douglas Reh, MD, FARS and Pablo Stolovitzky, MD, FARS

1:05 PM

Changing the surgical dogma in frontal sinus trauma: Transnasal endoscopic repair

Jessica W. Grayson, MD
 Elisa A. Illing, MD
 Do-Yeon Cho, MD
 Kristen O. Riley, MD
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 Birmingham, AL
 USA

Objectives/Hypothesis

Management of frontal sinus trauma includes coronal or direct open approaches through skin incisions to either ablate or obliterate the frontal sinus for posterior table fractures and openly reduce/ internally fixate fractured anterior tables. The objective of the current study is to evaluate outcomes of frontal sinus anterior and posterior table trauma using endoscopic techniques.

Methods

Prospective evaluation of patients with frontal sinus trauma was performed. Data was collected regarding demographics, etiology, technique, operative site, length involving the posterior table, size of the skull base defect, complications, and clinical follow up.

Results

Forty-six patients (average age 42 years) with traumatic injuries to the anterior and/or posterior table were treated using endoscopic techniques from 2008-2016. Mean follow-up 25 months (range 0.5-62). Patients were primarily treated with a Draf IIb frontal sinusotomies. A Draf III was used in 9 patients. Average posterior table fracture defect (length vs width) was 17.1 x 9.1mm, and the average length involving the posterior table was 13.1mm. Skull base defects were covered with either nasoseptal flaps or free tissue graft. One individual required Draf IIb revision, but all sinuses were patent at last follow up and all closed reductions of anterior table defects resulted in cosmetically acceptable outcomes.

Conclusions

Frontal sinus trauma has traditionally been managed using open approaches. Results in the current study indicate endoscopic management should become part of the management algorithm for frontal sinus trauma and challenges current surgical dogma regarding mandatory open approaches.

1:12 PM

Efficacy and safety of endoscopically-assisted transblepharoplasty approach for frontal sinus pathology

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 Jenny Y. Yu, MD
 S. Tonya Stefko, MD
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 Stella Lee, MD
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 USA

Introduction

While endoscopic approaches are the primary treatment for inflammatory and neoplastic disease of the frontal sinus, fibro-osseous neoplasms and lesions extending laterally and superiorly remain challenging and may necessitate additional open approaches. An alternative to bicoronal or eyebrow incisions, the endoscopically assisted transblepharoplasty approach (ETB) can access the floor of the frontal sinus while minimizing cosmetic sequelae and bony removal of the frontal bar. However, the efficacy and safety of ETB is not reported.

Methods

A single institution retrospective review of ETB was conducted from 2013-2016. The surgical indications included pathology lateral to the mid-pupillary line, extending above the superior 1/2 of the posterior table and fibro-osseous lesions. The outcome measures were accomplishment of the surgical objective, complications and post-operative cosmesis. Full profile eye-open post-operative pictures were evaluated by a plastic surgeon to determine asymmetries between operative sides.

Results

Twelve patients underwent 13 ETB approaches. Pathology included: osteoma (5); mucocele (3); epidermoid (1); encephalocele (1); inverted papilloma (1); residual necrotic SCCA (1). The majority of lesions had lateral extension (10). Complete tumor resection was accomplished in 9/9 mass lesions and all mucocoeles including an infected mucocele within fibrous dysplasia were marsupialized. Complications included transient V1 numbness (6) and 1 upper lid scar contracture that required revision. No new facial asymmetries were identified in the 7 cases where pictures were available.

Conclusion

Combining an upper lid blepharoplasty approach with endoscopic visualization to access the frontal sinus allows for complete tumor resection and/or marsupialization with excellent cosmesis and limited complications.

1:19 PM

Cryosurgical posterior nasal nerve ablation for the treatment of rhinitis

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 USA

PROGRAM ABSTRACTS

Introduction

Endoscopic posterior nasal nerve (PNN) resection has been described as an efficacious surgical treatment for refractory allergic and non-allergic rhinitis, but the requirement for surgery under general anesthesia has limited its acceptance. We have developed a device for office-based cryosurgical ablation of the PNN and report our first series of patients treated for refractory rhinitis.

Methods

27 patients with medically refractory rhinorrhea and/or nasal congestion for >3 months were recruited (Minimum rhinorrhea and/or congestion subscores of 2 as part of the Total Nasal Symptom Score [TNSS]). Under local anesthesia, the cryodevice was applied endoscopically to the posterior middle meatus and was used to freeze the PNN bilaterally. Patients were followed up after 7 days, 1 month and 3 months, and reported symptoms by TNSS and visual analog scale (VAS).

Results

The procedure was successfully completed in 100% of patients, with no complications. 85% reported no or mild discomfort by the first post-procedure day. TNSS was reduced significantly at 1 month ($p < 0.001$), with continued significant reduction at 3 months (mean 6.2 ± 0.5 at pretreatment, 2.5 ± 0.4 at 3 months, $p < 0.001$). Both rhinorrhea and congestion subscores decreased significantly at 3 months ($p < 0.001$). VAS scores showed comparable significant reductions in rhinorrhea and congestion symptoms ($p < 0.001$). Healing was uneventful in all patients, with no infectious complications or instances of prolonged crusting.

Conclusion

Office-based cryoablation of the PNN is well tolerated and results in decreased symptom scores for at least 3 months. Longer term outcomes are currently being collected.

1:26 PM

Utility of intraoperative frozen sections in surgical decision making for acute invasive fungal rhinosinusitis

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Pete Batra, MD, FARS
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USA

Background

Acute invasive fungal rhinosinusitis (AIFRS) represents a fulminant, potentially fatal, disease process in immunocompromised patients. The diagnosis often rests on a high index of clinical suspicion, with relative paucity of data on the diagnostic and therapeutic implications of intraoperative frozen sections.

Methods

Retrospective review was performed for 18 cases undergoing endoscopic sinus surgery for AIFRS. Reliability of intraoperative frozen section diagnosis was evaluated for all patients using final pathology as the gold standard.

Results

A total of 44 frozen sections were performed in this patient group. Biopsies were most commonly performed from middle turbinate in 16 (40.9%) and septum in 5 (11.4%) cases. Frozen sections were positive for fungal elements in 32 cases (72.7%), with the remainder demonstrating inflammation and/or necrosis. Final pathology demonstrated fungal elements in all 44 cases. Diagnostic accuracy of frozen sections illustrated sensitivity of 72.7% (95% CI 0.57-0.85), specificity of 100% (95% CI 0.85-1), PPV of 100% (95% CI 0.89-1), and NPV 64.7% (0.46-0.80). There was no statistically significant difference in sensitivity of frozen sections in cases of *Mucor* and *Aspergillus* at 68.8% and 76.2%, respectively (p value = 0.61).

Conclusion

Frozen section is an effective tool for guiding intraoperative decision making in patients with AIFRS. A NPV of 64.7% indicates that negative biopsies do not necessarily rule out the presence of invasive fungus, and additional surgery may be indicated based on clinical suspicion and intraoperative endoscopic findings. Further, frozen section appears to be equally effective in detecting either *Mucor* or *Aspergillus*.

Moderators: Stephanie Joe, MD, FARS and Ashutosh Kacker, MD

1:40 PM

Temporal patterns of fdg pet/ct sinonasal uptake following treatment of sinonasal malignancy

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Background

Current guidelines have identified 10-12 weeks post-treatment as the ideal time point for improved diagnostic accuracy of PET-CT for deep tissue sites of the head and neck. Following treatment, the sinonasal skull base is predisposed to prolonged inflammation that may render this time point inappropriate for initial post-treatment imaging surveillance for sinonasal malignancies. The purpose of this study is to evaluate temporal trends in 18FDG sinonasal uptake following treatment for sinonasal malignancies to better elucidate the optimal time point for initial PET-CT post-treatment evaluation in this patient population.

Methods

Retrospective analysis of all successfully treated and non-locally recurrent sinonasal malignancies over a 15-year study period (2000-2015) at our institution. Post-treatment 18FDG PET-CT SUV data was collected and compared between various time points (2-4 months, 5-12 months, 5-24 months and 13-24 months) using an independent samples t-test.

Results

A statistically significant difference was noted between the post-treatment time windows 2-4 and 5-12 months ($p = 0.048$) as well as

2-4 and 5-24 months ($p = 0.02$). A trend towards significance was seen when comparing 2-4 and 13-24 months ($p = 0.083$)

Conclusion

Our analysis of PET-CT in patients previously treated for sinonasal malignancy suggests that the post-treatment sinonasal skull base is characterized by a prolonged period of hypermetabolism that endures beyond the period previously described for deep tissue sites of the head and neck. These findings prompt a reevaluation of the previously described 10-12 week cut off point for initial post-treatment PET-CT for HNSCC as applied to sinonasal malignancies.

1:47 PM

A cost comparison of vascular flap and free tissue graft reconstruction of intradural skull base defects

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Background

The pedicled nasoseptal flap has recently emerged as a reconstructive workhorse in skull base defect reconstruction for its effectiveness in preventing postoperative cerebrospinal fluid (CSF) leak and meningitis. We aimed to determine the cost benefits of using vascular flap reconstruction over tissue graft, and the number-needed-to-treat (NNT) to prevent CSF leak among patients undergoing skull base surgery.

Methods

Charge data was collected from the Nationwide Inpatient Sample database for patients who underwent transsphenoidal surgery from 2007-2011. A multivariate analysis was performed to determine each complication's independent contribution to patient charge. Published rates of CSF leak and meningitis after vascular flap reconstruction versus avascular graft reconstruction were obtained from a systematic review of the literature.¹

Results

CSF leak added \$81,726.86 to total patient charge, and meningitis contributed \$141,632.40. Postoperative CSF leak rate was 15.6% (51/326) with avascular grafting, compared to 6.7% with vascular flaps (19/283). Rates of meningitis were 0.8% (7/242) and 0.0% (0/163) for grafts and vascular flaps, respectively. Thus, CSF leak and meningitis complications added an average charge of \$16856.73 per avascular graft reconstruction, compared to \$5475.70 per vascular flap. This amounts to a net savings of \$11,381.03 per additional vascular flap reconstruction performed. The NNT to prevent a CSF leak was 11.2.

Conclusions

Postoperative CSF leak or meningitis greatly increase total charge. When feasible, reconstructing skull base defects with vascular flaps, rather than free tissue grafts, may provide substantial cost benefits.

1:54 PM

Failure pressures after repairs of 2x2.5 cm rhinologic dural defects in a porcine ex vivo model

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USA

Background

The objective of this study was to determine failure pressures of six rhinologic repair techniques of large skull base/dural defects in a controlled, ex vivo model.

Methods

Failure pressures of six dural repairs in a porcine model were studied using a closed testing apparatus. 24x19mm dural defects were created. 40x34mm grafts composed of porcine Duragen (Integra), fascia lata, and Biodesign (Cook) were used either with or without Tisseel (Baxter International Inc.) to create six repairs: Duragen/no glue (D/NG), Duragen/Tisseel (D/T), fascia lata/no glue (FL/NG), fascia lata/Tisseel (FL/T), Biodesign/no glue (B/NG), Biodesign/Tisseel (B/T). Saline was infused at 30 ml/hr, applying even force to the underside of the graft until repair failure. Five trials were performed per repair type for a total of 30 repairs.

Results

Mean failure pressures were as follows: D/NG 1.361±0.169 cmH₂O, D/T 9.127±1.805 cmH₂O, FL/NG 0.200±0.109 cmH₂O, FL/T 7.833±2.657 cmH₂O, B/NG 0.299±.109 cmH₂O, and B/T 2.67±0.619 cmH₂O. There were statistically significant differences between glued (Tisseel) and non-glued repairs for each repair category ($p < 0.05$).

Conclusion

All glued repairs performed better than non-glued repairs. Both D/T and FL/T repairs performed better than B/T repairs. No repair tolerated pressures throughout the full range of adult supine intracranial pressure.

2:01 PM

Clinical outcomes of sinonasal squamous cell carcinomas based on tumor etiology

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Introduction

Squamous cell carcinomas (SCC) of the sinonasal cavity are rare entities found as either de novo tumors or arising from inverted papillomas (IP). This study aims to evaluate and compare clinical outcomes of sinonasal SCC based on their etiology and treatment strategy.

PROGRAM ABSTRACTS

Methods

A single-center, retrospective review comparing de novo SCCa (n=28) and those associated with IPs (n=40). All patients underwent definitive surgical resection. Demographic and tumor data, surgical approach, recurrence, and clinical outcomes were evaluated.

Results

There was no statistical difference when comparing the age, smoking history, comorbidities, or tumor stage of our patients with de novo sinonasal SCC versus IP-transformed SCC. There was no difference in tumor recurrence rate between the two groups. However, de novo SCCa tumors have a higher mortality rate compared to those cancers associated with IPs independent of tumor stage (p=0.04).

Conclusion

SCCs arising from inverted papillomas appears to have better prognosis in overall mortality rate compared to de novo sinonasal SCC tumors. This is the first study demonstrating improved survival based on sinonasal squamous cell carcinoma etiology.

2:08 PM

Enlargement of Meckel's Cave in patients with spontaneous cerebrospinal fluid leaks

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Introduction

Spontaneous CSF leaks have imaging findings consistent with chronically elevated intracranial pressure, such as empty sella. Meckel's cave is a CSF filled space that houses the trigeminal ganglion at the cranial base. The objective of this study is to evaluate "dilated" Meckel's cave as a radiologic sign in elevated intracranial pressure spontaneous CSF leaks and compare dimensions to a control cohort.

Method

Meckel's cave dimensions were measured in patients with spontaneous CSF leaks and documented elevated intracranial pressure. A control cohort receiving MRI scans for unrelated diagnoses were also evaluated. Subjects were included only if suitable MR imaging with T2 weighted sequences in the axial and coronal plane was available.

Results

Fifty patients with spontaneous CSF leaks and 50 normal control patients were included in the study. There was significant enlargement in all measured dimensions (medial-lateral, anterior-posterior, and cranial-caudal) at p < 0.01 for the spontaneous CSF leak group. When evaluating volume, spontaneous CSF leak subjects were significantly larger (1238.6 +/- 527.6 mm³ vs. control, 617.5 +/- 220.1 mm³, p < 0.0001). Average intracranial pressure measurements were 26 +/- 8.3 cm H₂O.

Conclusion

Patients with spontaneous CSF leaks have evidence of enlarged Meckel's caves. Evaluation of Meckel's cave dimensions should be included in preoperative imaging assessment as an additional indicator of chronically elevated intracranial pressure.

2:15 PM

Q & A

2:20 PM

Panel: The minimal disease patient: Do I operate and when?

Moderator: Jeremiah Alt, MD, FARS
Panelists: Raj Sindwani, MD, FARS; Spencer Payne, MD, FARS; Rick Chandra, MD, FARS

2:50 PM

Break with Industry Partners

Moderators: Justin Antisdell, MD and Jose Gurrola II, MD

3:20 PM

Inflammatory infiltrate and mucosal remodeling in chronic rhinosinusitis with and without polyps: Structured histopathologic analysis

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USA

Introduction

Chronic rhinosinusitis (CRS) is commonly classified into CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP) subtypes. Structured histopathologic reporting has the potential to identify salient histologic markers to differentiate between the phenotypes and provide insights into pathophysiologic mechanisms in CRS.

Methods

A structured histopathology report of 15 variables was prospectively employed to analyze ethmoid sinus tissue removed during endoscopic sinus surgery. Variables compared between CRSwNP and CRSsNP cases included degree of inflammation, eosinophils per HPF, neutrophil infiltrate, basement membrane thickening, subepithelial edema, hyperplastic/papillary changes, mucosal ulceration, squamous metaplasia, fibrosis, fungal elements, Charcot-Leyden crystals, and eosinophil aggregates.

Results

A total of 74 patients were accrued in the study, including 31 (41.9%) with CRSsNP and 43 (58.1%) with CRSwNP. Overall degree of inflammation, eosinophils per HPF, and neutrophil infiltration did not differentiate between the CRSsNP and CRSwNP subtypes. Compared to CRSsNP, CRSwNP had statistically significant increase in basement membrane thickening (74.4% vs 44.2%, p<0.001), subepithelial edema (67.4% vs. 38.7%, p<0.05), hyperplastic/papillary changes (14% vs 0%, p<0.05), fibrosis

(60.5% vs. 29.0%, $p < 0.05$), and eosinophilic aggregates (32.6% vs 12.9%, $p < 0.05$).

Conclusions

Significant histopathologic differences were evident in patients with CRSwNP and CRSsNP. Interestingly, the composition of the inflammatory cell infiltrate failed to establish differences between CRSwNP and CRSsNP cases. Surrogates of mucosal remodeling and presence of eosinophilic aggregates more reliably differentiated between the subtypes. These findings support the potential utility of structured histopathology reporting in CRS and may serve as important tools in accurately categorizing CRS endotypes after surgery.

3:27 PM

Age-related changes in nasal mucosal histology of adult patients without inflammatory sinonasal disease

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Objective

Previously reported data has shown that radiographically-measured intranasal volume (INV) increases with age. Hypothesizing that increased INV relates to histologic changes in the nasal mucosa over time, we sought to characterize nasal histology in asymptomatic adults.

Methods

Mucosal biopsies were collected from the inferior turbinate, middle turbinate, and posterior nasal septum in subjects without endoscopic, radiographic, or clinical findings of inflammatory sinonasal disease. Blind to patient age, samples were examined for surface epithelial type, basement membrane thickness, ratio of seromucinous gland to tissue area, eosinophil counts, ruptured seromucinous acini/ducts, interstitial hemorrhage, ductal dilatation, oncocytic change, inflammation, and stroma type.

Results

Of the 29 patients included, 9 were female and 20 were male. Mean age was 54.7 years. Pearson correlation, Spearman correlation, and linear regression were used to evaluate significance of the histologic findings in relation to patient age. The gland area to total tissue area ratio of the middle turbinate demonstrated a significant negative correlation with age ($r = -0.3694$; $p = 0.0486$). Interstitial hemorrhage was seen more often in the nasal septum of younger patients ($p = 0.0045$). No other significant correlations were found between age and histologic variables examined.

Conclusion

Even in the absence of sinonasal symptoms/disease, histologic changes are detected in subsites of the nasal mucosa, with a statistically significant relationship to increased age. Though physiologic changes, such as loss of the nasal cycle, may contribute to increased INV with age, these novel findings underscore the presence of age-related histologic changes in this adult patient cohort.

3:34 PM

The efficacy of a novel budesonide chitosan gel on wound healing following endoscopic sinus surgery

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Introduction

Adhesion formation and ostial stenosis are common causes of surgical failure after endoscopic sinus surgery (ESS). Postoperative topical steroid application has been shown to improve wound healing. Chitosan-dextran gel (CD gel) is an effective hemostatic nasal dressing. This study aims to determine the effect of the addition of budesonide to CD gel on post-operative ostial stenosis and adhesion formation following ESS.

Methods

This prospective, blinded, randomized controlled trial was conducted between 2012 and 2015. Thirty-six patients over 18 years undergoing ESS were randomized to receive either: no treatment, CD gel, CD gel with 1mg/2ml budesonide, or topical steroid cream to their left or right sinuses (different treatment each side). Each sinus ostium and endoscopic features of wound healing was measured intra-operation, 2 weeks, 3 months and 12 months post-operation.

Results

Data was analyzed using the ANOVA and post-hoc Tukey HSD tests. There was a significant reduction in stenosis within all three sinuses ostia sites when CD+budesonide was compared to control with the greatest effect seen at 12 months: The mean percentage of baseline areas at 12 months were 0.76 \pm 0.062 vs. 0.37 \pm 0.235, 0.76 \pm 0.063 vs. 0.52 \pm 0.049, and 0.83 \pm 0.065 vs. 0.58 \pm 0.050 (all $p < 0.05$), for CD+budesonide compared to control in the frontal, sphenoid, and maxillary sinuses respectively. The incidence of adhesions was 4% in the CD+budesonide group compared to 15% in the control group.

Conclusion

This study has shown that CD gel, when combined with budesonide, improves long-term sinus ostial patency and prevents ostial stenosis post-ESS.

3:41 PM

The effect of chitosan-dextran gel with budesonide and ropivacaine on pain and wound healing following endoscopic sinus surgery

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PROGRAM ABSTRACTS

Introduction

Chitosan-Dextran gel with budesonide (CD-budesonide gel) applied immediately following endoscopic sinus surgery (ESS) has demonstrated haemostatic, anti-adhesive and anti-stenotic properties in the sinuses post-operatively. This study's aim is to further develop CD-budesonide gel, by incorporating into it the local anaesthetic ropivacaine. It is hypothesized that the addition of ropivacaine will minimise pain and reduce opioid consumption in the post-operative period.

Methods

We conducted a prospective, blinded, randomized controlled trial that recruited 47 patients undergoing bilateral ESS for chronic rhinosinusitis. At the conclusion of surgery, patients were randomized to receive either CD-budesonide gel (control arm), or CD-budesonide gel with ropivacaine (treatment arm), applied bilaterally into their sinonasal cavity. Pain was assessed post-operatively using a numerical rating scale for seven-days at pre-determined time points. In addition, enteral and parenteral opioid consumption was compared between study arms for the same time period.

Results

There were statistically significant differences between pain scores following ESS between control and treatment arms respectively at twelve (3.00 vs. 1.57, $p=0.02$) and twenty-four (2.60 vs. 1.21, $p=0.03$) hours. Additionally, there was a significant reduction in opioid consumption between the 24th and 48th post-operative hours for the same study arms (3.84mg vs. 0.84mg, $p=0.04$), but no significant difference in total opioid consumption over the seven-day study period.

Conclusions

In addition to the proven benefits of CD-gel with budesonide, the inclusion of ropivacaine has shown to reduce pain and opioid consumption in the post-operative period, facilitating a comfortable and near pain-free recovery.

3:48 PM

Q & A

Moderators: Lori Lemonnier, MD and Charles Ebert, MD, FARS

3:52 PM

The development and validation of septoplasty surgical training model using three-dimensional printing

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Luc G. Mongeau, Professor
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Canada

Background

Providing alternative training modalities may improve trainees' ability to perform septoplasty. Three-dimensional printing has shown to be a powerful tool in surgical training. The objectives of this study are to explain the development of our 3D printed septoplasty training model, to assess its face and content validity,

and to present evidence supporting its ability to distinguish between levels of surgical proficiency.

Methods

Imaging data of a patient with a nasal septal deviation was selected for printing. Printing materials reproducing the mechanical properties of human tissues were selected based on literature review and prototype testing. Eight expert rhinologists, six senior residents and six junior residents performed endoscopic septoplasties on the model and completed a post simulation survey. Performance metrics in quality (e.g. amount of deviation removed, global assessment tool), efficiency (e.g. time), and safety (e.g. perforation length, nares damage) were recorded and blindly analyzed.

Results

The model was judged to be anatomically correct and the steps performed realistic, with scores 4.05 ± 0.82 and 4.2 ± 1 respectively on a 5 point Likert scale. Ninety-two percent of residents desired the simulator to be integrated into their teaching curriculum. There was significant difference ($p<0.05$) between the expert, intermediate and novice groups in time taken and nares cuts, while other performance metrics showed no significant difference.

Conclusion

To our knowledge, there are no other simulator training models for septoplasty. Our model incorporates two different materials mixed into the three relevant consistencies necessary to simulate septoplasty and it demonstrated evidence supporting its validity.

3:59 PM

The development and validation of a 3d printed ostiomeatal complex and frontal sinus training model for endoscopic sinus surgery

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Lily HP. Nguyen MDCM, MSc, FRCSC
Robert J. Funnell, PhD, Eng.
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Canada

Background

Endoscopic sinus surgery poses unique training challenges due to complex and variable anatomy, and the risk of major complications. We sought to create and provide validity evidence for a novel 3D printed simulator of the nose and paranasal sinuses.

Methods

Sinonasal CT images of a patient were imported into a 3D visualization software. Segmentation into bony and soft tissue structure was then performed. The model was printed using simulated bone and soft tissue materials. Rhinologists and otolaryngology residents completed five pre-specified tasks including maxillary antrostomy and frontal recess dissection on the simulator. Participants evaluated the model using survey ratings based on a 5-point Likert scale. Average time to complete each task was calculated. Descriptive analysis was used to evaluate ratings, and thematic analysis for qualitative questions.

Results

Total of 20 participants, 10 rhinologists and 10 otolaryngology residents tested the model and answered the survey. The participants felt that the simulator would be useful as a training/educational tool (4.6/5), and that it should be integrated as part of the rhinology training curriculum (4.5/5). Specifically, the ratings for the following domains were: Visual Appearance 4.25/5, Realism of Materials 3.8/5 and the Surgical Experience 3.9/5. Average time to complete each task was lower in the experts group compared to the residents.

Conclusion

We describe the development and validation of a novel 3D printed simulation model for the training of endoscopic sinus surgery skills. While participants found the simulator to be a useful training and educational tool, further model modification could improve outcome.

4:06 PM

Use of the concentric tube robot in the maxillary sinus

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USA

Introduction

The maxillary sinus is susceptible to various pathologies. Given its relationship to valuable anatomy, side effects can be serious and surgical access is necessary. While endoscopic techniques provide surgeons with multiple benefits, they may not offer sufficient access to all reaches of the sinus. Here, we discuss the development of an innovative device that will provide endonasal access to formerly unreachable sites in the maxillary sinus. We will evaluate the limitations of current instruments and the abilities of the concentric tube robot.

Methods

Access of handheld tools and the concentric tube arms were evaluated within a skull replica. Replicas of a 90 and 120-degree double action forceps and a Heuwieser antrum grasping forceps were created. Concentric tube arms were developed and precurved to 50° and 90°. Tool tip position was identified with a magnetic tracker. Once points were recorded, the reachable volumes were calculated and compared.

Results

Calculated reachable volumes demonstrate that the concentric tube arms were able to reach a significantly larger surface of the maxillary sinus than traditional hand tools, especially along the anterior and lateral walls.

Conclusions

Previously, pathology that was unreachable through endonasal approaches necessitated open surgery, with all of its possible sequelae. Here, we show that the concentric tube arms may be able to access the sinus in a way that hand tools cannot. While there remains considerable work to be done in the development of this tool, the concentric tube robot has the potential to revolutionize endonasal sinus and skull base surgery.

4:13 PM

Development of a fully automated ct sinus auto-segmentation pipeline

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USA

Introduction

It has been recommended that volumetric scoring methods of CT sinus scans be utilized for research related to sinonasal disease. While targeted segmentation techniques exist for such research, to our knowledge, all reported techniques require some form of manual intervention. Therefore, we developed a fully automated pipeline utilizing Advanced Normalization Tools (ANTs), a state of the art open-source software library, that integrates registration and segmentation strategies for quantification of volumetric opacification.

Methods

A library of 100 normal adult computed tomography sinus scans was used to create an optimal shape and intensity sinus template representing the cohort which was then manually labeled for the locations of the paranasal sinuses. The ANTs-based workflow was then used to "score" 75 previously manually segmented CT scans on volume, percent opacification and density (in Hounsfield units) values. These results were then directly compared to the manually segmented data.

Results

Comparison of the ANTs based algorithm to the manually segmented data showed excellent correlation ($r^2=0.941$) when percent opacification of all sinuses was computed. Individual sinus regions were not as correlative with r^2 values ranging from 0.699 to 0.813. Review of the pipeline's autosegmentation images revealed several consistent limitations in scoring those sinus regions which are noted to have significant variability (frontal and sphenoid).

Conclusions

Utilization of a fully automated software pipeline for the volumetric scoring of CT sinus scans is feasible. Excellent correlation is noted when the entire sinus areas is considered but refinement of the algorithm is required for individual sinus region accuracy.

4:20 PM

Q & A

4:25 PM

Panel: The recurrent nasal polyp patient: What now?

Moderator: Amber Luong, MD
Panelists: Stilianos Kountakis, MD, FARS; David Poetker, MD, FARS; Jivianne Lee, MD, FARS

5:00 PM

Closing Remarks and Meeting Adjourned

PROGRAM ABSTRACTS

5:30 PM

Poster Presentations & International Countries Welcome Reception

Harbor Ballroom DEF
(Supported by Medtronic and OptiNose)

Saturday, September 17, 2016 Breakout Room C, Harbor Ballroom I

1:00 PM

Welcome

Stella Lee, MD, Chairperson

Moderators: Troy Woodard, MD, FARS and Greg Davis, MD, FARS

1:05 PM

Examination of high-antibiotic users in a multi-institutional cohort of CRS patients

Vijay R. Ramakrishnan, MD, FARS
Jess Mace, MPH
Zachary M. Soler, MD, MSc
Timothy L. Smith, MD, MPH, FARS
Aurora, CO
USA

Introduction

In addition to known concerns of antibiotic overuse, recent high-impact research indicates that excessive antibiotic use increases vulnerability to inflammatory diseases and is associated with poorer long-term health. Given that sinusitis is the 5th leading condition accounting for antibiotic prescriptions, we aimed to evaluate patient and disease characteristics associated with greater antibiotic use in CRS.

Methods

Adults CRS patients enrolled in a prospective, multi-institutional, observational cohort study evaluating treatment outcomes were included in this analysis. Study participants were asked to report the number of days out of the previous 90 days that systemic antibiotics were taken for sinus disease. Patient demographics, disease characteristics, and subjective and objective measures of disease severity were documented.

Results

561 patients from 4 institutions were included in the analysis, with mean antibiotic use of 17.4 +/-22.4 out of the previous 90 days. No differences between antibiotic-use groups were found for objective measures of disease severity (CT, endoscopy, BSIT scores), however, increased patient-reported symptom burden (SNOT-22, RSDI) was associated with more antibiotic use. Patients reporting the most antibiotic use were older ($p=0.004$) but no ethnic or gender differences were seen. Comorbid diagnoses of allergy, asthma, diabetes, depression, or fibromyalgia, were not associated

with increased antibiotic use. In accordance with guidelines, CRSwNP patients were less likely to have used antibiotics.

Conclusion

Symptom burden may drive antibiotic use in CRS patients independent of objective measures of disease severity, patient demographics, and presence of comorbid disease. Clear guidelines are essential to define appropriate antibiotic use in CRS.

1:12 PM

WITHDRAWN

1:19 PM

Innate immune response of nuli-1 cells to staphylococcus aureus small colony variant infections

Judy Ou, MD
Clare Cooksley PhD
Stephen Kidd, PhD
Alkis J. Psaltis, MD, PhD, FRACS
Peter-John Wormald, MD, FRAC, FCS(SA)
Sarah Vreugde, MD, PhD
Woodville South SA
Australia

Introduction

S. aureus small colony variants (SCVs) can survive within the host intracellular milieu and are associated with chronic relapsing infections. Clinical SCVs are often unstable and can switch back to wild types, compromising their laboratory-based investigations. In this study we used a stable *S. aureus* SCV (SK2SCV) that was developed by long term culturing of a clinical isolate (SK2WT) in inflammation-relevant conditions. This study aimed to compare the intracellular infection rate as well as host cell responses to SK2WT and SK2SCV infections.

Method

NuLi-1 cells were infected with SK2WT and SK2SCV, and the intracellular infection rate was determined over time. mRNA expression of cells infected by each strains intra- and extracellularly was analyzed using a microfluidic qPCR array to generate an expression profile of 39 genes involved in the host immune response.

Results

No difference was found in the intracellular infection rate between SK2WT and SK2SCV. Whereas extracellular infection induced a robust pro-inflammatory response, intracellular infection elicited a modest response. Intracellular SK2WT infection induced mRNA expression of TLR2, pro-inflammatory cytokines (such as IL-1 β , and IL-6) and tissue remodeling factors (such as matrix metalloproteinase 9). In contrast, intracellular SK2SCV infection induced upregulation of only TLR-2 and IL-6.

Conclusion

Whereas intracellular infection rates of SK2SCV and SK2WT were similar, SK2SCV intracellular infection induced minimal mRNA expression changes in comparison to upregulation of pro-inflammatory and tissue remodeling factors in intracellular SK2WT infection. These findings support the current view that SCVs are able to evade host immune detection to allow its own survival.

1:26 PM

A surgical hydrogel to combat MSSA and MRSA biofilms

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 Jonathan McGuane, PhD
 Clive A. Prestidge, Prof
 Peter-John Wormald, Prof
 Sarah Vreugde, PhD
 Adelaide SA
 Australia

Introduction

Chronic rhinosinusitis (CRS) is associated with *Staphylococcus aureus* biofilms. The biofilm state enables bacteria to withstand the immune attack and adapt to adverse conditions, ultimately leading to resistance against antibiotics. The spread of methicillin-resistant *Staphylococcus aureus* (MRSA) strains emphasises the need for intervention strategies not based on traditional antibiotics. A novel non-antibiotic treatment of the iron-chelator deferiprone (Def) and the heme-analogue gallium-protoporphyrin (GaPP) in a surgical hydrogel was hypothesized to be more efficient against methicillin-susceptible *S. aureus* (MSSA) and MRSA biofilms than ciprofloxacin (CIP) *in vitro*.

Methods

Colony biofilms of MSSA and MRSA (clinical isolates from CRS patients) were treated with a surgical hydrogel incorporating Def (20 mM) and GaPP (250 µg/mL). The treatment efficacy was assessed by counting colony forming units (CFU) and confocal microscopy with live/dead BacLight staining.

Results

The Def-GaPP hydrogel significantly ($p < 0.01$) exceeded the efficacy of CIP showing a 3.8-fold log₁₀ reduction in CFU/ml for MSSA and 1.3-fold for MRSA biofilms, compared to CIP with a 1.3-fold log₁₀ reduction for MSSA and 0.3-fold for MRSA. Microscopic analysis indicated manifest anti-biofilm properties of the Def-GaPP gel.

Conclusions

This study revealed superior anti-biofilm properties of a novel strategy not based on antibiotics for the topical treatment of MSSA and MRSA biofilms. A surgical hydrogel loaded with Def and GaPP significantly exceeded the efficacy of CIP *in vitro*. This novel treatment has potential to improve clinical outcomes of CRS patients after sinus surgery.

1:33 PM

Q & A

Moderators: Zachary Soler, MD and Marc Dubin, MD, FARS

1:40 PM

Unsupervised network mapping of commercially available immunoassay yields three distinct chronic rhinosinusitis endotypes

Rohit Divekar, MBBS, PhD
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 Devyani Lal, MD
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 USA

Background

Endotyping chronic rhinosinusitis (CRS) through simplified cytokine assays may help direct individualized therapy such as corticosteroids, antibiotics or biologics. We performed an unsupervised network analysis to endotype CRS and control subjects using a commercially available cytokine-chemokine immunoassay.

Methods

A 41 cytokine-chemokine multiplex array along with major basic protein (MBP) assay were performed on sinonasal surgical tissue of 32 adults. Subjects were defined as non-CRS controls (nasal obstruction patients etc.; n=6), CRS with nasal polyps (CRSwNP; n=13), and CRS without nasal polyps (CRSsNP; n=13). Unsupervised network modeling was performed to reveal association of cytokine-chemokine ("analyte") clusters and patient groups.

Results

Network mapping and unsupervised clustering revealed three analyte clusters and three subject groups. Analyte cluster-1 comprised of Th1/17 type markers, cluster-2 of Th2 markers and cluster-3 of chemokines (CC) and growth factors (GF). Subject group-1 cluster was devoid of CRSwNP, had fewer asthmatics and was associated strongest with analyte cluster-3 (CC/GF) [$P < 0.001$]. Subject group-2 was characterized with most number of asthmatics (86%) and CRSwNP (100%) patients, and was associated with analyte cluster-2 (Th2; $P < 0.001$). Subject group-3 was associated with both analyte cluster-1 (Th1/17) and cluster-3 (CC/GF) [$P < 0.001$], and had the highest proportion of CRSsNP patients (62.5%). Tissue MBP, eosinophilia and CT scores were significantly higher in subject group-2 versus other groups [$P = 0.05$].

Conclusions

Unbiased network-mapping approach using a commercially available immunoassay kit reveals three distinct cytokine-chemokine signatures that endotypes CRS subjects. These signatures are prominent even in a limited number of patients, and may help optimize individualized therapy and outcomes.

1:47 PM

Measuring patient expectations regarding diagnoses and treatment of rhinosinusitis

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 Dorina Kallogjeri, MD
 Jay Piccirillo, MD
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 USA

Background

A priori patient expectations for Rhinosinusitis diagnosis and treatment are difficult to assess in the clinical setting. This study explores how expectations can be measured over time during the treatment course.

Methods

A survey was emailed to patients with sinus-related complaints prior to their first clinic visit and at 6-months post-visit. Quality of life, disease knowledge, and expectations regarding treatment options were assessed using categorical and visual analog scale (VAS) questions.

PROGRAM ABSTRACTS

Results

Eighty-three patients completed the initial survey. Forty-three patients (63%) expected that surgery would improve symptoms and 51 (78%) were willing to undergo the risks. Twenty patients completed the 6-month follow-up survey. Three of these patients were surgically treated between surveys, and 17 were medically managed. Fifty-percent of participants felt that surgery would cure their symptoms. However, of the participants who answered positively to this yes/no question, the VAS scale ranged from 50-100% likely that surgery would cure symptoms. For the patients who answered "no" to this question, the VAS scoring ranged from 11-86% likely of cure, suggesting wider variation in expectations based on VAS format. Of 10 VAS scored questions regarding knowledge of sinusitis and expectations of treatments, only one question regarding an understanding of the role of bacterial infection in rhinosinusitis showed a statistically significant change at the 6-month assessment.

Conclusions

Our analysis suggests that patients believe that sinusitis has a high likelihood of being curable. VAS formatted questions may provide more detailed information regarding patient expectations, and should be included in a validated expectations instrument.

1:54 PM

Influence of interpersonal traits on patient outcomes in the treatment of chronic rhinosinusitis

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 Zachary M. Soler, MD, MSc
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 USA

Introduction

Chronic rhinosinusitis (CRS) is a chronic inflammatory condition with comparable health states to other chronic diseases, such as congestive heart failure and chronic obstructive pulmonary disease. Interpersonal traits (IPTs), including personality type, perceived social support and trust in physicians are associated with treatment outcomes among patients with chronic disease but have not been evaluated for CRS.

Methods

Adult patients electing medical or surgical treatment for recalcitrant CRS were prospectively enrolled into a multi-institutional, observational outcomes study between March, 2011 and June, 2013. Validated measures of IPTs, including: the Big Five Inventory-10 Short Version (BFI-10), Multidimensional Scale of Perceived Social Support (MSPSS) and the Trust in Physician Scale (TPS) were completed and compared to patient-reported outcome measures (PROMs) including: the 22-item SinoNasal Outcome Test (SNOT-22), the Medical Outcomes Study Short Form-6D (SF-6D), and the Patient Health Questionnaire-2 (PHQ-2).

Results

354 participants met inclusion criteria and were followed for an average [\pm standard deviation] of 16.3 [\pm 4.8] months. Significant within-subject improvement in all mean PROM scores was reported following treatment ($p < 0.001$). No association was detected between PROMs and BFI-10 or MSPSS scores ($p > 0.050$).

Significant but weak absolute correlations were reported between TPS scores and SNOT-22, SF-6D and PHQ-2 total scores for all subjects ($p < 0.050$; $R_p < 0.138$).

Conclusions

Personality type and perceived social support do not associate with improvement following treatment for CRS. However, increased trust in physicians is weakly associated with post-treatment changes. Further study is needed to examine the relationship between physician trust, patient satisfaction and treatment outcomes among patients with CRS.

2:01 PM

Quality measures in rhinology: Results of a national survey

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 USA

Background

The initiatives to link health care payments to "value" or "quality" measures are becoming reality for many specialties within the US health care market. The impact of these initiatives on Rhinology is not yet clear. This survey means to provide an assessment of quality measure use within the American Rhinologic Society membership.

Methods

An online, anonymous cross-sectional survey of American Rhinologic Society (ARS) members was performed. We assessed the use of outcome measures and the adherence to current quality measures for rhinosinusitis.

Results

The survey was viewed by 295 ARS members and a total of 196 (85%) unique responses were captured. Practice setting varied; Academic/University (39%), Private Practice with Partners (31%), Solo Practice (12%). Only 44.3% of respondents use a specific outcome measure routinely in their practice. Of those, 83% use either the SNOT-20 or SNOT-22 and only 51% perform regular analyses of their outcome measures data, and do so only on an ad-hoc basis (60%). The use of CT scan did not significantly differ based on level of training. Completion of a fellowship in Rhinology or Anterior Skull Base Surgery was statistically significantly correlated with multiple practices including: use of an outcome metric in clinic ($?2=4.6$, $p=0.033$), use of an established grading system for CT scans ($?2=5.8$, $p=0.016$), and stringent use of antibiotics ($?2=9.8$, $p=0.043$).

Conclusions

There is variable use of outcome measures, grading scales and antibiotic use throughout practices among ARS members. Further work is needed to establish standard quality measures for use in rhinosinusitis patients.

2:08 PM

Association of olfactory dysfunction in chronic rhinosinusitis with economic productivity and medication usageRodney Schlosser, MD, FARS *(Presented by Jose L. Mattos, MD)*

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Jose Mattos, MD

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USA

Background

Chronic rhinosinusitis (CRS) has significant impacts upon productivity, economic metrics and medication usage, however factors that are associated with these economic outcomes are unknown.

Methods

We evaluated olfactory dysfunction in patients with CRS using the Questionnaire of Olfactory Disorders-Negative Statements (QOD-NS) and the 40 item Smell Identification Test (SIT-40) and correlated these olfactory metrics to healthcare utilization, productivity and medication usage over the preceding 90 days.

Results: After adjusting for CRS-associated comorbidities and CRS-specific quality of life (QOL), 221 patients with lower QOD-NS scores (worse patient-reported olfaction) had more missed days of normal productivity and employment, worse productivity levels, more hours of missed employment due to physician visits, more time caring for sinuses, further distance traveled to medical appointment, more days of oral steroid use and higher odds of being on disability insurance. Clinical olfaction, as measured by SIT-40, correlated with distanced traveled to medical appointment and odds of being on disability insurance, but did not correlate with other productivity measures.

Conclusions

Impaired olfactory-specific QOL is associated with significantly worse economic and productivity metrics and increased medication usage even after adjusting for severity of CRS-specific QOL. Future studies are warranted to determine if targeting the impaired olfactory-specific QOL noted in patients with CRS results in improved productivity and economic outcomes.

2:15 PM

Q & A

2:20 PM

Panel: Sinus surgery mulligan: A case I would now do differently

Moderator: Roy Casiano, MD, FARS

Panelists: Peter-John Wormald, MD; Todd Kingdom, MD, FARS;

Pete Batra, MD, FARS

2:50 PM

Break with Industry Partners**Moderators: Subinoy Das, MD, FARS and Philip Chen, MD**

3:20 PM

The longitudinal impact of genetics and clinical interventions on the microbiome of patients with chronic rhinosinusitis

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USA

Background

The sinus microbiome is known to play a significant role in both maintaining respiratory health and disease progression. However, the impact that clinical interventions have on this microbiome, alone or in combination with genetic background, remains poorly understood. Our study seeks to profile these changes over time in patients with CRS when compared to non-CRS patients undergoing similar procedures.

Methods

Microbiome swabs were collected from 80 patients undergoing endoscopic sinus surgery; 58 diagnosed with CRS and 22 controls. Patients were followed for 9-month post-surgery and samples collected during return clinic visits. 16S sequencing was performed on the Illumina MiSeq platform and diversity analysis done using Qiime. Clinical information and genetic profiling were used to further annotate and filter the results.

Results

Significant changes in bacterial populations were seen following surgery in both controls and CRS patients. Although post-surgical CRS patients rarely shifted towards a non-diseased profile, they did show significant changes in diversity which largely stabilize within a few weeks. Antibiotic and steroid treatments resulted in more subtle but inconsistent changes in the bacterial profiles. Mutational status of CFTR and the rhinovirus receptor CDHR3 both affected the pre-surgical microbiome, although changes with time appeared more patient-specific.

Conclusions

Numerous confounding factors all interact to determine a patient's unique sinus microbiome profile; however, patterns can be seen with respect to the effect of therapeutic interventions and genetic background. Understanding what these changes are and how they affect patient health will allow us to better treat the causes underlying CRS.

PROGRAM ABSTRACTS

3:27 PM

Sinonasal microbiome taxa and diversity differ in subjects with allergic rhinitis, chronic rhinosinusitis (CRS) without nasal polyps and CRS with nasal polyposis

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Bridget M. Barker, PhD
Paul S. Keim, PhD
Devyani Lal, MD
Flagstaff, AZ
USA

Background

Changes in the microbiome of chronic rhinosinusitis (CRS) patients have been recently published, most describing subjects undergoing sinus surgery. Microbiota variation across the range of disease subtype and severity has not been described. Our study goal was to compare the sinonasal microbiome in subjects encompassing controls, allergic rhinitis (AR) and the spectrum of CRS disease severity and subtypes.

Methods

A prospective office-based enrollment of subjects was performed, using AAO-HNS criteria to define CRS and AR. Clinical, immunological and CT data were recorded. Endoscopically-directed swab samples were obtained from bilateral middle meatus (MM) and inferior meatus (IM). Microbiome analysis was performed by sequencing the V3-V4 region of the 16S rRNA gene on the Illumina MiSeq. Statistical analyses were performed using QIIME and R statistical software.

Results

Sixty-six subjects were studied [8 controls, 12 AR, 25 CRS with nasal polyps (CRSwNP), and 21 CRS without NP (CRSsNP)]. Shannon diversity was significantly reduced in MM-associated communities in CRSsNP compared to CRSwNP and AR ($p < 0.05$; nonparametric t-test). While gross differences in beta-diversity were not observed across CRS subtypes ($p > 0.05$; PERMANOVA), low-abundance taxa differed between groups. Compared to CRSsNP, CRSwNP patients were enriched in *Staphylococcus*, *Alloiococcus*, and *Corynebacterium* spp ($p < 0.05$, $q < 0.10$, Zero-Inflated Negative Binomial). Conversely, CRSsNP were enriched in *Streptococcus*, *Haemophilus* and *Fusobacterium* spp.

Conclusions

CRSsNP patients have significantly depleted microbial diversity compared to CRSwNP, affirming that these broad subtypes differ pathophysiologically. Low-abundance taxa in AR, CRSwNP and CRSsNP subjects also differ and merit further study.

3:34 PM

Mapping microbiome variations in the noses of healthy and diseased subjects

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USA

Background

Agreement or differences in the microbiome composition of the middle meatus (MM) versus other sinonasal areas may offer clues to disease evolution, but this has not been studied. Our study compared the microbiome of the MM and inferior meatus (IM) in control, allergic rhinitis (AR) and chronic rhinosinusitis (CRS) subjects.

Methods

Subjects were prospectively classified into subgroups using standard clinical criteria. Endoscopically-guided swab samples were obtained from the MM and IM bilaterally, protecting MM swabs with sterile speculums. The bacterial microbiome was elucidated by sequencing the V3-V4 region of the 16S rRNA gene (Illumina MiSeq assays). The QIIME and R statistical software were used for sequence and statistical analyses respectively.

Results

Forty-eight subjects were studied (5 controls, 11 AR, 17 CRSwNP and 15 CRSsNP). There was considerable inter-subject microbiota variability. Microbiota clustered by subject ($p=0.003$, $r^2=0.0XX$; PERMANOVA) This was confirmed by similar microbial profiles of both sides and sites (MM and IM) within individual subjects ($p=0.001$, nonparametric t-test). Differences in Shannon diversity were not observed between MM and IM associated microbiome in control, AR or CRSwNP subjects, regardless of unilateral disease preponderance. However, in CRSsNP patients, bacterial diversity was significantly reduced in the MM when compared to the IM ($p=0.022$, nonparametric t-test).

Conclusions

Sinonasal microbial communities are subject-specific with little variation of taxa by side or site of collection, in both healthy and diseased states. However, in CRSsNP patients, microbiome diversity in the MM is significantly depleted when compared to the IM, perhaps reflecting localized MM pathogenetic processes.

3:41 PM

Can a panel of serum inflammatory biomarkers predict endoscopic sinus surgery outcomes for chronic rhinosinusitis?

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Anastasios Maniakas, MD
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François Larivière, MD, FRCPC
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Objectives

A need for serum biomarkers that differentiate between chronic rhinosinusitis (CRS) patients and healthy subjects has been described. Our objective was to assess whether surgical outcomes of endoscopic sinus surgery (ESS) influenced possible serum inflammatory and immune biomarkers.

Methods

Prospective, single physician study. Following consent, 26 CRSwNP patients undergoing ESS were recruited and followed up for 4 months. Sinus cultures were taken. Blood was collected from all patients and analyzed for complete blood count (CBC), lymphocyte subtyping (CD3, CD4, CD8, CD19, CD 16+56) total serum IgE, high sensitivity CRP, and interleukin-6. ELISA was performed for MCP-1. Blood studies and ELISA were repeated at 4 months post operatively.

Results

Preoperative predictive factors of ESS failure were found to be ASA sensitivity ($p=0.014$), culture positive for *S. Aureus* ($p=0.003$) and serum eosinophils >300 cells/ μ L ($p=0.08$). Elevated total CD8 lymphocyte count at 4 months post ESS was associated with failure. MCP-1 dropped post ESS ($p<0.001$) and was correlated with serum eosinophilia ($p=0.026$), but did not predict failure. There was no significant change in any other measured biomarkers.

Conclusion

Increased eosinophils are a hallmark of CRS and a level >300 cells/ μ L was associated with ESS failure and its predictive parameters. Our results also suggest a disturbance in 'cytotoxic' CD8 T-lymphocytes that translates into a more refractory form of CRS. Absence of significant change in many inflammatory biomarkers following resolution of mucosal inflammation underlines the concept of CRS as a systemic disease process, and may explain the need for continued therapy to prevent recurrence.

3:48 PM

Q & A**Moderators: Adam DeConde, MD and Benjamin Bleier, MD**

3:52 PM

Sinonasal epithelium produces nitric oxide in response to staphylococcus epidermidis products

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Background

Nitric oxide (NO) is produced by sinonasal epithelial cells as part of the innate immune response against bacteria. We previously described bitter taste receptor-dependent and independent NO responses to product(s) secreted by *Pseudomonas aeruginosa* and

Staphylococcus aureus, respectively. We hypothesized that sinonasal epithelium would be able to detect the gram-positive, coagulase-negative bacteria *Staphylococcus epidermidis* and mount a similar NO response.

Methods

Sinonasal air-liquid interface cultures were treated with conditioned medium (CM) from lab strains and clinical isolates of coagulase-negative Staphylococci and *S. aureus*. NO production was quantified by fluorescence imaging. Bitter taste receptor signaling inhibitors were utilized to characterize the pathway responsible for NO production in response to *S. epidermidis* CM.

Results

S. epidermidis CM contains a low molecular weight, heat, and protease-stable product that induces an NO synthase (NOS)-mediated NO production that is less robust than the response triggered by *S. aureus* CM. The *S. epidermidis* CM stimulated NO response is not inhibited by antagonists of phospholipase C isoform β -2 nor the TRPM5 ion channel, both critical to bitter taste signaling.

Conclusions

This study identifies an NO-mediated innate defense response in sinonasal epithelium triggered by *S. epidermidis* product(s). The active bacterial product is likely a small, non-peptide molecule that triggers a pathway independent of bitter taste receptors. Although the NO response to *S. epidermidis* is less vigorous compared to *S. aureus*, the product(s) share similar characteristics. Together, the responses to Staphylococci species may help explain the pathophysiology of upper respiratory infections.

3:59 PM

Stimulatory effects of histamine on migration of nasal fibroblasts

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Seoung-Ae Lee, PhD

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Il-Ho Park, MD, PhD

Seoul

South Korea

Purpose

Fibroblast migration is crucial for normal wound repair after sinonasal surgery. Histamine is known to be involved in wound healing by its effects on cell proliferation and migration. This study aimed to determine whether histamine affects the migration of nasal fibroblasts and to investigate the mechanism of action of histamine on nasal fibroblasts.

Methods

Primary cultures of nasal fibroblasts were established from inferior turbinate samples. Fibroblast migration was evaluated with scratch assays. Cells were treated with histamine and/or histamine receptor-selective antagonists. U-73122 and pertussis toxin, which are selective inhibitors of the lower signaling pathway of H1R and H4R, were used to confirm the modulation of nasal fibroblast migration by histamine. Fibroblast cytoskeletal structures were visualized with immunocytochemistry.

PROGRAM ABSTRACTS

Results

Histamine significantly stimulated the migration of nasal fibroblasts. Antagonists selective for HR1 and HR4 significantly reduced nasal fibroblast migration. In immunocytochemical staining, histamine treatment increased membrane ruffling and pyrilamine, diphenhydramine, fexofenadine, and JNJ7777120 decreased histamine-induced membrane ruffling. U-73122 and pertussis toxin also decreased histamine-induced migration of fibroblasts. Histamine maintains its stimulatory effects on fibroblast migration in the presence of mitomycin C, which blocks proliferation of cells.

Conclusions

We showed that histamine stimulates fibroblast migration in nasal fibroblasts. This effect appeared to be mediated by HR1 and HR4. However, because fibroblast migration also can be involved in scarring and fibrosis, more research is necessary to determine the effects of antihistamine on wound healing after sinus surgery.

4:06 PM

Bactericidal antibiotics promote oxidative inflammation and cell death in sinonasal epithelial cells

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Background

Antibiotics are widely and heavily used in the treatment of chronic sinusitis. Bactericidal antibiotics can stimulate reactive oxygen species (ROS) formation, a pro-inflammatory response and cell death in cultured human sinonasal epithelial cells (SNECs). Sulforaphane is a potent stimulator of the antioxidant Nrf-2 system and a suppressor of inflammation. In this study we utilized sulforaphane to further explore the relationship between bactericidal antibiotic treatment, ROS formation and the inflammatory/cell death response.

Methods

SNECs were collected from patients during endoscopic sinus surgery and grown in levofloxacin with or without sulforaphane for 24-hours. Reactive oxygen species were quantified. Inflammatory and cell death markers were measured by ELISA.

Results

Cultured SNECs treated with levofloxacin resulted in a significant dose-dependent increase in activity of the pro-apoptotic Caspase-3 protease. The increase in activity was suppressed by co-treatment with sulforaphane. ROS levels increased with levofloxacin treatment but were not significantly suppressed by co-treatment with sulforaphane.

Discussion

In this study, we demonstrate that treatment of cultured SNECs with levofloxacin leads to a dose-dependent increase in Caspase-3 activity. Sulforaphane co-treatment suppresses this increased pro-apoptotic response by a mechanism that may be independent of its antioxidant stimulating properties. Our results suggest that levofloxacin treatment stimulates a potent inflammatory and pro-

apoptotic response in a dose-dependent fashion. Future studies will explore if this is beneficial or harmful to recovery of function in those with sinusitis.

4:13 PM

Responsiveness and reliability of the sinus control test in chronic rhinosinusitis

Preeti Kohli, BA
Zachary M. Soler, MD, MSc
Kristina A. Storck, MSPH
Arash Shahangian, MD, PhD
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Background

The Sinus Control Test (SCT) is a 4-item, patient-reported questionnaire designed to help physicians identify sub-optimally controlled chronic rhinosinusitis (CRS). It has previously been validated but several psychometric properties are yet to be measured. The purpose of this study is to measure responsiveness to surgery and reliability of the SCT.

Methods

Adults meeting diagnostic criteria for CRS were recruited from rhinology clinics at a tertiary academic institution. To measure responsiveness, the SCT was administered at baseline and at least 3 months after surgery to 62 CRS patients. To measure reliability, the SCT was administered at two clinical encounters a maximum of 14 days apart to 22 CRS patients.

Results

Total SCT scores improved from 8.8 ± 3.9 to 4.7 ± 3.5 ($p < 0.001$). The percentage of patients with total SCT scores falling into the "uncontrolled," "partially controlled," and "controlled" categories before and after surgery were 32.1% vs 5.4%, 55.4% vs 50.0%, and 12.5% vs 44.6%, respectively. These distributions were significantly different ($p = 0.002$). Test-retest reliability was 0.765 ($p < 0.001$). Item-total correlations for individual questions ranged from 0.550 to 0.737. Before surgery, the overall Cronbach's α was 0.732 and if any one item was deleted ranged from 0.609 to 0.735. After surgery, the overall Cronbach's α was 0.782 and if any one item was deleted ranged from 0.716-0.750.

Conclusion

The SCT is responsive to surgical intervention and a reliable tool to monitor changes in CRS control levels.

4:20 PM

Q & A

4:25 PM

Panel: Failed sinus surgery: Revise or advanced?

Moderator: Kevin Welch, MD, FARS
Panelists: Alex Chiu, MD, FARS; Devyani Lal, MD;
Brad Woodworth, MD, FARS

5:00 PM

Closing Remarks and Meeting Adjourned

5:30 PM

**Poster Presentations & International Countries Welcome
Reception**

Harbor Ballroom DEF

(Supported by Medtronic and OptiNose)



TOP TEN RANKED POSTERS

Poster #001

Pirfenidone inhibits $\text{tgf-}\beta\text{1}$ -induced extracellular matrix production in nasal polyp-derived fibroblasts

Jae-Min Shin, MD, PhD
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Purpose

Pirfenidone has been shown to have anti-fibrotic and anti-inflammatory effects in the lungs. The purpose of this study was to evaluate the inhibitory effects of pirfenidone on transforming growth factor (TGF)- β1 -induced myofibroblast differentiation and extracellular matrix accumulation. We also determined the molecular mechanisms of pirfenidone in nasal polyp-derived fibroblasts (NPDFs).

Methods

NPDFs were isolated from nasal polyps from eight patients who had chronic rhinosinusitis with nasal polyp. Pirfenidone was used to treat TGF- β1 -induced NPDFs. Cytotoxicity was evaluated using a 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-tetrazolium bromide assay. Fibroblast migration was evaluated with scratch assays. Expression levels of α -smooth muscle actin (SMA), fibronectin, and phosphorylated Smad2/3 were determined by western blot and/or reverse transcription-polymerase chain reaction and immunofluorescent staining. Total collagen production was analyzed with the Sircol collagen assay and contractile activity was measured by a collagen gel contraction assay.

Results

Pirfenidone (0 – 2 mg/ml) has no significant cytotoxic effects in TGF- β1 -induced NPDFs. Migration of NPDFs was significantly inhibited by pirfenidone treatment. The expression levels of α -SMA and fibronectin were significantly reduced in pirfenidone-treated NPDFs. Collagen contraction and production were also significantly decreased by pirfenidone treatment. Finally, pirfenidone significantly inhibited phosphorylation of Smad2/3 pathway in TGF- β1 -induced NPDFs.

Conclusions

Pirfenidone has an inhibitory effect on TGF- β1 -induced migration, myofibroblast differentiation (α -SMA), extracellular matrix accumulation, and collagen contraction by blocking the phosphorylation of Smad2/3 pathways in NPDFs. Thus, pirfenidone may inhibit TGF- β1 -induced extracellular matrix by regulating Smad2/3.

Poster #002

Exhance-12: A one year study of safety and efficacy of opn-375, a fluticasone exhalation delivery system (flu-eds), in patients with chronic rhinosinusitis with and without polyps (crs C/s Np)

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John Messina, PharmD
Colette Kosik-Gonzalez, MA
Per Djupesland, MD
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Philadelphia, PA
USA

Background

The FLU-EDS delivers steroid with an intranasal technology capable of significantly greater posterior/superior deposition than standard nasal sprays, better reaching the osteomeatal complex, most areas of the turbinates, and transition zones leading to the paranasal sinuses. Failure to effectively reach CRS target sites (esp. the osteomeatal complex) likely explains lack of efficacy and poor patient and physician satisfaction with standard steroid nasal sprays in CRS.

Methods

Multicenter, 52-week, open-label study with endoscopic assessment. Subjects with CRS/sNP, defined by history and nasal endoscopy, received FLU-EDS 372 μg bid. Lund-Mackay assessments, nasal polyp grade, and local adverse events of interest were evaluated via nasendoscopy. Other safety, efficacy and patient-rated outcomes were also assessed.

Results

223 subjects enrolled (189 CRSsNP; 34 CRSwNP), 96% reported prior use of corticosteroids, and 29% prior surgery. FLU-EDS was well tolerated, with adverse event profile similar to conventional nasal steroid sprays. Mean total SNOT-22 scores improved dramatically through 12 months: mean end-of-study change was -19.4 (CRSsNP) and -18.6 (CRSwNP). Among subjects with Lund-Mackay edema scores >0 at baseline, 50% of CRSwNP and 56% of CRSsNP subjects had complete resolution of edema at end-of-study. Among subjects wNP, after 12 months 54.2% had polyp elimination in at least 1 nostril and 83.3% had \geq 1 point improvement in polyp grade. 87% of patients reported improvement, and 72.1% reported 'much' or 'very much' improvement.

Conclusions

Over 1 year of treatment, FLU-EDS 372 μg bid was well tolerated and produced clinically significant improvements across a broad range of objective and subjective measures.



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Poster #003

Spleen tyrosin kinase induces muc5ac expression in human airway epithelial cell

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Background

MUC5AC, a major secreted mucin, is increased in chronic inflammatory airway disease. Spleen tyrosine kinase (SYK) is a mediator, which acts as an important regulator of intracellular signal transduction in the inflammatory response. SYK was originally identified in hematopoietic cells, and its expression in some non-hematopoietic cells, including respiratory epithelial cells, was recently demonstrated. However the effects of SYK on mucin-secretion in human airway epithelial cells have not been studied.

Objective

The objective of this study is to investigate the effect and brief signaling pathways of SYK on MUC5AC expression in human airway epithelial cells.

Methods

In mucin-producing human NCI-H292 cells and primary cultures of human nasal epithelial cells, the effects and signaling pathways of SYK on MUC5AC expression were investigated by reverse transcriptase-polymerase chain reaction (RT-PCR), real-time PCR, enzyme immunoassay, and immunoblot analysis with several specific inhibitors and small interfering RNA (siRNA).

Results

SYK induced MUC5AC expression. SYK activated significant phosphorylation of ERK1/2 and p38 MAPK signaling pathways. SYK-induced MUC5AC expression was significantly attenuated by pretreatment with U0126 (ERK1/2 MAPK inhibitor) and SB203580 (p38 MAPK inhibitor). In addition, the knockdown of ERK2 and p38 MAPK by ERK2 and p38 MAPK siRNA significantly blocked SYK-induced MUC5AC expression.

Conclusion

These results suggest that SYK increases MUC5AC expression via ERK2 and p38 MAPK signaling pathways in human airway epithelial cells.

Poster #004

Subcutaneous versus sublingual Immunotherapy In allergic rhinitis: A cost comparison

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USA

Background

Allergy immunotherapy has long been recognized as a viable option for the management of allergic rhinitis. Subcutaneous and sublingual forms have been utilized without clear superiority of either technique. In the United States, there has been little published comparing the costs associated with these therapies to the health system or patient. We performed such a comparison, evaluating the direct and indirect costs of these treatments.

Methods

Direct costs to the health system for SCIT and SLIT were determined by summing the allowable reimbursements from three payer sources for allergy testing, vial preparation, and immunotherapy administration. Indirect costs of SCIT were calculated by adding lost wages, travel expense, and vehicle depreciation and compared to the out of pocket costs of SLIT.

Results

For direct healthcare costs, SLIT was found to be less expensive when utilizing a single injection to treat for fewer than seven antigens in Medicare patients, six antigens for Medicaid, and all numbers of antigens for private insurance. If two injections are necessary, the costs favor SLIT for fewer than twelve antigens in Medicare and ten for Medicaid. When comparing out of pocket and indirect costs to patients, SLIT was found to be more affordable when treating for fewer than eleven antigens.

Conclusion

There is a paucity of data comparing the costs of SCIT and SLIT. Our study demonstrates that SLIT represents a lower cost option with regard to both direct healthcare and indirect patient costs when treating for a range of allergens often seen in clinical practice.

TOP TEN RANKED POSTERS



Poster #005

Outcomes in transcranial microsurgery versus extended endoscopic endonasal approach for primary resection of craniopharyngiomas: A single institution experience

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Object

Craniopharyngiomas have historically been resected via transcranial microsurgery (TM). The extended endoscopic endonasal approach (EEA) has become more widely acceptable. Controversy remains over which approach leads to better outcomes. This study's purpose is to determine whether outcome differences were identified between these approaches for primary resection of craniopharyngiomas.

Methods

A review of craniopharyngioma resections at our institution between 2005 and 2015 was performed. Pediatric patients, revision cases, and tumors greater than 2 standard deviations above the mean volume were excluded. Patients were divided into 2 groups: TM versus EEA. Demographics, symptomatology, preoperative tumor volumes, extent of resection, tumor subtype, and postoperative complications were obtained.

Results

After exclusions, 12 patients underwent TM while 9 underwent EEA. No significant differences existed between groups for demographics, presenting symptoms, tumor subtype, tumor volumes, extent of resection, additional surgery/adjuvant therapy, recurrence, overall complication risk, or quality measures. Cerebrospinal fluid leakage was encountered only in the EEA group (2 patients). Importantly, the rate of postoperative visual improvement was significantly higher in the EEA group (88.9% vs 25.0%; $p = .0075$). Visual deterioration only occurred in the TM group (3 patients).

Conclusions

Outcome variables are similar between TM and EEA. The endoscopic endonasal approach to primary craniopharyngioma resection represents a safe alternative to TM. Visual improvement is statistically more likely in EEA despite cerebrospinal fluid leak also being more probable. These results add to the growing evidence that EEA may be considered the approach of choice for primary craniopharyngioma resection in centers with appropriately trained surgeons.

Poster #006

Effects of rhinovirus infection on patient-derived air-liquid interface cultures

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Background

Infection with rhinovirus (RV) has been hypothesized as instrumental in the development of chronic rhinosinusitis (CRS) in a subset of patients. However, the underlying factors which contribute to viral susceptibility and response remain largely unknown, particularly with respect to the recently identified and more clinically severe RV-C isotypes.

Methods

Intraoperative tissue samples were obtained from 27 patients undergoing endoscopic sinus surgery for CRS and epithelial cells from these samples grown at air-liquid interface (ALI). These cells were then infected with live RV-A16, RV-C15 or RVC-15-GFP. Viral replication was quantified using qRT-PCR and, in the case of the RV-C15-GFP, fluorescent microscopy to visualize and quantify virus infected cells. Cytokine analysis was performed using the MagPix 27-plex cytokine panel.

Results

Degree of RV replication in the ALI cultures was correlated with a number of clinical metrics and genetic markers. The only variable that showed significance with respect to susceptibility to RV-C15 was the Lund Mackay (LM) score. IL-1 α , IL-8, IL-10 and IL-12 were induced by both RV-A16 and RV-C15 infection in most samples. GM-CSF was induced solely by RV-C15. In general, cells which replicated high viral titers showed a suppressed cytokine response to infection.

Discussion

ALI is a reliable model for modeling susceptibility of human sinonasal epithelium to rhinovirus. Correlation of viral replication with patient LM scores, combined with muted cytokine production in these cultures, suggest that a suppressed immune response in patients with severe disease may lead to greater viral susceptibility.



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Poster #007

A cost comparison of open and endoscopic approaches to the skull base

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Background

Endoscopic skull base surgery has emerged as a feasible option for numerous skull base pathologies. Nevertheless, open skull base approaches remain a key option for complex lesions. We aimed to compare the costs associated with open and endoscopic skull base surgeries using complication rates at our institution and national cost data.

Methods

117 open and 330 endoscopic surgeries at our institution were reviewed to determine complication rates and length-of-stay for each approach. We utilized the Nationwide Inpatient Sample to collect charge data for 4150 patients undergoing surgery for sinonasal/skull base neoplasms. A multivariate regression was performed to identify the independent contribution of each complication to total patient charge, as well as a baseline cost per day of hospitalization.

Results

Postoperative complications added an average charge of \$55,064.61 per open surgery, compared to \$12,080.49 per endoscopic surgery. For open approach patients, the average LOS of 7.9 days represented a baseline charge of \$135,918.95. Among endoscopic patients, average LOS was 4.6 days and had a charge of \$79,142.68. Thus, the total charge was \$190,983 per open approach and \$91,223 per endoscopic approach, a net difference of \$99,760.39.

Conclusion

Open approaches resulted in substantially greater charge than endoscopic approaches due to higher rates of postoperative complications and longer LOS. Although the risk of selection bias cannot be understated, for cases in which both approaches are feasible, utilization of endoscopic approaches would likely reduce patient and hospital costs.

Poster #008

Role of preoperative vs postoperative itraconazole in allergic fungal rhinosinusitis

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Background

Antifungals used as adjuvant to surgery in AFRS (Allergic Fungal Rhinosinusitis) have shown varying success in delaying recurrences. Itraconazole has been used both as preoperative and post-operative adjuvant. This study investigates the role of Itraconazole in AFRS and compares its role between preoperative and post-operative administration of the drug.

Methods

Design: Randomized prospective study.

Period: Jan 2010 to Dec 2014

Population: 100 histologically proven AFRS patients.

Patients were randomly divided into groups as: Group 1 (n=25), received 4 weeks Itraconazole in the preoperative period and operated subsequently, Group 2 (n=25), received 4 weeks Itraconazole in the post-operative period, Group 3 (n=50), matched patients of AFRS, who didn't receive Itraconazole. All the groups received oral steroids in tapering doses starting from 1mg/kg for 6 weeks in the postoperative period. Symptomatic (SNOT 20), radiologic (Lund Mackay, LM) scores and endoscopic (Kupferberg's NE Grades) were noted. Primary post-operative follow up was for 24 weeks with routine CT scans and nasal endoscopies, followed by which all the patients were followed with nasal endoscopies only with CT scans when required.

Results

Both preoperative and postoperative Itraconazole showed significant improvement in the SNOT, LM and Kupferberg' grades in the follow up period. Preoperative Itraconazole therapy showed significantly better results compared to postoperative Itraconazole therapy though the recurrence rates were similar in both groups.

Conclusion

Itraconazole is a better preoperative adjunct in AFRS than postoperative.

TOP TEN RANKED POSTERS



Poster #009

Tissue characterization of inverted papillomas using raman spectroscopy: A proof of concept study

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Introduction

Inverted papillomas (IP) are locally invasive tumors of the sinonasal tract that have a propensity to recur and require close follow-up. The modernization of optical diagnostic tools, including Raman spectroscopy (RS), can potentially identify early tumor recurrence based on the biological fingerprints of normal and tumor tissue.

Methods

A proof of concept study comparing biopsy samples from patients with normal nasal mucosa, chronic rhinosinusitis (CRS) 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 735-nm laser. Spectral data were compared to histopathology using computational statistics.

Results

A total of 6 normal, 5 CRS and 5 IP biopsy specimens were evaluated by RS and histopathology. Consistent differences in spectral peaks were observed among the 3 tissue types. Spectral signals from IP tissue was accurately distinguished from CRS and normal specimens based on computational algorithms. Correlation coefficients above 90% were obtained for spectral data from histologically similar tissues.

Conclusion

Raman spectroscopy can distinguish inverted papilloma tissue from chronically inflamed and normal sinus mucosa. A larger validation study is needed to assess the utility of Raman spectroscopy in the management of inverted papillomas.

Poster #010

The fungal microbiome of chronic rhinosinusitis analyzed using its sequencing

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Introduction

Next generation sequencing of fungal DNA increases the sensitivity of fungal identification, and may improve our understanding of the role fungi play in sinus health and disease. This prospective cohort study utilizes Internal Transcribed Spacer (ITS) amplicon sequencing to analyze the mycobiome in CRS.

Methods

Flocculated swabs were collected intra-operatively from the middle meatus of 90 patients (63 with CRS; 27 controls). DNA was extracted and ITS amplicon concentration was measured using fluorometry. ITS amplicons were sequenced on the Illumina MiSeq. Downstream reads were then processed using QIIME and fungal taxonomy assigned using the UNITED ITS database.

Results

Using conventional detection techniques of culture and histology, fungus was identified only in 9/63 (14.3%) of CRS patients ("fungus-identified group"), and the remaining 54 CRS patients and all controls did not have fungus identified. This fungus-identified group had a significantly higher average ITS amplicon concentration, and a significantly lower Shannon's Diversity index compared to the other two groups. The most commonly identified organism using ITS sequencing was *Aspergillus* (35.22% of all sequences), and it was also shown to be significantly higher in the fungus-identified group compared to the others.

Conclusions

ITS sequencing offers a sensitive technique of characterizing the sinonasal mycobiome. Our results demonstrate correlation with conventional fungal detection techniques, and suggest that fungal dysbiosis may be associated with disease development in a subset of CRS patients. This "fungus-identified group" showed a reduced fungal diversity. The genus *Aspergillus* appeared to be a major player in constituting the mycobiome in CRS patients.

Poster #011**A comparison of silastic and gloved merocel middle meatal spacers following FESS: A randomized controlled trial**

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Background

Spacers are inserted into the middle meatal space following functional endoscopic sinus surgery (FESS) to prevent lateralization of the middle turbinate, scarring and synechiae. Our objective was to determine if postoperative pain, discharge, pain during removal, scarring and incidence of synechiae differed between nasal cavities receiving Silastic or gloved-Merocel spacers following FESS.

Methods

A double-blind randomized controlled trial was conducted in adult subjects requiring bilateral FESS for chronic rhinosinusitis with or without nasal polyposis. The middle meatus of each participant was randomly allocated to receive Silastic or gloved-Merocel spacers. Insertion into the middle meatal space was performed intraoperatively and left in situ for 6 days. Participants were reviewed at 6 days, 5 and 12 weeks postoperatively. Pain, discharge and pain during spacer removal were assessed using a visual analogue scale (0 – 10). The presence of scarring and synechiae were evaluated endoscopically.

Results

Forty-eight participants (96 nasal cavities) were recruited. Preoperatively, Lund-Mackay CT scores were similar between Silastic and gloved-Merocel treated cavities (6.38 ± 2.35 versus 6.18 ± 2.17). One-week post-FESS, pain during spacer removal was significantly greater for Silastic than gloved-Merocel spacers (2.13 ± 1.34 versus 1.51 ± 1.23 , $p=0.020$). Pain prior to removal and extent of discharge did not significantly differ between cavities. Five- and twelve-weeks post-FESS, no significant difference was observed in scarring or incidence of synechiae.

Conclusion

Following FESS, patients report less pain during removal of gloved-Merocel than Silastic spacers. The likelihood of adverse clinical outcomes does not differ between either spacer modality.

Poster #012**A cross-sectional population-based survey of the prevalence, disease burden, and characteristics of the US adult population with symptoms of chronic rhinosinusitis (CRS)**

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USA

Background

Prevalence estimates for CRS vary (range: 15-40 million) and are often derived from secondary or healthcare claims-related data.

Methods

Population survey of 10,336 U.S. adults randomly drawn from a representative general panel of 4.3 million. Information collected included general health and nasal symptoms (including diagnostic symptom criteria for CRS), including frequency, duration, and severity/bother (of each symptom and overall), diagnoses, and treatments.

Results

Approximately 11.5% of people self-report symptoms/duration criteria for CRS. More than 70% of those rated their symptoms as severe (9-10) on a global burden scale of 0-10. In addition: 38% used oral steroids and >86% intranasal steroids (INS) in the prior year; 10.4% were known to have nasal polyps (CRSwNP), half of which reported prior surgery. In contrast, ~15% of people reporting CRS symptoms without known polyps (CRSsNP) had prior surgery. People reporting severe or moderate symptoms reported similarly high rates of congestion/obstruction and drainage; severe had notably higher rates of facial pain/pressure and loss of smell/taste. Functioning was markedly harmed: sleep and mood were most affected; work/school, social participation, and other domains were also impacted. People report many doctor visits (among CRSwNP/CRSsNP, 60% report >5 in the last year), <50% reporting knowing that they have received a diagnosis of CRS. Of severe CRSsNP patients, <50% believe their symptoms are under control. Of all INS users, ~80% are frustrated with degree of relief.

Conclusion

CRS symptoms are highly prevalent and accompanied by significant burden. There is high unmet medical need in the population.

POSTERS

Poster #013**A pharmacoepidmiologic survey on management in allergic rhinitis in China**

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China

Background

Several clinical guidelines for allergic rhinitis (AR) have been published. The actual medical management of AR is still little known about, despite the disease being very prevalent. We used an internet-based survey to address this issue in everyday general medical practice in China.

Method

An Internet-based survey of otolaryngologists was performed to query about usage of medicine for patients with AR. A total of 584 otolaryngologists participated the survey.

Results

Our survey response rate was 36%. The use of drugs for AR as first-line treatment varied: Three hundreds and thirty-three (57%), 186 (31.8%), 36 (6.3%), 16(2.7%), 13 (2.2%) prescribe nasal steroid always, often, sometimes, infrequently, and never, respectively. One hundred and sixty-one (27.6%), 241 (41.3%), 128 (21.9%), 33 (5.7%) 21 (3%) prescribe oral antihistamines always, often, sometimes, infrequently, and never, respectively. Thirty-eight (6.5%), 126 (21.5%), 173 (29.6%), 108 (18.6%), 139 (23. %) prescribe nasal antihistamines always, often, sometimes, infrequently, and never, respectively. Forty-five (7.8%), 129 (22.1%), 172 (29.4%), 103 (17.6%), 135 (23.1%) prescribe oral leukotriene receptor antagonists always, often, sometimes, infrequently, and never, respectively.

Conclusion

This survey demonstrates that current practices in medical management of AR can vary widely among respondents, and are not uniformly based on evidence-based medicine and clinical outcomes research.

Poster #014**A shifting paradigm in sinonasal surgery: the safety and efficacy of office based rhinology**

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Canada

Objective

Office based rhinology has become popularized in recent years with the advent of several minimally invasive techniques. There is a paucity of literature, however, supporting more involved in-clinic procedures such as true endoscopic sinus surgery (ESS). There is a high volume of this work being done at our centre and the objective of this paper was to review the safety, efficacy and tolerability of in-clinic surgeries.

Methods

A retrospective chart review was conducted. All adult patients undergoing in-clinic sinonasal surgery with a minimum of 3 months follow-up were included. Information regarding intra-operative and post-operative complications and revision procedures were recorded. For the ESS procedures the indication, sinuses operated on and type of revision were also collected.

Results

A total of 315 patients met inclusion criteria. There were 166 turbinoplasty, 118 ESS, 35 septoplasty, 34 rhinoplasty and 4 septorhinoplasty surgeries performed. For the ESS procedures, 74 (62.7 %) were bilateral and experience was had operating in all paranasal sinuses – these were not just polypectomies. Mean follow-up was 10.9 months. Complication rates were comparable to those under general anesthetic for equivalent surgeries.

Conclusion

Office based sinonasal surgery is safe, effective and well tolerated by patients. The need for revision surgery in our series was low. An in-clinic procedure may avoid a general anesthetic in the operating room for appropriately selected patients.

Poster #015**A skull-base surgery patient care module to improve clinical outcomes**

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 Mingyang Gray, MD
 Anthony Del Signore, MD, PharmD
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 USA

Introduction

Complications, including infection, diabetes insipidus, syndrome of inappropriate antidiuretic hormone, and cerebrospinal fluid leak, are common after skull-base surgery. Clinical nursing staff and critical care fellows are often the first to detect signs and symptoms of these complications. Studies show that educational modules and in-service exams can improve patient outcomes. By implementing a post-operative skull-base surgery education protocol for clinical staff, we can improve post-operative outcomes. We hypothesize that education modules for clinical staff can significantly improve awareness and education, as measured by pre- and post test scores.

Methods

A pre/post-test single-arm intervention study was conducted. Clinical staff completed a multiple-choice test before and after an education module on post-operative skull-base surgery.

Results

A significant difference was noted between pre-tests and post-tests scores of all clinical staff (79.7% vs. 94.9%, $p=0.007$). When assessing nursing staff alone, there was a significant difference between pre-test and post-test scores (79.2% vs. 94.7%, $p=0.019$). There was no significant difference between pre-test and post-test scores of critical care fellows and residents.

Conclusion

Our study suggests that clinical nursing staff may lack basic knowledge and principles about skull-base surgery, post-operative care, and signs and symptoms of complications. Thus, skull-base surgery teams should implement patient care modules for clinical staff in order to improve post-operative outcomes and decrease complication rates, thereby decreasing costs and length of hospital stays. This education module is the first step in standardizing care for skull-base surgery patients.

Poster #016**A systematic review of eosinophilic angiocentric fibrosis of the paranasal sinuses**

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 USA

Introduction

Eosinophilic angiocentric fibrosis (EAF) is a rare disease of unclear etiology. There is a paucity of literature discussing prognostic factors or comparing surgical approaches. This systemic review focuses on sinonasal cases of EAF, analyzing tumor and patient characteristics for possible prognostic markers, and compares surgical outcomes.

Methods

Systematic literature review with case report analyzing available cases of EAF located within the paranasal sinuses. Patient characteristics, tumor location, treatment modalities, and surgical outcomes were evaluated.

Results

Literature search yielded 39 articles meeting criteria. In addition to one case from this institution, 59 cases were reviewed. Median age was 46 (range 16-81 years). Median duration of symptoms was 3 years. The most common presenting symptoms were nasal obstruction (69%, $n=41$) and change in external nasal appearance (39%, $n=32$). The majority of cases (85%) were treated with surgical resection alone or in combination with medication. Of surgical patients, 62% underwent a complete resection with a recurrence rate of 20%. Median follow up duration was 2 years (range 1 month–18 years). Endoscopic approach showed a significant positive correlation with complete resection ($p=0.045$). Patient sex ($p=0.6$), tumor location (range of $p=0.32$ to $p=0.98$), lateral rhinotomy ($p=0.26$), septoplasty ($p=0.84$), and external rhinoplasty ($p=0.28$) were not significantly correlated with total resection. Insufficient sample size precluded calculation of predictors of recurrence following surgery.

Conclusions

This review suggests that an endoscopic approach to EAF tumor is a viable option frequently yielding complete resection.

POSTERS

Poster #017**A systematic review of post-transplantation lymphoproliferative disorder of the paranasal sinuses and nasal cavity in cystic fibrosis**

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USA

Introduction

Post-transplantation lymphoproliferative disorder (PTLD) represents a challenging complication of organ transplantation in cystic fibrosis (CF) patients from both diagnostic and treatment standpoints. The mainstay of PTLD treatment includes immunosuppression reduction in combination with chemotherapy and/or radiation. The authors present a CF lung transplant recipient who developed PTLD of the nasal cavity managed with interval endoscopic resection avoiding adjuvant therapy.

Methods

Systematic literature review and case presentation.

Results

Eight cases of PTLD of the paranasal sinuses/nasal cavity were identified over four published reports. The most common presenting symptoms were nasal obstruction (63%,n=5), nasal polyposis (63%,n=5), and post obstructive rhinosinusitis (63%,n=5). The majority of patients (88%,n=7) were managed with reduction of immunosuppression either alone (38%,n=3) or in combination with radiotherapy (38%,n=3) or chemotherapy (13%,n=1). We describe a 55-year old patient with CF and nasal polyposis who underwent lung transplantation and developed PTLD approximately one decade later. The patient presented with nasal obstruction and unilateral epistaxis with a polypoid, violaceous mass filling the nasal cavity. The patient deferred chemotherapy and radiation, electing to undergo resection for symptomatic relief. The patient underwent endoscopic resection of the mass which was pedicled from the anterolateral aspect of the inferior turbinate with excellent symptomatic control and has required localized re-resection twice over an eight year span.

Conclusions

Symptomatic control of PTLD in CF patients with pedicled disease localized to the nasal cavity may be achieved with interval endoscopic surgical resection while avoiding the morbidity of chemoradiotherapy.

Poster #018**A year of charity surgical work after residency – how to do it, what I learned and where I went wrong**

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Objective

After residency, the author spent a sabbatical year performing Otolaryngology charity work in Cambodia and India before commencing his Rhinology fellowship training. He outlines the highs and lows associated with performing such work.

Methods

After organising funding, the author spent time in Cambodia training local surgeons in endoscopic sinus surgery and setting up a local rhinology service in Phnom Penh. He then worked in mission hospitals and outreach camps in south and north india before returning to the UK to begin Rhinology fellowship training.

Results

The year was filled with professional and personal development. There were great highs but also significant lows associated with the work. Administration was challenging at times as was travelling and living in third world countries. At numerous times, the author would question the significance of the work he was doing and the motives behind it. The year was filled with adventure and certainly he came back a very different man to the one who had initially started on the journey. If the opportunity were to arise again, he would seize it with both hands.

Conclusions

Surgical charity work is often romanticised. While it is a highly worthwhile endeavour there are certain aspects which are required to be understood before embarking on such a journey. The advantages and disadvantages of such work are candidly expressed in this presentation.

Poster #019**Absent taste with normal smell: Retronasal anosmia, aguesia, orthonasal normosmia**

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 USA

Introduction

While orthonasal normosmia with retronasal anosmia can reduce flavor no cases are documented. Such a case is described.

Methods

Case Study: A 62-year-old woman, three years ago, had a gradual onset of taste loss and use of excess salt and spices. She disaffirms loss of smell, dysosmia, phantosmia, and palinosmia. She describes her taste as only 5% of normal, and can taste only sweet, sour, bitter, and spicy; thus food is flavorless. She denies dysguesia, phantoguesia and palinoguesia. Testing revealed a B12 deficiency that, despite treatment, did not improve her complaints.

Results

Abnormalities on physical examination: Neurological examination: Mental status examination: Digit span: 6 forwards and 2 backwards. Interpretations of similarities: concrete. Motor examination: Drift: right abductor digiti minimi sign with right cerebellar spooning. Reflexes: bilateral pendular quadriceps femoris, bilateral Hoffman reflexes. Chemosensory testing: Olfactory: Dirhinous University of Pennsylvania Smell Identification Test: 38 (normal). Brief Smell Identification Test: 10 (normosmic). Retronasal olfaction: Jelly Bean Difference Test: 1 (anosmic). Gustatory testing: 6-n-propylthiouracil Disc Test: 2 (abnormal). Fiberoptic endoscopy: negative. MRI: residual intracranial hypertension with resolving bilateral subdural hematomas.

Conclusion

Absent perceived flavor with normal orthonasal smell, reduced gustation, and absent retronasal olfaction demonstrates the dichotomy of orthonasal and retronasal smell, possibly due to nasal cavity architecture diverting odors. This highlights the need for independent assessment of orthonasal and retronasal smell and suggests that the presence of intact orthonasal smell with absent taste may not be an accurate indicator of malingering.

Poster #020**Adverse effects of olfactory testing: Phantosmia and phantoguesia**

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 USA

Introduction

A case of olfactory tests inducing prolonged phantosmia and phantoguesia is reported.

Methods:

Case study: A 54 year male noted reduced smell to 10% and taste to 30% of normal after completing five week of Daptomycin. In response to a variety of odors he experienced a burnt metallic taste and odor intensity 10/10. Chemosensory test: Olfaction: Anosmic: Brief Smell Identification: 6; Alcohol Sniff: 4; Pocket Smell: 1; Olfactometer Butanol Threshold: L 0.0 R 4.0; Identification: L 7.0 R 8.0; Sniff'n Sticks: Threshold: L <1.0 R <1.0; Dirhinous Discrimination: 2. Hyposmic: Quick Smell Identification: 2; Isotonic saline nasal-infusion: No effect. Retronasal Olfactory: Jelly Bean Difference: 0 (anosmic); Taste: Gustatory: 6-Propylthiouracil disc: 10 (normal). MRI of the brain with and without contrast: 5 cm arachnoid cyst R cerebellar hemisphere. Fiberoptic endoscopy: normal.

Results

Smell tests induced prolonged phantosmia and phantoguesia: Olfactometer Butanol Threshold Test: Persistent onion smell and taste, increasing in intensity throughout the test to a level 8/10, lasted 1½ hours, culminating in a L dull frontal headache. Olfactometer Identification Test: Every odorant induced either garlic smell or taste, which persisted for several hours after testing. Sniff'n Sticks: After 5-10 minutes a lilac taste appears along with a lilac smell which replaced the actual smell of the odorant being tested which persisted for hours.

Discussion

The mechanism may be odor induced reverbering circuits in the olfactory bulbs with central projection. A warning that patients with olfactory dysfunction may experience prolonged side effects may be warranted with such testing.

POSTERS

Poster #021**Aggressive management of epistaxis in the elderly**

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Introduction

Due to various age-related changes, epistaxis is common in elderly patients, occasionally necessitating hospitalization for management of severe bleeds. The aim of this analysis was to explore the impact of aggressive management (AM) on outcomes of epistaxis hospitalization in the elderly.

Methods

The 2008-2013 National Inpatient Sample was queried for elderly patients (> 65 years) with a primary diagnosis of epistaxis and accompanying procedure codes for anterior and posterior nasal packing or AM (defined as cauterization, ligation, or embolization).

Results

8,449 cases were identified meeting the inclusion criteria: 62.4% receiving only nasal packing and 37.6% receiving AM. On average, AM was associated with 9.9% increase in length-of-stay and 54.0% increase in hospital charges. Chronic comorbid condition rates did not vary between the cohorts, except for diabetes mellitus, which was less common in the AM cohort (26.6% vs. 29.0%; $P=0.014$). AM was associated with increased rate of blood transfusion (24.5% vs. 21.8%; $P=0.004$), but no significant differences in rates of stroke, blindness, thromboembolism, renal/cardiac/pulmonary complications, or in-hospital mortality were observed. Comparing patients receiving ligation or embolization, no differences in length-of-stay, complications, or in-hospital mortality were seen, however embolization patients incurred 232.1% greater hospital charges ($P<0.001$).

Conclusion

AM in the elderly does not appear to be associated with increased morbidity or mortality when compared to nasal packing only. Therefore, when clinically warranted, AM in the elderly appears to be a safe treatment option. Compared to ligation, embolization in the elderly results in greater hospital charges but no change in patient outcome.

Poster #022**Aggressive necrotizing pseudomonal sinonasal infections: A case series**

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Introduction

Pseudomonas aeruginosa is a gram negative bacterium frequently implicated in recalcitrant sinonasal infections, especially in immunocompromised hosts. We report six cases of rapidly progressive *Pseudomonas* acute rhinosinusitis producing tissue necrosis and, in certain cases, cranial nerve palsies.

Methods:

Retrospective review of six patients with aggressive necrotizing sinonasal infections treated at four tertiary academic medical centers with sinonasal cultures growing *P. aeruginosa* in the absence of other pathology.

Results:

A total of six patients were identified. In all cases, there was tissue necrosis which appeared to mimic an invasive process such as mucormycosis, prompting urgent surgical intervention. Pathologic analysis revealed fibropurulent exudates in backgrounds of positive *P. aeruginosa* cultures without evidence of invasive fungal organisms or malignancy. Four of the 6 patients presented with cranial nerve palsies, with 3 patients having vision changes and 3 complaining of trigeminal neuropathy. Only 3 of 6 patients improved clinically over time after surgery and antibiotic therapy; 2 remain in follow up without improvement and 1 has succumbed to other causes.

Conclusions

P. aeruginosa is a tenacious organism that is frequently associated with severe, recalcitrant sinonasal infections. We report the first case series of necrotizing sinonasal infections caused by this organism, and illustrate that, in rare cases, *P. aeruginosa* may mimic and behave like life-threatening conditions such as fulminant invasive fungal sinusitis or malignancy.

Poster #023**Allergy immunotherapy patient education materials: Are they developed at an appropriate difficulty level?**

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 USA

Objectives

A newer alternative to subcutaneous immunotherapy, sublingual immunotherapy (SLIT) has recently gained popularity in the U.S. Patients are largely unfamiliar with SLIT and often seek consultation with otolaryngologists, allergists, and primary care providers, making the design of appropriately written patient education materials (PEMs) to be of paramount importance. As health literacy is closely associated with outcomes, multiple agencies have released guidelines describing the appropriate level of difficulty for PEMs. Our objective was to compare the readability of online PEMs describing traditional immunotherapy as well as SLIT, in an attempt to evaluate whether these resources are written at an appropriate level.

Methods

We evaluated online PEMs using validated readability assessments (Coleman-Liau, New-Dale-Chall, Flesch-Kincaid, FORCAST, SMOG, Raygor Estimate). We organized PEMs by source (allergy societies, academic sources, and private practices) as well as topic (immunotherapy in general vs. SLIT), calculating difficulty levels for these PEMs.

Results

Among nearly all measures of readability, evaluated PEMs were written above the difficulty levels recommended by the NIH, AMA, and DHHS. Both PEMs developed by professional organizations (Grade 11.6 +/- 0.6) as well as those designed by private institutions (11.3 +/- 0.6) were written well above recommended levels. Although PEMs specific to SLIT were written at a slightly higher grade level than those relating to conventional immunotherapy, this difference did not reach statistical significance (12.2 vs. 10.8, $p = 0.12$).

Conclusion

Immunotherapy PEMs, including those encompassing SLIT, are written at too high a difficulty for most patients. These results strongly support attempts at simplification to facilitate comprehension.

Poster #024**Alterations in sinus pneumatisation patterns and anatomy in cystic fibrosis**

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Aims

Alterations of sinus anatomy in general, and frontal sinus anatomy, in particular demonstrates geographic and disease variability. Chronic rhinosinusitis with or without nasal polyps is a cause of significant co-morbidity in cystic fibrosis patients. This study aims at characterizing such variability in CF to better understand the implications for disease process and treatment.

Method

Contemporaneous cohort of CF patients seen in a specialist respiratory centre were analysed for disease characteristics including, co-morbidity, nasal disease and genetic background. Twenty-six patients were included and their CT scans analysed for Lund-Mackay scoring, pneumatisation patterns, and extra-mural cells.

Results

Half the CF patients had CRS with 80% of suffering from nasal polyps. Twenty-six percent have had one nasal operation with an additional 31% having multiple surgeries. Eleven percent had bronchiectasis, 3% asthma and 69% pancreatic insufficiency. Twenty-three percent were on immunosuppression with 38% on oral steroids. Nearly 83% were heterozygous for DF508, with 34% homozygous carriers of the gene. Mean Lund-Mackay score was 15 with considerable sinus hypo- or aplasia (46%), implying underscoring in this cohort. Agger nasi cells are seen in 70%, frontal cell type 1 in 15%, and Haller cell, suprabullar and frontal bullar cell in 7% each. Frontal cell type 2 and/or 3, interfrontal sinus septal cell or supraorbital ethmoid cell is seen in 3%.

Conclusion

CF patients possess marked alteration in anatomy and physiology of the sinuses. Such changes call for adjustment of the application and interpretation of existing disease assessment tools to better quantify and monitor nasal disease.

POSTERS

Poster #025**An updated systematic review and meta-analysis of the safety and efficacy of the endoscopic modified Lothrop procedure**

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Introduction

A previous meta-analysis has established the short-term success of the endoscopic modified Lothrop procedure (EMLP). However, larger series and longer-term outcomes have since been published. Furthermore, modifications to the EMLP have been described, including mucosal grafts to cover exposed bone of the nasofrontal beak. The purpose of this review is to summarize the updated literature on the safety and efficacy of the EMLP.

Methods

Original studies that reported clinical outcomes from a minimum of five patients undergoing the EMLP were reviewed. If studies from the same institution presented overlapping cohort data, only data from the largest and most recent series were extracted. When possible, raw data was obtained and analyzed.

Results

Data from sixteen studies were pooled yielding 1012 patients with an average post-operative follow-up of 46.1 months. Primary indications for EMLP included chronic frontal sinusitis (82.4%) and mucoceles (7.7%). Symptomatic outcomes were reported in 668 patients, and 89.1% described overall improvement at a minimum follow-up of 5 months post-operatively. The rate of complications was 4.3%, with the most common complication being adhesions (38.2%). The revision surgery rate was 17.1%, and 19.9% of this cohort underwent a second revision procedure. At last follow-up, the frontal neostium was considered patent or stenotic in 92.1% of cases. Free mucosal grafts were used in 83 patients, and their revision surgery rate was 4.8% at a mean follow-up of 32.4 months.

Conclusion

At long-term follow-up, the EMLP continues to demonstrate safety and efficacy. It may be a viable option in recalcitrant frontal sinusitis.

Poster #026**Anti-enanthopathy: Anosmia induced gustatory rhinitis and exsufflation**

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Purpose

Anosmic induction of gustatory rhinitis has not heretofore been described.

Methods

2 cases are reported

Results

Case 1: A 69 year old with a gradual total loss of smell and 85% of taste of idiopathic origin, coincident with the appearance of gustatory rhinitis with nasal congestion and stuffiness, precipitated by consumption of any solid food or hot drink, and has persisted.

Chemosensory tests: Olfactory tests: Anosmic: Brief Smell Identification Test (BSIT): 3, Quick Smell Identification Test: 0. Retronasal Smell Index (RSI): 1. Fiberoptic endoscopy: normal. Case 2: A 50 year old developed an upper respiratory infection followed by a total loss of smell and 90% of taste, with exacerbation of gustatory rhinitis. Prior to this, he felt the need for nasal exsufflation after completing a meal, especially with spicy foods. After the loss, nasal exsufflation was required within the first 2 chews while eating any solid foods or hot beverages, with increased severity. Chemosensory testing: olfactory: all abnormal: BSIT: 6, Olfactometer Identification: Left 9, Right 9, Pocket Smell Test: 1/3, Alcohol Sniff Test: 0. RSI: 0. MRI and MRA: pansinusitis. ENT exam: normal.

Conclusion

Anosmia may have caused disinhibition of afferent trigeminal fibers in the mouth or nose, which then acted to stimulate the efferent projections for gustatory rhinitis. That this reflex could either be induced by or eliminated by olfactory loss, suggests a more complicated role of olfaction in the mediation of this syndrome.

Poster #027**Antimicrobial profiling and resistance in chronic rhinosinusitis patients in a dedicated rhinology clinic**

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Objectives

To examine the yield and resistance profile of pathogens in chronic rhinosinusitis (CRS) patients receiving culture-directed management and the consequent antimicrobial management.
 Study Design: This was a retrospective case note review of 156 patients with CRS who had 203 mucopus samples taken endoscopically using a mucus trap.

Participants

Consecutive patients with CRS seen at the James Paget University Hospital between January 2014 and February 2015.

Setting

Tertiary referral sinus centre.

Main outcome measure

To determine the pathogens isolated, the frequency of the pathogens and their resistance profiles and the consequent antimicrobial treatment given.

Results

Commonest organism was *Staphylococcus aureus* accounting for 30% of cultured samples, followed by *S. Pneumoniae* (6.5%), *Pseudomonas* (6%), *Haemophilus Influenzae* (6%) and *Coliforms* (4%). *S. Aureus* Clarithromycin resistance rates were 31% compared to MRSA rates of 9%.

Discussion

Rising *S. Aureus* resistance to Clarithromycin represents a concerning trend the treatment of CRS, given the pre-eminence of Clarithromycin use in widely adopted clinical treatment guidelines for CRS. We suggest when antibiotics are used in the context of CRS treatment, their use should be directed by culture and sensitivity results with less emphasis on empirical treatment given the high resistance rates to commonly used antimicrobial therapies.

Poster #028**Are prophylactic systemic antibiotics necessary with nasal packing? A systematic review**

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Background

The usage of prophylactic systemic antibiotics with nasal packing has been a controversial topic. There have been no systematic literature reviews to determine the need for prophylactic systemic antibiotics. We have performed a systematic literature review to determine the role of prophylactic systemic antibiotics with nasal packing in the prevention of toxic shock syndrome and local nasal infections.

Methods

A search for studies reviewing the efficacy of prophylactic systemic antibiotics in the prevention of toxic shock or nasal/sinus infections for patients with nasal packing for epistaxis and post-operatively for septoplasty was performed. This was conducted in PubMed, OVID and Cochrane Central Register of Controlled Trials, following the methods of 2009 PRISMA guidelines. Only English publications and human studies including randomized controls or quasi-randomized control trials, controlled clinical trials, retrospective studies, and case series were included.

Results

Six studies met the inclusion criteria for the review and were included. Primary outcomes were signs and symptoms of nasal or sinus infections in patients who underwent nasal packing for epistaxis or septoplasty. There were no reports of toxic shock syndrome in any patients and there was no statistical difference in purulent drainage in septoplasty patients (9.9% vs 11.2%) treated with or without antibiotics.

Conclusions

There is a paucity of literature reviewing the need for prophylactic systemic antibiotics with nasal packing. The available literature suggests that prophylactic systemic antibiotics do not prevent sinus or nasal infections or toxic shock syndrome in patients with nasal packing, although further high-quality studies are needed.

POSTERS

Poster #029**Audit of emergency functional endoscopic sinus surgeries**

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Introduction

With the advent and common adoption of endoscopes and endoscopic instruments, 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.

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 2009 to 2012. Cases which are coded as emergency are then sieved out. This database is consistent and intact from 2009 to 2012. There has been no change or migration of database or software during this period.

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 was between 42-60, 1 was younger than 40 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 abscess. 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 literature. Emergency FESS are fairly rare. Most are in older persons. The most common reason is sinusitis related complications.

Poster #030**Balloon dilation of the maxillary and frontal ostia: A comparative cadaveric investigation**

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Introduction

Sinus balloon dilation catheters (SBC) have become an increasingly common tool that is used by an ENT surgeon. There are two major types of SBCs, wire-based and probe-based, but data is lacking comparing the accuracy of the systems in relation to the target anatomy.

Objective

The objective of this study was to assess whether a wire or probe-based sinus balloon dilation systems differed in terms of ability to access and dilate the natural maxillary and frontal ostia.

Design

Five fully trained otolaryngologists used wire-based and probe-based SBCs to access and dilate the frontal and maxillary sinuses in 50 cadaveric specimens. A non-operating investigator assessed the position of the devices relative to the target anatomy using intra-sinus endoscopy and well-defined grading criteria.

Setting: Cadaveric lab

Main Outcome and Measures

Outcomes included measuring balloon access as evaluated by the operating surgeon and lead investigator. In addition, balloon reach and accuracy of dilation were evaluated by the lead investigator

Results

The wire-based system was more accurate compared to the probe-based system in dilating the natural ostium of the frontal (80% vs 28%, $p < 0.0001$) and maxillary (96% vs 20%, $p < 0.0001$) sinuses. Penetration of the posterior fontanelle during maxillary access was 2% for the wire-based system and 8% for the probe-based system ($p = 0.25$).

Conclusion

The wire-based SBC was more accurate than the probe-based SBC in accessing and dilating both the maxillary and frontal ostia. Future study is needed to ascertain the clinical importance of these findings.

Poster #031**Balloon sinuplasty vs. FESS in the management of chronic rhinosinusitis: Which approach is cost-effective?**

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Objectives

Balloon sinuplasty (BD) has increased in popularity in recent years as an approach for limited chronic rhinosinusitis, despite a paucity of data demonstrating long-term efficacy. Our objective was to compare the cost-effectiveness of ESS to BD for CRS without nasal polyposis management.

Methods

To simulate the clinical investigation of patients who underwent ESS or BD for CRS, a decision tree model was initially constructed, followed by Markov style analysis to account for effects of these two procedures. The primary outcome in this analysis was the cost effectiveness ratio (ICER) calculated based on the decision tree and Quality adjusted life years (QALY) calculated from the Markov model. Costs, probabilities, and effectiveness based on health utility scores were extracted from previous published studies. Standard discounting of costs and rewards were applied.

Results

Initial ESS costs (including complications) was \$15,822 versus \$12,770 for BD, with effectiveness of 0.75 for both procedures. Markov analysis shows after 10 years, incremental cost of ESS and follow up treatment was \$25,622 with QALY of 6.80 versus balloon dilation at \$27,783 with QALY of 6.82 gained compared to patients without active medical treatment. ICER of ESS was \$108,050, suggesting BD may be a more cost-effective choice in this patient population.

Conclusion

This economic analysis suggests BD may be a more cost-effective approach for management of mild CRS without NP than ESS. These findings should be interpreted with caution, as "effectiveness" figures were derived from one citation. Further prospective high-quality clinical studies are necessary to evaluate this comparison.

Poster #032**Bilateral silent syndrome: A case report**

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Introduction

Silent Sinus Syndrome (SSS) is a rare condition that typically presents unilaterally with collapse of the maxillary sinus due to negative pressure. The process leads to the downward retraction of the orbital floor and subsequent hypoglobus. Only three cases of bilateral SSS have been reported in the literature.

Study

A case of a patient who initially presented for hearing loss and nasal congestion and is later diagnosed with bilateral maxillary SSS following diagnostic nasal endoscopy and CT sinus imaging.

Location

Tertiary Academic Center

Discussion

The patient was found to have bilateral Silent Sinus Syndrome with different degrees of maxillary sinus collapse. At the time, the patient did not have any diplopia or evidence of hypoglobus. Following evaluation, the patient underwent bilateral maxillary antrostomy to prevent further collapse of the maxillary sinuses.

Conclusion

This case report adds to the current literature as it exemplifies a rare case of bilateral Silent Sinus Syndrome. It remains important for clinicians to correctly identify the process and surgically relieve the condition to prevent further orbital changes.

POSTERS

Poster #033**Can inverted papilloma recurrence be minimized to zero?**

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Background

Inverted papilloma (IP) is the most common benign sinonasal tumor requiring surgical management by otolaryngologists. Reported recurrence rates range from 12-20%, with the majority recurring within 18-36 months. Therefore, contemporary strategies need further optimization. We reviewed our institutional strategies and results of IP treatment.

Methods

A cohort of IP patients that underwent surgical resection (2010-2016) was studied.

Results

Twenty-three adult patients underwent surgery for IP. Of these, 35% had recurrent tumor at time of presentation; 57% had Krouse Stage 3 disease. The probable site(s) of tumor attachment (abnormal bony thickening on pre-operative CT scans) were studied. All patients underwent endoscopic surgery supplemented by sublabial and brow trephination as necessary. Endoscopic tumor resection principles were employed and the site of tumor attachment identified in all. The attachment site was resected widely, drilling out the underlying bone. Intraoperative frozen section pathology was utilized for all procedures. Negative margins were achieved in 96% (22/23) with the exception of one patient where diffuse involvement of a large supraorbital cell was addressed by mucosal stripping. Mean follow-up was 26 months (range 4-61 months). Surveillance was performed every 1-6 months with nasal endoscopy and imaging, depending on site of tumor attachment and follow-up interval. In all patients who achieved negative surgical margins, no recurrences were noted.

Conclusions

Endoscopic resection of inverted papilloma employing tumor resection principles, wide resection of tumor attachment site and routine use of intraoperative frozen section pathology notably minimizes recurrence for IP. These strategies may help otolaryngologists significantly improve outcomes for IP.

Poster #034**Carcinoma-in-situ from inverted papilloma: A systematic review**

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Introduction

Treatment strategies for sinonasal inverted papilloma (IP) and squamous cell carcinoma (SCCa) are well-established; however, management of sinonasal carcinoma-in-situ arising from IP (CIS-IP) is unclear. We aim to describe the characteristics and treatment of CIS-IP in the current literature.

Methods

We performed a literature search of PubMed, Ovid/Medline, and Cochrane Central for articles from 1985 to 2015. Inclusion criteria included English-language studies containing original data with =1 case of CIS-IP, measurable clinical outcomes, and available treatment information. We excluded cases of IP, SCCa, and dysplasia. Data were systematically collected on study design, patient demographics, clinical characteristics and outcomes, and level of evidence. Two investigators independently reviewed all manuscripts and performed quality assessment.

Results

Of 974 articles identified, 7 were included. All were level 4 evidence. Fourteen cases of CIS-IP were identified. Surgery included both endoscopic (6/14) and non-endoscopic (8/14) resection. Procedures included endoscopic resection (6/14), intranasal resection (2/14), medial maxillectomy (5/14), and total maxillectomy (1/14). Five patients received radiation therapy, and three patients received chemotherapy. Follow-up ranged from 28-124 months (mean 74 months). Recurrence was seen in 2/14 patients.

Conclusions

There has been only a small number of CIS-IP described in the literature, exclusively in level 4 evidence studies. CIS-IP is treated primarily with surgery, with radiation or chemotherapy for advanced cases. This qualitative systematic review is the first examining treatment strategies of CIS-IP. Significant high-level research is needed to develop clear treatment guidelines for CIS-IP.

Poster #035**Cerebrospinal fluid leak and meningitis after skull base tumor surgery: Predisposing factors and impact on short-term outcomes**

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Objectives

Determine the patient variables associated with development of cerebrospinal fluid (CSF) leak or meningitis after surgery for sinonasal and nasopharyngeal tumors
 -Evaluate the impact of CSF leak and meningitis on patient outcomes

Methods

Using the Nationwide Inpatient Sample, data were collected for 4150 patients who underwent surgery for sinonasal and nasopharyngeal tumors from 2002-2011. Analysis of demographics, comorbidities, complications, and outcome variables was performed.

Results

Sixty-one patients were diagnosed with a CSF leak, and thirty-three patients developed meningitis. The number of CSF leaks rose over time with significantly higher rates in later years (2009-2011). Tumors in the frontal and ethmoid sinuses had comparatively increased rates of CSF leaks ($P < 0.01$). Patients with coexisting neurological conditions, paralysis, or psychosis had higher rates of CSF leak ($P < 0.05$), and meningitis occurred more frequently among patients with coagulopathies, anemias, electrolyte disturbances, neurological conditions, and weight loss ($P < 0.05$). CSF leak correlated with greater rates of postoperative pneumonia ($P = 0.02$), vascular complications ($P = 0.004$), hematoma ($P = 0.007$), and meningitis ($P < 0.001$). After adjusting for patient and hospital variables, both CSF leak and meningitis were associated with greater length-of-stay and patient charge ($P < 0.001$).

Conclusions

Among these surgical patients, coexisting neurologic or psychiatric conditions portend increased risk for CSF leak. Overall, development of CSF leak and/or meningitis after skull base tumor surgery is associated with significantly increased length-of-stay and costs, and proper postoperative care for these patients may require management of frequently associated complications.

Poster #036**Challenges of reconstructing sino-cranial-orbital tumor defects**

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Background

Sino-cranial-orbital tumors are difficult to reconstruct for several reasons. First, the sinus is lined by airway epithelium that produces mucus and must remain patent to prevent formation of a mucocele. Second, the dura and cranial cavity should be separated from the nasal cavity to prevent infection. Third, the periorbital skin is thin with a tenuous blood supply. Successful reconstruction must take into consideration these challenges.

Methods

We report on the reconstruction of a gentleman with a T4 squamous cell carcinoma originating in the sinus and invading into the skull base and orbit. He had undergone previous reconstruction with cranialization of the sinus cavity, calvarial bone graft, and orbital exenteration and received postoperative radiation. Post-operatively there were complications of a neo-frontal sinus, osteomyelitis, and 5 x 5 cm large sinocutaneous fistula.

Results

The team was able to resect all necrotic bone and infected hardware via bicoronal and facial approach. The forehead was reconstructed and the fistula closed with titanium mesh overlaid on both sides by radial forearm free flap. The cranial cavity remained continuous with the nasal cavity, but the dura was intact and sealed off with a layer of nasal mucosa. Patency of the neo-frontal sinus was verified intraoperatively via endoscopy.

Conclusion

Sino-cranial-orbital resections are challenging to reconstruct due to the different functions of the sinonasal mucosa, dura, and orbital skin. In this case report, we were able to separate all three compartments and preserve function, while closing the fistula with a free-tissue free flap.

POSTERS

Poster #037**Clinical and symptom-based predictors of eosinophilic crssnp patients**

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Background

Recent findings suggest that CRSsNP is immunologically heterogeneous but eosinophilic CRSsNP (eCRSsNP) is the most common subtype. In the absence of nasal polyps, identifying clinical and symptomatic features of eCRSsNP may better target therapy for patients.

Methods

Fifty-four patients undergoing sinus surgery for CRSsNP were enrolled. Demographic, clinical comorbidities, endoscopy scores and preoperative quality of life (QoL) instruments, including Sino-Nasal Outcome Test (SNOT-22) and PROMIS-29, were collected. Eosinophilic cationic protein (ECP) levels were determined from ethmoid and uncinate tissue homogenates using ELISA and normalized to total protein. Patients were divided into eCRSsNP and neCRSsNP subtypes using a previous established ECP threshold (mean+ 2SD of control levels; 289.75 ng/mg total protein) and demographic data and preoperative QoL scores were compared.

Results

Fifteen and 39 patients were classified as eCRSsNP and neCRSsNP, respectively. On univariate analysis, eCRSsNP patients were younger, had increased medical visits and higher Lund-Mackay score (LMS) than neCRSsNP patients (all $p=0.05$). SNOT-22 total, PROMIS-29 domain scores and individual symptoms were not different between eCRSsNP and neCRSsNP patients ($p>0.05$). Multivariate logistic regression analysis confirmed that LMS and age were independent predictors of eCRSsNP status ($p<0.05$). Receiver operating characteristic (ROC) curve analysis showed they could significantly predict eCRSsNP status ($c=0.804$, $p<0.01$). Cutoff analysis identified a point with 50% sensitivity and 89% specificity corresponding to a LMS of 14 for a 45 year-old patient.

Conclusions

Compared with neCRSsNP, eCRSsNP had more severe radiographic disease and were younger. No patient-reported symptom or QoL domains significantly distinguished eCRSsNP from neCRSsNP patients.

Poster #038**Clinical outcomes of endoscopic and open resection of sinonasal inverted papilloma in Showa University Hospital**

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Sinonasal papilloma is a benign neoplasm that accounts for about 10% of sinonasal tumors and is classified histopathologically into inverted papilloma (IP), exophytic papilloma and cylindrical cell papilloma. IP is characterized by its tendency toward local recurrence after removal and potential for malignant transformation. The main goal of therapy is complete surgical removal of the tumor with free margins, as incomplete resection may cause recurrence. Endoscopic approaches are now standard, though open approaches have been utilized in the recent past in Japan.

Since 2010, the endoscopic approach has been utilized at our hospital in Tokyo through the assistance of high-definition endoscopy and navigation systems. Here, we review our experience and report both advantages and disadvantages of the endoscopic approach for IP from the perspective of surgical sites and procedures, recurrence rates and complications. We also compared with cases performed by open resection until 2009 with more recent cases that used endoscopic technique. From 2005 until 2015, there were 34 cases of IP treated endoscopically compared to 8 cases treated via open procedures from 2005 until 2009. Median followup was 29.5 months and 55.8 months respectively. Recurrence rates were 8.8% in the endoscopic group, and 25% in the open group. Complications included 2 cases of nasolacrimal duct stenosis; both occurred in the endoscopic group. Both open and endoscopic cases were more likely to occur in the maxillary sinus. We conclude that endoscopic approaches achieve lower rates of recurrence compared to open approaches when feasible in terms of site and extent.

Poster #039**Comparison of surgical outcomes of transfrontal versus transsphenoidal pituitary surgery in the elderly**

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Introduction

Past research has shown surgery in the elderly to be associated with greater complications and poorer outcomes. This analysis aims to explore this trend with respect to pituitary surgery, by comparing outcomes of transfrontal approach (TFA) versus transsphenoidal approach (TSA) in the elderly.

Methods

This retrospective cohort analysis utilized discharge data from the 2008-2013 National Inpatient Sample (NIS) to identify elderly patients (> 65) with a primary diagnosis of pituitary neoplasm and a primary procedure code of TFA or TSA surgery.

Results

Of 4,345 elderly patients undergoing pituitary surgery, 4.0% underwent TFA and 96.0% underwent TSA. Race and gender did not vary significantly between the two cohorts. TFA patients incurred greater hospital charges (\$89,103 vs. \$53,428; $P < 0.001$) and experienced longer hospital stays (9.28 days vs. 4.66 days; $P < 0.001$), compared to TSA patients. Comorbidities did not vary between the groups, except for hypothyroidism, which was more common in the TSA cohort. Binary logistic regression analysis yielded significantly greater odds of central diabetes insipidus, iatrogenic pan-hypopituitarism, aspiration pneumonia, thromboembolism, intubation/tracheotomy, pulmonary complications, and urinary/renal complications after TFA compared to TSA. Furthermore, the TFA was associated with 7.238 (3.075 – 17.035; $P < 0.001$) greater odds of in-hospital mortality.

Conclusion

Pituitary surgery in the elderly is performed more frequently via the TSA than the TFA. TFA in the elderly is associated with poorer outcomes, in terms of length of stay, hospital charges, complications, and mortality, when compared to the TSA.

Poster #040**Complications in endoscopic sinus surgery for chronic rhinosinusitis : A 12-year review**

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Objectives

The aim of our study was to evaluate the complication rate of Endoscopic Sinus Surgery (ESS), over a 12-year period. Although, to assess if a relation exists between the complication rate and surgeons qualification (fellowship training in endoscopic sinus surgery).

Methods

A retrospective chart review was done. Adult patients 18 years and older, whom underwent ESS either primary or secondary for chronic rhinosinusitis. Patients medical records were reviewed for patient's demographics, comorbidities, type and side of surgery, use of intraoperative imaging guidance, intraoperative and postoperative complications, length of hospital stay and follow up.

Results

A total of 169 patients were reviewed. 116 were primary while 53 were revision surgeries (31.4%). 138 (81.7%) were bilateral, while 31 were unilateral (18.4%). There were 92 males (54.4%) and 77 females (45.6%). Patients ages ranged from 19 to 78 years. The overall complication rate was documented in 15.4% (n= 26). Intraoperative bleeding was 4.7% (n=8) while major postoperative bleeding was 1.2% (n=2). Other postoperative complications were CSF leak 1.2% (n=2), decreased vision 0.6% (n=1), orbital complication 0.12% (n=2). The nonqualified surgeons (84.2%) had a higher rate of complications in comparison to qualified surgeons (15.8%).

Complication rate in imaging guidance surgery was 26.3% (n=5) compared to 73.7% (n=14) in ESS without imaging guidance.

Conclusions

Intimate knowledge of anatomy, preoperative assessment, imaging guidance surgery and experience all are essential factors to perform ESS appropriately.

POSTERS

Poster #041**Computational fluid dynamic modeling of nose-to-ceiling head positioning for sphenoid sinus irrigation**

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Introduction

Postoperatively after sinus surgery, patients are commonly instructed to irrigate with high volume saline irrigations with their heads over a sink with their noses pointed inferiorly (nose-to-floor). While irrigations have been shown to penetrate the paranasal sinuses in the nose-to-floor head position, no study has assessed whether sphenoid sinus penetration can be increased by irrigating with the nose pointed superiorly (nose-to-ceiling). The purpose of this study was to use a validated computational fluid dynamic (CFD) model of high volume saline irrigations, to assess the difference in sphenoid sinus penetration with nose-to-floor and nose-to-ceiling head positions.

Methods

Sinus surgery was performed to include wide maxillary antrostomies, total ethmoidectomies, wide sphenoidotomies, and a Draf III frontal sinusotomy. CFD models were created based on computed tomography maxillofacial scans obtained preoperatively and postoperatively. CFD modeling software was used to simulate 240 mL irrigations to one nasal cavity with the following parameters: velocity 30 mL/s (120 mL, over 4 seconds), head positioning with either nose-to-floor or nose-to-ceiling, and an angle of irrigation 20 degrees to the nasal floor.

Results

In the nose-to-floor position, irrigation did not penetrate the ipsilateral or contralateral sphenoid sinuses preoperatively or postoperatively, though it did penetrate the maxillary, ethmoid, and frontal sinuses. In the nose-to-ceiling position, the irrigation did penetrate the sphenoid sinus, though the frontal sinus was not penetrated.

Conclusion

CFD modeling demonstrated that distribution of topical irrigations to the sphenoid sinus occurred when the head was oriented in a nose-to-ceiling head position, but not in the nose-to-floor position.

Poster #042**Construct validation of a low-cost, non-biologic, sinus surgery task trainer**

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Introduction

Low-cost, low-fidelity simulation is a reliable method for advancing surgical skills outside of the operating room. The purpose of this study was to evaluate construct validity of a low-cost, low fidelity, non-biologic sinus surgery task trainer.

Methods

We performed a cross-sectional validation study among a cohort of medical students, residents, and otolaryngology faculty. Participants performed surgical tasks on a low-cost sinus surgery task trainer. Video performance was recorded, anonymized, and graded with a global rating scale (GRS). Potential predictors of task trainer performance were also evaluated including prior video game, sports, musical instrument, and sinus surgery simulation experience. Spatial performance was assessed using a Mental Rotation Test. Regression analyses were performed to assess main associations.

Results

26 participants completed the study. After adjusting for prior video game, musical instrument, sports and sinus surgery simulation experience, we observed a trend in GRS scores associated with additional level of training ($\beta=1.70$; 95% CI: 0.57, 4.83). Past history of video gaming ($\beta=1.33$; 99% CI: -0.69, 3.35), previous sinus surgery simulation ($\beta=2.72$; 99% CI: -0.43, 5.87), and past sports experience were associated with GRS score ($\beta=2.08$; 99% CI: -0.50, 4.65). We did not observe an association between past musical instrument playing and GRS score ($\beta=1.25$; 99% CI: -1.76, 4.25).

Conclusions

The present study demonstrated evidence of construct validity with a low-cost, non-biologic sinus task trainer. We observed associations between GRS score and prior video gaming, sports participation, and sinus surgery simulation experience.

Poster #043**Contralateral sinus involvement of treated unilateral allergic fungal rhinosinusitis**

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Introduction

Recurrence of allergic fungal rhinosinusitis (AFRS) is evident. However, there are no reports studying the recurrence of unilateral AFRS to the non-diseased sinuses.

Objectives

- 1- To evaluate the recurrence on the contralateral sinuses.
- 2- To study the possible predictor factors to develop the recurrence (clinical, radiological and surgical predictors).

Methods

Patients with unilateral AFRS from (2010-2015) were enrolled in multi-institutional case-control study. All patients were evaluated after endoscopic sinus surgery for recurrence. Patient's records were reviewed for demographic data, clinical, radiological and surgical profiles as well as adjunctive medical treatment.

Results

A total of 68 patients were identified. Contralateral recurrence was found in 31% with mean duration of recurrence 17.7 months. Positive association was found with the presence of preoperative contralateral symptoms and signs (Odds ratio 3.49, 95% CI 1.19 - 10.22, P-value 0.02). Post-operative use of Pulmicort irrigation was associated with less contralateral recurrence (Odds ratio 6.27, 95% CI 1.624 – 24.138, P-value: 0.004). Other variables like: Comorbidities (bronchial asthma and allergic rhinitis), Perioperative use of systemic steroid, radiological signs, Radical Vs. Conservative surgery, additional surgery to contralateral side (like Turbinoplasty, Conchotomy, etc), post-operative use of antibiotics, did not show any statistical significance.

Conclusion

Recurrence of 1/3 of unilateral AFRS to the contralateral sinuses is considered significant. This percentage might be higher with longer follow up. Positive signs and symptoms of the non-diseased sinuses can predict the involvement. Further study with larger number is necessary to investigate the possibility of prophylactic surgical intervention for the non-diseased sinuses.

Poster #044**Delayed return of first bite syndrome: Prolonged flavor loss**

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Introduction

While First Bite Syndrome has been reported (Nagothu, 2016), delayed First Bite Syndrome has not heretofore been described.

Methods: Case Study

A 67 year old male suffered from an upper respiratory infection seven months prior to presentation, followed by complete loss of smell and taste. He describes both burning leaves and coffee having a distorted, chemical-like smell. He also suffers from phantosmia of an indescribable smell, occurring predominantly at night. He affirms being able to taste seasoned croutons, Triscuits, and whole grain Tostitos. He experiences First Bite Syndrome, where he initially tastes 90% of the food. Within a minute, it decreases to 0%. The ability to taste this food remains absent for weeks. For instance, while the first bite of these foods contained 90% of taste, they then dropped to 0%. One week and three weeks later, the taste still had not recovered, with strawberries remaining at 10%, watermelon at 50% and chocolate showing some recovery: 0% at one week and 40% three weeks later.

Results

Chemosensory Testing: Olfactory Testing: Brief Smell Identification Test: 7. Quick Smell Identification Test: 2/3. Gustatory Testing: Jellybean Difference: 1. 6-N-Propylthiouracil Disc Taste Test: 1.

Conclusion

Potential mechanisms for this include olfactory and gustatory pathological persistent adaptation, due to viral-induced nerve dysfunction. Alternatively, the first taste could be false due to expectation effect, which then rapidly dissipates and thus remains minimal. The prolonged recovery to chocolate remains unknown. Even the usual duration of loss after First Bite is unknown and requires further exploration.

POSTERS

Poster #045**Determining barriers to customized web-based rhinology education**

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Introduction

Nasal irrigations are critical to successfully treating chronic rhinosinusitis. However, barriers to effective patient education include time, language differences, and recall of information. We hypothesized that using native language web-based nasal irrigation videos would improve patient compliance and satisfaction. Our first step was determining potential barriers to web-based patient education.

Methods

Nasal irrigation teaching videos were developed in five languages, which were uploaded to Vimeo; usage was monitored. From March-June 2016, 100 patients completed surveys querying demographics, Internet access, and devices utilized. Chi-square and ANOVA tests were used to analyze categorical data.

Results

English and Spanish videos were the most frequently viewed, which correlated with the native languages of our patient population (86% and 14%, respectively). Participant's average age was 54, with a wide range in the level of education attained, including: high school degree (20%), some college (31%), bachelor's degree (12%), and graduate degree (20%). Preferred devices for Internet access were laptops and smartphones, with the majority of subjects accessing the Internet more than once daily. Age, race/ethnicity, language, and education level were unrelated to Internet access ($p > 0.05$).

Discussion

To our surprise, the age, race/ethnicity, language and education level of participants had no relevant association to web-based access. Moreover, the majority of participants responded positively to web-based education videos in their native language. As the number of patients seen in clinic increases proportional to the decreased time spent for medical education, web-based educational videos are an effective method to transfer this time from the clinic to their home.

Poster #046**Do injectable dissolvable dressings predispose to biofilm formation post FESS?**

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During FESS procedures, it is an increasingly common practice to use dissolvable haemostatic nasal dressings. Anecdotal, we began noting an increasing rate of sinus bacterial infection after using these dressings.

To analyse this further, we designed a retrospective case control study, based on the packing used. Controls were chosen based on operation type, department, surgeon, and time period (August 2015 to February 2016). Exclusion criteria included: patients on concurrent antibiotics, those with diabetes, those with impaired muco-ciliary clearance conditions, and those with malignancy.

120 sets of notes were examined. 22 were excluded. Range in follow up time was 32 to 71 days post operatively. Of those meeting inclusion criteria, half (49 patients) belonged to the dissolvable packing cohort and half to the control group. Rates of infection were 6.1% versus 0 in the cohort of patients with dissolvable packing, versus controls. Similarly, the rate of post operative bleeding was also higher in patients with removal haemostatic packs (8.2%) than in the control group (0).

Conclusion

Whilst judicious use of dissolvable nasal dressings is an extremely useful adjunct in FESS surgery, greater emphasis should be placed on its relative contra-indication in cases where the intra-operative field is felt to be highly contaminated with bacteria. Similarly, given that many of these procedures are performed as day cases, a rise in overnight stays for post operative bleeding has both implications for the patient and institution.

Poster #047**Does endoscopic sinus surgery alter the biomechanics of the orbit?**

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Objective

The purpose of this experimental cadaver study was to determine if functional endoscopic sinus surgery (FESS) leads to a change in the pattern of orbital blowout fractures.

Methods

Ten fresh-frozen cadaveric heads were acquired and underwent endoscopic uncinectomy, maxillary antrostomy, and anterior and posterior ethmoidectomy on one, randomized, side. The contralateral sinuses were used as intra-specimen control. Hyaluronic acid globe injections were performed to simulate normal intra-ocular pressure. Post-op CT scans confirmed no orbital fractures prior to trauma testing. Orbital trauma was induced using a guided weight-drop technique. Both orbits were tested in random order, and sequentially higher drops were performed until both the test and control side demonstrated an orbital fracture on CT scan.

Results

Two heads contained no globes and were excluded. Two heads were excluded due to enophthalmos that prevented adequate impact to the globe. In the remaining 6 heads, the post-FESS side incurred a medial orbital wall fracture in all cases. No orbital floor fractures were identified. On the control side, all 6 heads incurred orbital floor fractures. Fisher's exact test demonstrated a significant difference in fracture pattern ($p < 0.001$).

Conclusions

To our knowledge, this is the first demonstration that the uncinated process and ethmoid air cells act as a buttress for the medial orbital wall. The anatomic changes of FESS may alter the biomechanics of the orbit and affect the pattern of subsequent traumatic blowout fractures.

Poster #048**Does frontal sinus intervention during endoscopic sinus surgery affect clinical outcome?**

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Background

With the increasing number of endoscopic frontal sinus procedures performed over the past decade and the associated economic implications, the question arises as to whether chronic rhinosinusitis (CRS) patients who undergo frontal intervention differ from those who do not. The purpose of this study was to compare clinical outcomes following endoscopic sinus surgery in patients with and without frontal intervention.

Methods

Retrospective review of a prospective cohort. Patients with CRS recruited from 11 different otolaryngologic practices between 2011 and 2015 completed SNOT22, CSS, and EQ-5D questionnaires before and 3, 12, 24, 36, and 48 months after sinus surgery ($n=745$). Baseline disease-specific and general health-related quality of life (QOL) scores were compared for patients whose sinus surgery did ($n=464$) or did not ($n=281$) include frontal intervention.

Results

Aside from a predilection for female gender (51%vs41%, $p=0.0097$) and advanced age (mean 49.4vs45.5years, $p < 0.001$) in the frontal intervention group, there were no significant differences in patient demographics or comorbidities (allergies, GERD, hypertension, and diabetes) between the groups. Preoperative QOL scores, including health utility values (HUV), were similar between frontal and non-frontal groups (HUV 0.813vs0.825, $p=0.238$). The frontal group did demonstrate a greater improvement in CSS scores 3 months after surgery (28.5vs24.0, $p=0.0162$). After one year, changes in QOL scores showed comparable, significant improvement in both groups.

Conclusion

Patients with CRS who undergo frontal procedures during sinus surgery can expect improvements in disease-specific and general health-related QOL outcomes that are comparable to patients who do not require such procedures.

POSTERS

Poster #049**Does immunosuppression or diabetes impact recovery after frontal sinus lothrop procedures?**

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Introduction

The Draft III (modified Lothrop) procedure can be efficacious for complex frontal pathology, but patients experience prolonged healing. Immunodeficient and diabetic patients are prone to delayed wound healing, causing concern for lesser outcomes after this procedure. This study compares outcomes after Draft III in diabetic and mildly immunodeficient patients to uncompromised patients.

Methods

Retrospective cohort study including Draft III procedures performed from 6/2012-1/2016. Patients without comorbidity data or <6 weeks of follow-up are excluded. Diabetic and immunodeficient patients are combined into a single immunocompromised cohort (n=12) compared to patients with uncompromised immune function (n=36). Data collected: surgery indications, frontal patency, nasal obstruction visual analog score (VAS), sino-nasal outcome test (SNOT-20), antibiotics use, comorbidities, and complications. Frontal patency frequency compared using chi-squared test. Percent change for the VAS and SNOT-20, and antibiotic use compared using student's t-test and Mann-Whitney tests.

Results

Mean follow-up longer in the immunocompromised (mean \pm standard deviation: 38 \pm 19 weeks) than the uncompromised (27 \pm 18 weeks). Common frontal patency was >89% post-operatively in both cohorts. The study has >80% power to detect a 30% change in frontal patency. SNOT-20 and VAS percent change scores improved in both cohorts, but are not statistically different. In the first 4 months post-operatively, immunocompromised patients took significantly more antibiotics (6 \pm 4weeks) compared to the uncompromised group (1.3 \pm 2weeks) (p<0.01).

Conclusions

Diabetes and mild immunodeficiency does not appear to significantly compromise lothrop patency and disease specific quality of life outcomes after Draft III. However, these patients require more antibiotics in the perioperative period.

Poster #050**Dysosmic olfactory windows: Brief epochs of transformation of perceived normosmia to dysosmia**

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Introduction

Olfactory windows are characterized by occasional whiffs of normal smell sensation in those with otherwise reduced or absent olfactory ability. Dysosmia replacing normal perceptions of aromas during such events has not heretofore been described.

Methods

Case Study: A 51-year-old right-handed male presented four years after head trauma with persistent reduction in smell and taste to 25% of normal. He admits to an occasional olfactory window of a whiff of odor of approximately 30% of normal intensity, which then rapidly fades away. He also experiences whiffs of odor, which initially smells like the odor should smell and then for a whiff or two smells distorted and then has no smell at all. For instance when exposed to auto exhaust, he occasionally would perceive an olfactory window of exhaust, which after a whiff or two transforms to the smell of petroleum for two whiffs, and then has no smell.

Results

Chemosensory Testing: Alcohol Sniff Test (AST): 6 (anosmia). Sniff Magnitude Test: Sniff Magnitude Ratio: 1.02 (anosmia). Retronasal Smell Testing: Retronasal Smell Index: 1 (abnormal). Gustation: 6-n-Propylthiouracil Disc Taste Testing: 1 (ageusia).

Discussion

Possibly, initially visual stimuli induced odor memory overcame the underlying dysosmia causing the normosmic first whiffs, which was replaced by dysosmic perception, which in turn rapidly adapted. Alternatively, this may be a common phenomenon amongst those with olfactory windows, with this patient being more vigilant to his chemosensory perception. Query as to how well the odor of olfactory windows matches the true smell of the aroma is warranted.

Poster #051**Effect of diabetes mellitus on postoperative endoscopic sinus surgery outcomes**

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Outcome Objectives

1. Analyze effect of diabetes on post-surgical outcomes in endoscopic sinus surgery. 2. Apply this information towards management of diabetic patients undergoing endoscopic sinus surgery.

Methods

Data on endoscopic sinus surgery performed from 2005-2013 was collected from the American College of Surgeons National Surgical Quality Improvement (ACS-NSQIP) database. Two groups were created, based on the presence of a diabetes diagnosis, and were analyzed for pre-operative variables, comorbidities, and postoperative complications using SPSS statistical software.

Results

There were 644 patients included in the analysis, 85 of which (13.2%) had a diagnosis of diabetes. The rate of overall complications was 15.3% in the diabetes group and 5.9% in the non-diabetes group ($p = 0.005$). Overall medical complications were similarly elevated (11.8% vs. 3.0%, $p = 0.001$), including incidence of pneumonia (3.5% vs. 0.5%, $p = 0.033$), re-intubation (5.9% vs. 0.7%, $p = 0.003$), ventilation greater than 48hrs (7.1% vs. 0.7%, $p = 0.001$), and septic shock (3.5% vs. 0.0%, $p = 0.002$). Patients with diabetes also had greater rates of unplanned readmission (4.7% vs. 0.9%, $p = 0.021$). There were no significant differences in surgical complications (4.7% vs. 3.6%, $p = 0.543$) or reoperation rates (3.1% vs. 3.4%, $p = 1.000$) between the two groups.

Conclusion

Diabetic patients undergoing endoscopic sinus surgery are at increased risk for postoperative medical complications and unplanned readmission. However diabetes does not appear to increase postoperative surgical complication risk or re-operation rate.

Poster #052**Efficacy of oral glucocorticosteroid in diabetic hyposmia:****Case study**

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Introduction

While both topical and systemic glucocorticosteroids have been reported to improve olfactory function, use in diabetics has not heretofore been described.

Methods

Case Study: A 60 year old right handed male with a 45 year history of type 1 diabetes mellitus, on insulin pump with glulisine insulin, presented with an eight year history of gradually decreasing ability to smell, which totally vanished by one year prior to presentation, without improvement since then. Coincident with this, he affirms a decreased ability to taste, which he rates at 10% of normal. After a five day course of oral methylprednisolone, he was able to taste Raspberry Iced of normal intensity for two days and on the third day the taste waned and was totally absent by the 4th day, without return of taste or smell since then.

Results

Chemosensory Testing: Dirhinous Olfactory Testing: Brief Smell Identification Test: 8 (hyposmia). Retronasal Olfactory Testing: Retronasal Smell Index: 1 (abnormal). Gustatory Testing: Propylthiouracil Disc Taste Test: 9 (normogeusia). Other: CT scan with and without infusion: normal. Fiberoptic endoscopy: normal.

Discussion

Glucocorticosteroids cause a variety of side effects including exacerbation of underlying diabetes. Moreover type 1 diabetics show greater susceptibility to this. Given that diabetics have a high prevalence in the general population, and is a well-known cause of chemosensory loss, despite the risk, cautious short-term treatment with steroids under vigilant supervision may be warranted. Prior to systemic intervention, local steroid placement, while not totally benign, may be worthwhile.

POSTERS

Poster #053**Emergency management of stroke after selective arterial embolisation for epistaxis - the preston multidisciplinary evidence based pathway**

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Objectives

Many indications exist for selective arterial embolisation for difficult epistaxis. Complications of the procedure include blindness, cerebrovascular accidents and death. To our knowledge, no evidence based management pathway has been produced outlining the best strategy to manage patients with these devastating complications.

Methods

After treating a young lady with Osler-Weber-Rendu syndrome, who had a cerebrovascular insult post procedure, we formally reviewed the literature and produced a management pathway to treat these complications to provide the best end outcomes for these patients. An essential part of effective management is a concurrent multi-disciplinary team approach when a complication is suspected. This is stressed in the pathway.

Results

To summarise, salient steps include: 1. Initial diagnosis and resuscitation (spaced with regular five minute neurological observations to monitor clinical progression of a worsening neurological defect) 2. Urgent on call medical physician review with decision to be made regarding high dose aspirin indication 3. Urgent CT scan of head with contrast 4. Liaison with on call neuroradiologist to assess whether guided intra-arterial abciximab or thromboaspiration can provide real-time recanalisation 5. Liaison with on call thrombolysis stroke team (if patient deficit deemed life threatening and epistaxis able to be controlled) 6. Early transfer to a specialist neurological/stroke unit

Conclusion

Neurological deficit after selective arterial embolization can be devastating and life threatening. We hereby present, to our knowledge, the first evidence based management pathway to guide the Rhinologist to provide the best end outcome for the patients in this difficult situation.

Poster #054**Endoscopic endonasal approach for the management of anterior skull base tumors with limited intracranial invasion- a case series study**

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Introduction

Endoscopic endonasal approach (EEA) for skull base tumor removal has become more and more popular worldwide. The purpose of this study was to report on a series of 5 patients with anterior skull base tumors with limited intracranial invasion who were treated via EEA in our hospital during the past 2 years.

Methods

This is a retrospective chart review, case series study. Clinical data, surgical complications, pre- and postoperative images, and follow-up information were reviewed and analyzed.

Results

Five patients with esthesioneuroblastoma (2 cases), sarcomatous carcinoma (1 case), metastatic renal cell carcinoma (1 case), and extracranial meningioma (1 case) were enrolled in this study. All patients presented as unilateral nasal lesion with unilateral nasal obstruction as well as hyposmia. Via EEA, gross total tumor removal was achieved in 5/5 cases (100%) in this study. After surgery, skull base defect was reconstructed in a multilayer fashion. Neither severe post-op complication nor CSF leak was detected at the end of the follow-up.

Conclusions

Complete resection of limited intracranial invasion tumors in anterior skull base can be achieved via the EEA in selected cases.

Poster #055**Endoscopic endonasal removal of glomangiopericytoma in the nasal cavity**

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We report a case with glomangiopericytoma located in the left olfactory cleft. A 62-year-old woman complaining of left nasal congestion and epistaxis presented with a red-brown polypoid lesion in the left nasal cavity. Computed tomography revealed a mass in the left olfactory cleft without any bony destruction. A biopsy was performed in the clinic, and the histologic findings showed evident fibroblast cell lines with no sign of malignancy. Endoscopic endonasal surgery was performed under general anesthesia. The tumor was localized to the left olfactory cleft. After cauterization of the sphenopalatine artery was done to reduce bleeding, en-bloc resection of the tumor was completed with an adequate safety margin. Pathology confirmed a glomangiopericytoma. The patient recovered well with no complications. No recurrence was seen after 24 weeks of follow-up.

Hemangiopericytoma is a rare tumor arising from pericytes of the vessels with low malignant potential. First reported in 1942 by Stout et al., 15-30% of hemangiopericytoma occur in the head and neck. Sinonasal hemangiopericytoma, called glomangiopericytoma because of perivascular myoid phenotype, comprises under 0.5% of all sinonasal tumors. This rare tumor occurs across a broad age range, with a peak incidence in the seventh decade of life, with a slightly female predominance and not ethnic predilection. Although the precise etiology is unclear, increased vascularization (caused by past trauma, hypertension, pregnancy), and the prolonged use of corticosteroids are considered to be involved. Complete resection is the preferred treatment.

Poster #056**Endoscopic transsphenoidal pulsed hydrodissection for pituitary macroadenomas**

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Objective

Endoscopic resection for pituitary macroadenoma is now a proven, safe and widely utilised technique. If the diaphragma sellae is breached during dissection the patient is exposed to a risk of CSF leak and potentially secondary meningitis. We describe a technique utilising pulsed hydrodissection that exteriorises large macroadenomas into the sphenoid sinus where dissection can be used safely without risk of CSF leak. The same technique can be used to remove residual tumour fragments.

Methods

Using intraoperative photographs and videos we demonstrate the utility of pulsed hydrodissection. A traditional transsphenoid approach to the sell turcica is employed. The tumour is exposed utilising a wide apron incision through the dura mater. Careful inferior dissection of the tumour, avoiding the supero-posterior diaphragma, creates the surgical plane required. A curved blunt suction tip, attached to a 50ml syringe containing warm 0.9% saline solution, is situated in the inferolateral sella region. Pulsed semi-rapid irrigation then exteriorises the tumour anteriorly into the sphenoid sinus without any risk of inadvertent vascular or CSF injury. In addition, pulsed hydrodissection can be used to clean the area as well as exteriorise any further residual tumour elements.

Conclusion

We outline a safe technique that is easily learned and replicated to reduce the risk of post operative CSF leak associated with the dissection of pituitary macroadenomas. This centres around protecting the diaphragma sellae from dissection injury and can also be used for residual tumour removal.

POSTERS

Poster #057**Endoscopic treatment of frontal sinus inverted papilloma: a focus on the surgical approach and complications**

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Introduction

Frontal sinus inverted papilloma (IP) are more commonly managed endoscopically with Draf IIb and Draf III approaches versus external approaches. There is controversy between choosing these two approaches as both have their benefits and risks. We report our institution's experience and provide recommendations for surveillance strategy.

Methods

This is a retrospective case series study taken at a tertiary hospital. Medical charts of frontal sinus IP patients operated on between May 2005 and January 2014 were reviewed. Demographic information, surgical approach, attachment point, degree of tumor extension, recurrence and complications were recorded for each patient.

Results

35 cases (8 primary cases, 27 revision cases) with a mean follow-up time of 52 months were reviewed. 5 cases were diagnosed with malignancy after surgery, which were excluded when calculating the recurrence rate. The recurrence rate of Draf IIb (n=22) was 5.56% and Draf III (n=13) was 25%. The incidence of neo-ostium closure and mucocele formation of the Draf III group (53.85%, 38.46%) are significantly higher than the Draf IIb group (13.64%, 4.55%) ($p < 0.05$). The incidence of mucocele formation in the neo-ostium closure group is significantly higher than the open ostium group ($p < 0.05$).

Conclusions

Endoscopic Draf IIb approach in the setting of frontal IP minimizes recurrence rate, neo-ostium closure and mucocele formation. Considering a possible association of neo-ostium closure and mucocele formation, we recommend subperiosteal resection and mucosal flap if there is a high risk of neo-ostium closure. Imaging can be applied periodically during surveillance.

Poster #058**Endoscopic versus open excision of juvenile nasopharyngeal angiofibroma: A systematic review**

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Objectives

Surgical excision of juvenile nasopharyngeal angiofibroma (JNA) has evolved from open surgery to newer endoscopic approaches. Outcomes comparisons between these approaches have been limited to smaller case series. This systematic review compares clinical outcomes of endoscopic versus external excision of JNA in terms of recurrence, blood loss, and complications.

Methods

A comprehensive review of the English literature was performed back to 1996, the year of the first report of endoscopic excision of JNA. A study was considered eligible for inclusion if it reported itemized data detailing tumor extent, surgical technique, intraoperative blood loss, recurrence rate, complications, and at least 12 months of follow-up. Andrews staging system was adopted for uniform comparisons. Where other classifications were used, tumors were re-classified according to Andrews staging if adequate data were provided. We analyzed each group separately by stage. Endoscopic and open cases were extracted from the included studies for statistical comparison. The magnitude of the effect (Index Rate Ratio; IRR) was established by a mixed model based on fixed and aleatory effects. Variability within studies was evaluated using Poisson distribution model.

Results

Twenty-six studies were included, comprising 546 patients. No major complications were associated to endoscopic approaches. Open approaches had an overall rate of recurrence 9 times higher than endoscopic approaches, independently of tumoral stage. (IRR=9.7 $p=0.002$). For each tumoral stage, open surgery had a rate of recurrence 5 times higher than endoscopic surgery (IRR=5.97 $p=0.02$).

Conclusion

Endoscopic excision of JNA appears to be superior to open approaches in terms of recurrence.

Poster #059**Eosinophilia and quality of life in patients receiving a bioabsorbable steroid-eluting implant during endoscopic sinus surgery**

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Introduction

Steroid-eluting biodegradable stents are available as an adjunct for endoscopic sinus surgery (ESS) in the treatment of chronic rhinosinusitis (CRS). The Propel implant (Intersect ENT, Menlo Park, CA) combines release of mometasone with a spring-like spacer activity. This study aims to relate the use of this device with eosinophilia and patient-reported quality of life (QOL).

Methods

Consecutive adult patients undergoing ESS for CRS with ethmoidectomy and placement of a Propel implant over an 18-month period were prospectively included for study. Patients with sinonasal neoplasm, cystic fibrosis or postoperative oral steroid use were excluded. Pre-operative sinus computed tomography opacification was evaluated using the Lund-Mackay score (LMS). Sinonasal Outcome Test (SNOT-22) scores for each patient were recorded pre-operatively and at 3-month intervals post-operatively. Serum eosinophilia (>6.0% on peripheral smear) and tissue eosinophilia in sinus mucosa were recorded.

Results

One hundred fifty-one patients were included for analysis. Of these, 22.2% had polyposis, 14.0% had serum eosinophilia and 42.1% had tissue eosinophilia. Patients with serum eosinophilia had LMS of 11.82 versus 6.91 in patients without eosinophilia ($p < 0.0001$). The mean (standard deviation) SNOT-22 score was 44.4 (20.8) preoperatively, which improved postoperatively to 22.13 at 3 months ($p = 0.016$), 21.13 at 6 months ($p = 0.017$), 20.76 at 9 months ($p < 0.001$) and 28.67 at 12 months ($p < 0.001$). Similar results were found when stratified by presence of polyposis or serum or tissue eosinophilia.

Conclusion

Patient-reported QOL scores remain improved up to 12 months after placement of the Propel implant during ESS, irrespective of the presence of polyposis or eosinophilia.

Poster #060**Eosinophilic granuloma of the orbital apex**

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Introduction

Langerhans cell histiocytosis represents a spectrum of diseases ranging from an acute disseminated form to a chronic unifocal form, also known as eosinophilic granuloma. Eosinophilic granuloma is the most common type and typically affects males between the first and second decade. Orbital eosinophilic granuloma typically occurs at the superior temporal quadrant due to the presence of active bone marrow. Involvement of the orbital apex is extremely rare.

Methods

Case report of eosinophilic granuloma occurring in the orbital apex.

Results

A 13-year-old boy presented with unilateral estropia, vision loss and orbital pain for 14 days. Physical exam showed severely reduced abduction, counting fingers at 8 feet and a 3+ relative afferent pupillary defect. Computed tomography demonstrated a 1.5cm by 3.2cm by 2.4cm mass at the orbital apex eroding through sphenoid lateral wall. Endoscopic debulking as well as orbital decompression through lysing the annulus of Zinn resulted in immediate improvement of visual acuity to 20/30. Permanent histopathology demonstrated eosinophilic granuloma. Immunohistochemical studies showed positivity for CD1a and S100. Chemotherapy with prednisone and vincristine was initiated with continued improvement in vision. Features of this unusual location for eosinophilic granuloma are reviewed as well as other reports in the literature.

Conclusion

Eosinophilic granuloma is a benign, unifocal tumor that can cause local bone and tissue destruction by mass effect and inflammation. Treatment through biopsy alone, local curettage, chemotherapy, inter-lesional steroid injection, and low dose radiation have been described. Involvement of the orbital apex is an extremely rare presentation.

Poster #061**Epistaxis in the diabetic patient: Impact of aggressive management on patient outcomes**

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Introduction

Diabetic patients are prone to atherosclerosis and hypertension, which may increase epistaxis rates. Diabetics are also prone to developing in-hospital complications, including cardiac and urinary/renal complications. The aim of this study was to explore characteristics of diabetic patients hospitalized for epistaxis and further analyze the impact of aggressive management (AM) of epistaxis on patient outcomes.

Methods

The 2002-2013 National Inpatient Sample was queried for patients with a primary diagnosis of epistaxis and an associated diagnosis of diabetes mellitus. AM was defined as treatment with cauterization, ligation, or embolization.

Results

9,286 cases were identified with the inclusion criteria: 25.0% in the AM cohort. The most common patient was a 67-year-old white male. The most common comorbidities were hypertension (65.2%), chronic pulmonary disease (22.4%), and congestive heart failure (17.9%). AM in diabetics was associated with a small increased rate of stroke (0.2% vs. 0.0%; $P=0.038$) and blood transfusion (24.4% vs. 21.6%; $P=0.005$). AM was not associated with changes in rates of cardiac complications, pulmonary complications, urinary/renal complications, blindness, or in-hospital mortality. Blood transfusion, in the diabetic cohort was associated with significantly increased rates of pulmonary complications (4.3% vs. 2.9%; $P=0.003$), cardiac complications (1.9% vs. 0.9%; $P<0.001$), renal/urinary complications (11.8% vs. 5.3%; $P<0.001$), and in-hospital mortality (1.1 vs. 0.6%; $P=0.040$).

Conclusion

Among diabetic patients hospitalized for epistaxis, need for blood transfusion, but not AM, was associated with greater morbidity and mortality. Increased use of AM may decrease blood transfusion rates and subsequently decrease morbidity and mortality in the diabetic epistaxis patient.

Poster #062**Esthesioneuroblastoma of the maxillary sinus antrum presenting as siadh: A case report**

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Introduction

Esthesioneuroblastoma (olfactory neuroblastoma) is a rare neoplasm that typically arises from the olfactory neuroepithelium within the sinonasal cavity. Patients often present with nasal obstruction, headache, and epistaxis. In rare cases, patients may also exhibit signs of a paraneoplastic syndrome. We present a rare case of syndrome of inappropriate antidiuretic hormone (SIADH) secondary to esthesioneuroblastoma arising from the maxillary sinus antrum. SIADH manifests as hyponatremia, with symptom severity ranging from fatigue to hyponatremia-induced seizure.

Methods

A 28-year old female (DB) presented to our tertiary rhinology clinic with a 6-month history of nasal congestion, post-nasal discharge, and headache, on a background history of progressive fatigue, weakness, and hyponatremia refractory to fluid restriction and oral sodium chloride tablets. PET scan revealed a single mixed-attenuation lesion in the right maxillary sinus, further characterized as a homogenous enhancing mass on MR imaging. The patient subsequently underwent image-guided sinus surgery and complete excision of the right maxillary sinus mass.

Results

Histopathology confirmed a diagnosis of esthesioneuroblastoma with clear margins. Normalization of hyponatremia occurred within 24 hours post-operatively and was maintained at the 6-week assessment, with considerable improvement in energy levels. Sinonasal symptoms resolved within 3-months post-operatively, with sustained normalization of osmoregulation. No further surgical or radiotherapy was required.

Conclusion

We present a rare case of an esthesioneuroblastoma identified outside of the typical location in the olfactory cleft and skull base, presenting as SIADH. Although rare, SIADH-associated esthesioneuroblastoma should be considered in patients presenting with hyponatremia of undefined etiology with concomitant sinonasal symptoms.

Poster #063**Expression levels of fibroblast growth factor receptor and vascular endothelial growth factor in juvenile nasopharyngeal angiofibroma**

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Objectives

Juvenile nasopharyngeal angiofibroma (JNA) is a rare tumor that occurs almost exclusively in adolescent males. Although histologically benign, up to 40% of patients can have recurrence with an aggressive clinical course. The pathogenesis and molecular characterization of JNA remains understudied but vascular endothelial growth factor (VEGF) and fibroblast growth factor (FGF) may contribute to tumor progression. We isolated JNA fibroblasts from tumor explants and performed RNA-sequencing to characterize its transcriptome and expression levels of VEGF and FGF receptor (FGFR).

Methods

Fibroblasts were isolated from two JNA tumor explants and from normal adult tonsil tissue and cultured in vitro with Dulbecco's modified eagle's medium and fetal bovine serum. Fibroblast cells were harvested for RNA and Illumina total RNA-sequencing was performed. Expression levels were analyzed in fragments per kilobase of transcript per million (FPKM) from the resulting sequence library and compared against normal fibroblast levels to determine fold change.

Results

RNA-sequencing analysis revealed a total of 1,088 significantly differentially expressed genes with 749 up-regulated and 339 down-regulated. Regarding genes involved in the FGF and VEGF axis, FGF11, FGFR2, FGFR4, and VEGFA were up-regulated.

Conclusions

We isolated JNA fibroblasts and performed RNA sequencing to characterize its transcriptome. Expression levels of FGF11, FGFR2, FGFR4, and VEGFA were up-regulated compared to normal adult fibroblasts. Current work focuses on confirmation of results through reverse transcription PCR and western immunoblotting. These findings will facilitate the development of preclinical models and molecular targeted therapies for JNA.

Poster #064**External drainage of orbital superior subperiosteal abscesses - a safe and reproducible technique**

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Objectives

The majority of subperiosteal abscesses occur in the medial compartment of the orbit. As such, the Rhinologist is comfortable draining these either endoscopically or via an external Lynch Howarth incision. However, instances occur when there is a coexisting or singular subperiosteal abscess in the superior compartment of the orbit. Some Rhinologists drain these endoscopically. However, at times this is neither practical nor technically easy. We present an easy to follow, reproducible method of accessing the superior orbit safely using an external approach.

Methods

Using a photographic and video case study of a patient with an abscess, we show a step by step surgical technique to access the superior subperiosteal orbital space safely. The approach also results in good long-term cosmetic outcomes.

Results

The technique is described in detail in the presentation with accompanying images/video. Salient steps include:?

1. Palpation and marking of the lateral third of the superior orbital rim?
2. Injection of vasoconstrictor and use of a size fifteen scalpel to incise directly onto the bony rim
3. Blunt dissection with scissors and Freer's elevator on the undersurface of the bony superior orbital rim, sticking closely to bone
4. Drainage of the abscess, washout and insertion of drain

Conclusion

The technique described gives a stepwise method of accessing the superior subperiosteal space safely via an external approach. The approach described is simple and easily taught to juniors. In addition, the technique is designed to minimize damage to the periorbita, rectus muscles and neurovasculature structures of the orbit.

POSTERS

Poster #065**Finding the petrocavernous carotid artery:
The vidian-eustachian junction as a reliable landmark**

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Introduction

Identifying the internal carotid artery (ICA) when managing petroclivus and infratemporal fossa pathology is essential and rhinologists need to evolve endoscopic surgical anatomy. The Vidian nerve and Eustachian tube cartilage come together at the Foramen Lacerum, the Vidian-Eustachian Junction (VEJ). The ICA position, relative to the VEJ is described.

Methods

Endoscopic dissection of adult fresh-frozen cadaver ICAs and a subsequent case-series of patients with petroclival pathology were assessed. The position of the VEJ to the ICA horizontal segment, vertical segment and 2nd genu were assessed. The distance of the ICA 2nd genu to VEJ was assessed in coronal, axial, and sagittal planes. The length of the Vidian nerve and Eustachian tube (ET) was measured from the pterygopalatine fossa (PPF) and nasopharyngeal orifice to the VEJ.

Results

Of 10 cadaver dissections (82±6.7yrs, 40% female), the horizontal ICA was at or behind the VEJ in 100%, above in 100%, and laterally in 80%. The vertical segment is at or behind in 100%, above in 100%, and medially in 100%. The 2nd genu was at or behind the JP in 100% (3.3±2.4mm), at or above in 100% (2.5±1.6mm), and medial in 100% (3.4±2.0mm) to the JP. The VEJ was successfully used to locate the ICA in 9 consecutive patients (55.5±13.6yrs, 55.6% female) where pathology was also present. The VEJ was 15.0±.6mm from ET and 17.4±4.1mm from PPF.

Conclusion

The Vidian-Eustachian Junction is an excellent landmark as it defines both a superior and posterior limit when isolating the ICA in skull base surgery.

Poster #066**Flavorful exsufflation: Blast the taste buds by blowing your nose**

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Objective

Mechanisms which intensify retronasal oropharyngeal pathways of odors may improve perceived flavor. Such is described in response to exsufflation.

Methods

Case study: A 70 year old male, at age 54 developed an upper respiratory infection with a 50% loss of smell and taste which gradually diminished to total loss one year ago.

All his life he has had gustatory rhinitis in response to eating cold or spicy foods, causing him to blow his nose after eating. He noted no ability to taste chocolate milkshakes, a favorite beverage of his. When consumed, nasal congestion occurs, which encourages a forced exsufflation into a handkerchief, in turn reinvigorates a normal taste of the milkshake. Without exsufflation he has no perceived flavor of this. This occurred exclusively with subsequent chocolate milkshakes.

Results

Chemosenation: Olfactory testing: Brief Smell Identification Test: 3 (Anosmia), Retronasal Smell: Retronasal smell index: 1 (Abnormal). Gustatory testing: Propylthiouracil disk taste test: 8 (Normogeusia). Fiberoptic endoscopy: normal. MRI of brain: normal.

Discussion

Exsufflation induced valsava may have changed the degree of nasal engorgement, inducing eddy currents in the oropharynx, enhancing passage of odorants to the olfactory epithelium. Alternatively, the residual oral milkshake may have traveled in a retrograde fashion from the oropharynx into the nasopharynx, to a more proximal location to the nasal epithelium causing greater sensation. Exsufflation may have removed excess mucous coating, which was preventing odorants from reaching the olfactory epithelium. Forced nasal exsufflation in those with hyposmia or anosmia may be one mechanism of transiently improving this condition.

Poster #067**From ventilation to irrigation - a new paradigm in the management of chronic rhinosinusitis with severe nasal polyposis**

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Objectives

The pioneers of endoscopic sinus surgery espoused opening the sinus cavities so that they could be "ventilated" appropriately. However in severe nasal polyp disease (minimum Lund-MacKay score of 16 & Kennedy Stage 3), the recurrence and revision surgery rates are high using this approach. We outline in detail our combined surgical, immunological and medical approach using an "irrigation" model of therapy that results in low rates of disease recurrence.

Methods

Management should revolve around facilitating appropriate topical steroid to reach inflamed nasal mucosa regularly to prevent polyp recurrence. This should be balanced with improving innate immunity (including normalising Vitamin D levels), screening for allergens and instituting immunotherapy whilst also excluding systemic pathologies and aspirin sensitivity. Using intraoperative photographs and video we outline our version of the "full house FESS" that creates a "common cavity" for all sinuses to open into. This allows for specially formulated irrigation solution to reach as much inflamed nasal mucosa as possible.

Results

The Jain Hospital has managed over 7,000 patients with chronic rhinosinusitis and over 2,000 patients with severe nasal polyposis. In the last cohort of 1,000 patients with severe polyposis none required formal revision surgery at a mean follow up of 19 months.

Conclusion

We outline an evidence based approach to treating severe nasal polyposis. This begins with understanding immunopathological reactions at the epithelial level and then building on this to create a holistic surgical and medical management strategy. This results in reduced polyp recurrence rates for patients.

Poster #068**Holistic medicine induced hyposmia and ageusia**

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Objective

Myriad medications and metals have been reported to cause chemosensory dysfunction. Holistic supplements have not heretofore been reported to induce these same problems.

Methods

A 61 year old female was nasute until one week after beginning a combination of holistic medications and natural vitamins including bovine (heart, kidney, spleen, liver, bovine adrenal cytosol, and orchic extract), porcine (stomach, and brain), veal bone, achinacea, manganese lactate, silica, dried alfafa juice, dried pea juice, ferrous fumarate, copper, zinc chelate, magnesium and more. One week later she noted sudden total loss in ability to smell and taste. She denied other precipitants for this including upper respiratory infection and head trauma. There have been no improvements for over a year since the onset, despite stopping all of these medications within 2 months of starting them. She denies phantosmia, dysosmia, cacosmia, pallinosmia and flavorful eructation. She states she has 0 % ability to taste and denies cacogeusia, dysgeusia, phantageusia, pallinosmia or first bite phenomenon. Her symptoms have persisted despite treatment with zinc and Vitamin B1.

Results

Chemosensory Tests: Olfaction: Brief Smell Identification: 6 (hyposmia). Alcohol Sniff: 0 (anosmia). Retronasal Smell: Index: 0 (abnormal). Gustation: Propylthiouracil Disc: 1 (ageusia). Other: Fiberoptic Endoscopy, MRI of sinuses, and ENT exam normal. Clock Drawing Test: 3 (abnormal). Animal Fluency: 8 (abnormal). CNS Lability Scale: 16 (abnormal).

Discussion

Alternative medicine is employed by 62% of the population and has not been evaluated in regards to its chemosensory impact. Such investigation is warranted.

POSTERS

Poster #069**IL-1 α high-IL-4low-IL-13low as a novel plasma cytokine signature of olfactory dysfunction in older US adults**

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Background

Plasma cytokines serve as biomarkers of physical frailty. Whether they also serve as markers of sensory impairment remains unknown. In prior work, we showed that olfactory impairment predicts increased odds of 5-year mortality. Thus, a peripheral cytokine correlate of olfactory dysfunction would be clinically useful as a biomarker for identifying high-risk patients.

Methods

We analyzed data from the National Health, Social Life, and Aging Project, a representative sample of older US adults (age 62-90, N=2,089). Plasma cytokines were measured with Luminex multiplex technology using standard protocols. Olfactory function was measured with validated tests (n-butanol sensitivity and odor identification via Sniffin' Sticks). We tested established markers of frailty and immunologic function with olfactory function using multivariate ordinal logistic regression, adjusted for age, gender, race/ethnic group, and comorbidity. Individuals with evidence of acute inflammation (CRP > 8.6 mg/L) were excluded from all analyses (n=291).

Results

IL-1 α high-IL-4low-IL-13low expression (a known marker of physical frailty) was associated with worse odor sensitivity (OR 1.55, 95%CI 1.16--2.09). Similar results were found for odor identification. Interestingly, there was a trend between elevated Th2 cytokine profiles and worse olfactory function, but not with Th1 profiles.

Conclusions

We identify a peripheral cytokine profile that correlates with olfactory dysfunction. This highlights IL-1 α , IL-4, and IL-13 as potentially important mediators of inflammation affecting olfaction in older adults, and introduces a potential use for the group as a clinical biomarker of olfactory disease. These results also support a role for systemic cytokines in both sensory and physical frailty.

Poster #070**Impact of diabetes mellitus on turbinoplasty outcomes**

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Introduction

Turbinoplasty is commonly performed for the surgical management of chronic nasal obstruction due to inferior turbinate hypertrophy or chronic rhinitis refractory to medication. Diabetes mellitus (DM) has been associated with increased perioperative morbidity and mortality in various surgical procedures. This relationship has remained a study of interest, in attempt to improve management of the diabetic surgical patient. Data elucidated from this study will be important for patient education and informed consents.

Methods

Patients who underwent turbinoplasty from 2005 to 2013 were identified from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database. Preoperative variables, comorbidities, and postoperative complications were analyzed.

Results

Of the 1045 patients who underwent turbinoplasty identified from the database, 70 patients (6.7%) had a DM diagnosis. Of significance, the DM group had a higher incidence of re-intubation (4.3% vs. 0.3%, P=0.005), ventilation > 48 hours (2.9% vs. 0.3%; P=0.039), urinary tract infections (UTI) (2.9% vs. 0.1%; P=0.013) and overall medical complications (5.7% vs. 0.6%; P=0.008) as compared to the non-DM group. No difference in overall surgical complications (0.0% vs. 1.2%; P=1.000) or overall complication rate (5.7% vs. 2.2%; P=1.000) between the two groups was observed. There was also no difference in re-operation (1.9% vs. 2.4%; P=1.000) and unplanned readmission (1.4% vs. 1.8%; P=1.000).

Conclusion

DM patients undergoing turbinoplasty have a significantly greater incidence of re-intubation, ventilation >48 hours, UTIs and overall medical complications. However, diabetes does not appear to increase surgical complications, re-operation or unplanned readmission rates.

Poster #071**Impact of osa in transsphenoidal pituitary surgery: An analysis of inpatient data**

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Introduction

Continuous positive airway pressure (CPAP) is generally avoided postoperatively in patients with obstructive sleep apnea (OSA) who have undergone transsphenoidal surgery for pituitary neoplasm, due to potential for increased complications such as pneumocephalus. The aim of this study was to analyze postoperative outcomes in transsphenoidal pituitary surgery patients with OSA. Secondly, we examined patient characteristics and comorbidities.

Methods

The 2002-2013 National Inpatient Sample was queried for patients undergoing transsphenoidal surgery for pituitary neoplasm. Patients with additional diagnosis of OSA were identified, and compared to a non-OSA cohort.

Results

17,777 patients were identified with the inclusion criteria: 5.0% had an additional diagnosis of OSA. The OSA cohort had more comorbidities including diabetes mellitus, congestive heart failure, chronic pulmonary disease, coagulopathy, hypertension, hypothyroidism, liver disease, obesity, peripheral vascular disease, and renal failure. Postoperatively, OSA was associated with increased rates of hypoxemia (1.6% vs. 0.4%; $P<0.001$), pulmonary collapse (1.2% vs. 2.3%; $P=0.007$), respiratory failure (1.5% vs. 3.9%; $P<0.001$), and emergent tracheotomy (0.2% vs. 0.7%; $P=0.017$). Compared to non-OSA patients, OSA patients did not have increased rates of CSF rhinorrhea, diabetes insipidus, aspiration pneumonia, infectious pneumonia, postoperative infection, shock, sepsis, re-intubation, thromboembolic complications, cardiac complications, or urinary renal complications. Additionally, in-hospital mortality rates did not vary between the OSA and non-OSA cohorts.

Conclusion

In patients who underwent transsphenoidal pituitary surgery, OSA was associated with higher rates of certain pulmonary and airway complications. OSA was not associated with greater odds of non-pulmonary/airway complications or inpatient mortality, despite older average age and higher comorbidities rates.

Poster #072**Impact of resident involvement in turbinoplasty outcomes: A national surgical quality improvement program analysis**

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Introduction

With the evolving landscape of healthcare, the effect of resident participation on patient outcomes have been of highlighted focus. The objective of this study is to elucidate the impact of resident involvement on postoperative turbinoplasty outcomes and to apply its results towards recommendations regarding educational training and supervision development.

Methods

Data on turbinoplasty surgery performed from 2005 to 2013 was gathered via the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database. Only cases with information regarding resident participation were included. Two groups were created based on the aforementioned data: attendings and residents (AR) and attendings alone (AA). Groups were analyzed based on demographics, comorbidities, and postoperative outcomes.

Results

There were 311 cases included in the analysis, 77 with resident involvement and 234 with attendings alone. Resident participation was associated with increased risk of bleeding requiring transfusion (5.2% vs. 0.0%, $p=0.004$), overall surgical complications (6.5% vs. 0.9%, $p=0.011$), and unplanned readmission (3.9% vs. 0.4%, $p=0.048$). There was no difference between the two groups when comparing overall medical complications (2.6% vs. 1.7%, $p=0.640$) and rates of reoperation (5.6% vs. 6.7%, $p=1.000$). After adjusting for demographics and comorbidities, multivariate comparison showed no statistically significant differences between the AR and AA groups (Odds Ratio-3.225 (0.994-10.464), $p=0.051$).

Conclusion

Although resident participation in turbinoplasty seems to be associated with increased surgical complications and unplanned readmission, after accounting for preoperative differences between the groups, resident involvement was not associated with a significant difference in overall complication rates when compared to attendings alone.

POSTERS

Poster #073**Impact of smoking on early outcome of endoscopic sinus surgery**

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Introduction

Smoking tobacco is a well-recognized risk factor for poor wound healing and adverse surgical outcomes, routinely associated with increased incidence of postoperative complications. This study aims to investigate the impact of smoking on the outcome of endoscopic sinus surgery (ESS) in the 30-day postoperative period, a relationship that has yet to be explored in the literature.

Methods

The American College of Surgeons National Surgical Quality Improvement Program (NSQIP), spanning 2005-2013, was used to collect data on ESS patients for a 30-day postoperative period. These cases were analyzed for smoking status in relation to complication, readmission, and reoperation rates.

Results

A total of 644 ESS patients were in the database, of which 124 were smokers. There was no significant difference in incidence of surgical (4.0% smoker vs. 3.7% nonsmoker, $p=0.794$), medical (4.0% smoker vs. 4.2% nonsmoker, $p=1.000$), or overall (7.3% smoker vs. 7.1% nonsmoker, $p=1.000$) complications between the smoking and nonsmoking groups in the 30-day postoperative period. Smoking was also not associated with increased occurrence of re-operation (4.2% smoker vs. 3.2% nonsmoker, $p=0.542$) or unplanned readmission (1.6% smoker vs. 1.3% nonsmoker, $p=0.686$) within 30 days.

Conclusions

Although known to be notoriously detrimental to the wound healing process postoperatively, tobacco smoking was not associated with increased incidence of surgical, medical, or overall complications in ESS compared to nonsmokers. Unplanned readmission and re-operation rates in ESS patients who smoke were also unaffected. Overall, it appears that smoking status may not be a significant contributor to the first postoperative month of ESS.

Poster #074**International frontal sinus anatomy classification and anatomic associations with low-lying anterior ethmoidal arteries**

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Background

The International Frontal Sinus Anatomy Classification (IFAC) was introduced to more accurately characterize ethmoid and frontal sinus pneumatization patterns. Our objective was to examine the prevalence of IFAC cells and determine radiologic features associated with a low-lying anterior ethmoidal artery (LAEA).

Methods

Imaging of adult patients who underwent computed tomography scans were retrospectively reviewed using the IFAC classification from January 2015 to March 2016. We also measured the distance from the skull base to the AEA, height of the lateral lamella of the cribriform plate, and anterior-posterior diameter from the anterior wall of the frontal sinus to the skull base (APF). Patients with a history of sinus surgery, trauma, malignancy or congenital anomaly were excluded. Statistical analysis was performed using Pearson's correlation coefficients and chi-square tests.

Results

A total of 95 patients met inclusion criteria. There was a significant association between supraorbital ethmoid cells and a LAEA ($p<0.001$), with a significant effect size ($\eta^2=0.276$, $p=0.007$). An inverse relationship was observed between Keros I classification and a LAEA ($p<0.001$), with a significant effect size ($\eta^2=0.414$, $p=0.000$). Significant associations were found between AEA distance from the skull base and cribriform lateral lamella height ($R=0.576$, $p<0.001$). In addition, there was a significant association between AEA distance from the skull base and the APF ($R=0.497$, $p<0.001$).

Conclusions

The presence of a supraorbital ethmoid cell and wide APF were associated with a LAEA. There was a significant relationship between Keros type I classification and the anterior ethmoidal artery lying adjacent to the skull base.

Poster #075**Is obesity a risk factor for spontaneous cerebrospinal fluid leaks following surgery?**

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Objective

1. To determine if obesity, among other patient demographics, is a risk factor for spontaneous cerebrospinal fluid leaks following skull base surgery
2. To determine if elevated BMI is a risk factor for increased complications in cerebrospinal leak repair

Methods

Our retrospective study includes 14 patients that presented for spontaneous cerebrospinal fluid leak from 2013-present. We collected demographic data and information about complications related to CSF leak repair; including multiple trips to OR, placement of lumbar drain and initiation of diuretic therapy. Statistical analysis was conducted.

Results

There were 7% of patients with a normal BMI, 21% that are overweight and 71% that are obese. 33% of the overweight patients and 10% of the obese patients had multiple trips to the OR compared to none with a normal BMI, 10% of the obese patients were started on diuretics compared to none in the normal BMI group and 10% of overweight patients had a lumbar drain placed compared to none in the normal BMI group

Conclusion

The association between obesity and CSF rhinorrhea is well established. Patients with higher BMI have a more challenging inpatient stay following CSF leak repair. Further inquiry and larger sample size is needed to confirm this.

Poster #076**Is there a role for routine biopsies in patients undergoing endoscopic sinus surgery for chronic rhinosinusitis with nasal polyps?**

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Introduction

Endoscopic sinus surgery (ESS) is the treatment of choice for medically recalcitrant chronic rhinosinusitis with nasal polyps (CRSwNP). During surgery, routine biopsies are usually taken for histopathologic analysis. The purpose of this study was to assess whether this clinical practice adds to the management of this disease.

Methods

This study included 74 patients (40 male, 34 female); 68 who underwent ESS for CRSwNP and 6 with a previous office biopsy positive for inverted papilloma. During this study period biopsy samples were sent for histopathologic analysis and tissue bank storage.

Results

Biopsies of nasal polyp tissue from CRSwNP patients reported benign allergic polyps in 67/68 (98.6%) of cases. In the remaining case, the patient had a co-existing diagnosis of sarcoid, and histology demonstrated granulomatous inflammation with histiocytes and lymphocytes. Patients with inverted papilloma initially presented with unilateral polypoid disease that was diagnosed on office-based biopsy, and histology re-confirmed on formal endoscopic resection.

Conclusions

The routine histological analysis of bilateral nasal polyps is costly, time consuming and unnecessary unless sub-classifying CRSwNP for research purposes. Where unilateral polyps exist or there are abnormal features such as autoimmune disease diagnostic biopsy is indicated, however, this can often be performed in the office setting.

POSTERS

Poster #077**Isolated abducens nerve palsy as the first sign of prostate adenocarcinoma metastasis to the clivus**

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Skull base tumors and metastases are uncommon occurrences. Due to their location these can cause cranial nerve neuropathies. We present the case of a patient who presented with diplopia found to have isolated unilateral abducens nerve palsy. Imaging revealed a clival mass and transnasal biopsy diagnosed metastatic prostate adenocarcinoma in a patient with no prior history of cancer.

Poster #078**It's too salty: Hypogeusic hypergeusia**

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Hypogeusic hypergeusia (enhanced taste in the presence of true reduced taste) has not been described.

Methods

Case study: A 60 year old female struck the back of her head and lost consciousness. Within a few days, taste was reduced to 20% of normal. Overtime, she developed perceived hypergeusia to salt, whereby salt would taste 150-200% of normal. When she would add salt to bland food, there was no change in the food's taste.

Results

Chemosensory Testing: Olfactory: Brief Smell Identification: 11 (normosmia). Quick Smell Identification: 2 (hyposmia). Pocket Smell Identification: 2 (hyposmia). Alcohol Sniff: 19 (normosmia). Retronasal Smell Index: 2 (reduced). Gustatory: Normoguesia to all taste except mild hypogeusia to salt. Salt water applied to the tongue: salt intensity on the left anterior 3/10, right 0/10, and bilaterally posteriorly 10/10. Splenda and sugar challenges were performed. Baseline salt taste was 3/10. On application of Splenda on the tongue the salt taste dropped to 0/10 and the patient detected sweet taste on the tongue: 8/10 on the tip, and 5/10 in the middle. By three minutes after application of the Splenda, the salt taste returned to level 3/10. Sugar challenge revealed similar findings. Pre challenge salty taste was 3/10 and upon application of sugar to the tongue the salty taste dropped to 0/10 although no sweet taste was registered. Three minutes after sugar application the salty taste returned to 3/10.

Discussion

Taste testing for those who present with hypergeusia for presence of hypogeusia is warranted.

Poster #079**Lesser of two evils; upper respiratory infection as an entiotpathy to burning mouth syndrome**

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Objectives

Upper respiratory infection (URI) has been noted to precipitate burning mouth syndrome (BMS). However, complete, temporary resolution of BMS in response to URI has not heretofore been described.

Methods

A 35 year old woman presented with a one year history of persistent burning and stinging sensation level 6/10 in severity. The pain was unremitting until she developed an upper respiratory infection (URI) with rhinorrhea, cough, fever, nasal congestion and postnasal drip. During this, BMS pain resolved completely. Lasting less than one week, as the URI resolved, the BMS returned to its baseline state.

Results

Olfactory Testing: Brief Smell Identification: 9 (normosmia). Quick Smell Identification: 2 (hyposmia). Pocket Smell Identification: 2 (hyposmia). Alcohol Sniff: 2 (anosmia). Retronasal Smell: Retronasal Smell Index: 6 (normal). Gustatory Testing: Propylthiouracil Disc Taste: 10 (normogeusia). Taste threshold: normogeusia to sodium chloride, hydrochloric acid, and phenylthiocarbamol; mild hypogeusia to sucrose and urea. Saxon Test: 0.1 gram (abnormal). Candida Culture: Negative.

Conclusion

We hypothesized that the URI would exacerbate the burning since it hinders taste and taste suppresses pain. There are myriad potential explanations for the temporary resolution of this patients glossopyrosis. Stimulation of touch fibers and large Ad fibers, through the "gate control theory of pain" of Melzack and Wall, act to inhibit C fibers, thereby reducing pain. Perhaps, the URI reduced BMS pain through: swelling functioning as a counter-stimulus or movement during recurrent exsufflation and tussis epochs. Patients presenting with BMS should be queried regarding changes in their symptoms during viral infections.

Poster #080**Long-term radiologic sinonasal surveillance in craniosynostosis – support for a non-anatomical, etiological basis for chronic rhinosinusitis**

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Introduction

Craniosynostosis is a rare congenital anomaly characterized by premature fusion of the calvarial sutures and typically requiring multiple surgical interventions of the craniofacial skeleton that in turn create significant anatomical perturbations of the paranasal sinuses. Chronic Rhinosinusitis (CRS) is a prevalent inflammatory disease of the paranasal sinuses with an elusive underlying pathophysiology among which anatomical obstruction has been theorized to be an important determinant. Our aim was to explore the validity of this claim by radiologically surveilling the paranasal sinuses in a postoperative craniosynostosis patient cohort for evidence of sinonasal mucosal changes indicative of CRS.

Methods

Retrospective analysis of 49 consecutive craniosynostosis patients who underwent craniofacial corrective surgery at our institution. Serial postoperative CT scans of the paranasal sinuses were graded according to the Lund-Mackay (LM) radiologic staging system. Longitudinal linear mixed-effects modeling was employed to determine the relationship between LM score and age at the time of imaging, number of craniofacial interventions and number of involved sutures.

Results

Mean and median LM scores over all time points were 4.85 (SD=4.62) and 3 (range=0-20), respectively. A non-statistically significant inverse relationship was noted between age at the time of imaging and LM score ($p = 0.118$). No significant relationship was noted with other variables of interest.

Conclusion

The disproportionately mild mucosal changes observed in this patient cohort relative to the extreme distortion in sinonasal anatomy suggests that anatomical obstruction of the paranasal sinuses is likely a minor contributory factor, if at all, in the pathogenesis of CRS.

POSTERS

Poster #081**Management of the septoplasty flap: A description of technique and retrospective review**

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Introduction

Nasal septal deviation is a common cause of nasal obstruction. Modern septoplasty techniques are safer and more effective than their predecessors. However, septoplasty has several common complications – hematomas, synechia, epistaxis, and perforations. Our objective is to describe an approach to septoplasty that does not require packing, splints or quilting sutures and to assess its incidence of complications.

Methods

An IRB approved retrospective review was performed. Patients with a CPT code for septoplasty were identified. Endoscopic septoplasty was performed without transseptal quilting sutures, packing or splints. Electronic medical records and nasal endoscopies were reviewed for the incidence of complications including epistaxis requiring intervention, septal hematoma, synechia, perforation and need for reoperation.

Results

The incidence of epistaxis requiring intervention was 1.4%, however only three patients (0.6%) were found intraoperatively to have bleeding from the septum, while the remainder was the result of concurrent turbinate reduction or ESS. One patient (0.2%) had a synechia involving the septum. Three patients (0.6%) were found to have septal perforations postoperatively, none of which were symptomatic. Septal hematomas were seen in 15 patients (3.0%). Our technique was modified to incorporate a posterior fenestration for drainage. Two-hundred and fifty patients underwent septoplasty with this modification and three (1.2%) developed septal hematomas.

Conclusions

The overall incidence of complications of this technique was low. While historically splints, packing or quilting sutures were thought to be essential to minimizing complications and improving outcomes, this study demonstrates that our approach has a favorable safety profile and is a viable alternative.

Poster #082**Medpor grafting in septorhinoplasty: How we do it**

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Background

Patients undergoing septorhinoplasty or rhinoplasty often require augmentation as part of the surgical correction of the nose. The materials used to perform this function vary depending on the nasal sub-unit requiring correction. The ideal graft material should be well tolerated, feel natural, not resorb or extrude, be easy to shape, easily sterilized and if necessary easily removed. Current grafting materials can be broadly divided into autologous or synthetic materials.

Medpor™ is a biocompatible porous polyethylene implant that has been used previously in septorhinoplasty and rhinoplasty. The manufacturers claim that due to the increased permeability Medpor™ grafts can allow fibrovascular in-growth and integration of local tissue. This should allow for increased graft stability and integration. We report a process for implantation and experience with Medpor in augmentation rhinoplasty surgery.

Method

Retrospective review of 17 patients who underwent Medpor™ grafting in Septorhinoplasty between 2008 and 2015. All grafts were treated with antibiotics pre implantation and the patients were discharged with a post operative course of antibiotics. All grafts were placed using external approach septorhinoplasty technique.

Results

Medpor grafting was well tolerated in 16/17 patients when pre-treated with antibiotics and used as a dorsal spreader graft. 1 graft was extruded, a collumella tip graft. Extrusion in this position was avoided in later cases by placing a cartilaginous shield graft over the Medpor graft.

Poster #083**Modified endoscopic denker approach in management of inverted papilloma of the anterior maxillary sinus**

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Introduction

Inverted Papilloma (IP) is a benign epithelial tumor of the nasal cavity, which is locally aggressive and has a tendency for recurrence, with published recurrence rates up to 30%. Complete resection requires clear margins and removal of bone at the site of attachment. Tumors of the anterior maxillary sinus present a challenge and historically have been accessed through Caldwell-Luc or canine fossa trephine, which may be combined with endoscopic transnasal approach. We present a retrospective analysis of 12 patients who underwent a modified endoscopic Denker (MED) approach to the maxillary sinus for management of Inverted papilloma. This approach allows for complete endoscopic visualization of the anterior aspect of the maxillary sinus without transseptal or sublabial incision.

Methods

Retrospective chart review of patients who underwent MED approach for management of IP at two institutions.

Results

Twelve patients were identified, 6 male and 6 female. Ten of these patients had prior surgery, with an average number of 1.9 surgeries prior to the MED approach. All patients had Krouse stage 3 disease. Average follow up was 30.75 months, with a range of 5-63 months. There was only one recurrence, with a recurrence rate 8.3%. Complications from this procedure included epiphora in three patients, with only one requiring endoscopic dacryocystorhinostomy, one severe epistaxis requiring sphenopalatine ligation, and one incident of transient upper lip numbness.

Conclusions

The MED approach is a safe and effective surgical procedure for primary and recurrent IP originating from the anterior aspect of the maxillary sinus.

Poster #084**Modified endoscopic medial axillectomy for multilocular post-operative maxillary cyst: A series for 10-year follow-up**

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Introduction

Multilocular post-operative maxillary cyst (POMC) is an uncommon delayed complication of radical maxillary sinus surgery. Due to unfavorable pathological features as compartmentalization, and antral access narrowing, high recurrent rate and morbidity were reported after conventional operation. Hence, the aim of this study is to present a safe and effective surgical procedure for multilocular POMC.

Methods

A retrospective review was performed of patients who underwent modified endoscopic medial maxillectomy for POMC between January 2000 and December 2005. Under the guide of computed tomography (CT) scan, modified endoscopic medial maxillectomy started from creating a large antrostomy over medial maxillary sinus wall to facilitate an easier approach for all compartments of cysts. Then we removed the inter-cystic septums to fuse all compartments together as a large open cavity, similar to the concept of mastoidectomy. In this study, we will discuss the clinical presentations, imaging features, operative details, and outcome.

Results

Consecutive nine patients underwent modified endoscopic medial maxillectomy for multilocular POMC. CT reports showed that three separated compartments were noted in four patients (44%) and two separated compartments in five (56%). Most common clinical presentation is cheek pain (89%), and all pre-operative symptoms were improved after operation. Stoma kept patent after 10-year follow-up, and no perioperative or postoperative major complication was reported.

Conclusions

We recommend modified endoscopic medial maxillectomy for multilocular POMC. This is an effective and safe surgical approach and our preliminary experience demonstrates complete resolution of symptoms after this procedure.

POSTERS

Poster #085**Nasal airflow patterns by computational fluid dynamics following turbinate reconstruction for empty nose syndrome**

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Introduction

The precise causes of the complex subjective symptom profile in empty nose syndrome (ENS) is unclear given objectively increased nasal airway patency. In this study, computational fluid dynamics (CFD) was performed both prior to, and following, inferior turbinate augmentation to model the resultant changes in airflow patterns.

Methods

An ENS patient with marked symptomatic improvement by ENS6Q scoring following turbinate augmentation was identified, and pre- and post-operative CT imaging was collected. 3-D computer models of the nasal passages were generated for CFD simulations. An unsteady CFD code was used to perform high resolution simulations of the nasal airflow including details of air motion, temperature, and humidity. Quiet breathing was approximated as a steady inspiration of 250 ml/s.

Results

Comparison of the CFD results following corrective surgery showed higher levels of airflow turbulence. Augmentation produced ~50% increase in root mean square (rms) pressure, a 25% increase in rms wall shear stress, and a 25% increase in rms heat flux on the nasal walls. Nasal resistance increased by ~25% while no significant differences were seen in nasal wall surface area or total heat loss from the walls. The distribution of heat flux through the walls and wall shear stress shift towards the anterior half of nasal cavity and the nasal valve region following augmentation.

Conclusions

The increase in rms values for air pressure, wall stress, and heat flux following inferior turbinate augmentation likely contributes to the improvement in sinonasal symptoms.

Poster #086**Nasal endoscopy billing patterns: A survey of the American Rhinologic Society**

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Introduction

Nasal endoscopy (NE) is an essential element of office-based clinical rhinology. Despite the presence of guidelines, variability exists regarding coding and billing for NE especially with regard to inclusion of Evaluation and Management (E/M) codes with NE. The goal of the current survey was to assess the billing patterns for NE among American Rhinologic Society (ARS) members.

Methods

An invitation to participate in a web-based survey was electronically sent to all ARS members followed by a reminder invitation at the two week mark of a one month open period. Survey participants were queried regarding the practitioner demographics and billing patterns for NE in several different clinical scenarios using a 5-point Likert scale, with a score of 5 representing "always" and a score of 1 representing "never" for billing both E/M and NE.

Results

A total of 93 respondents successfully completed the survey with a range of practitioner demographics and practice type (50.5% private, 44.1% academic). Higher scores for billing both E/M and NE for the queried clinical scenarios were noted for new patients (mean 4.50) compared to established patients (mean 3.81) and postoperative patients (mean 3.04). Inclusion of a septoplasty as part of the surgery impacted billing an E/M code 28% of the time. Practice type and history of performing a fellowship did not significantly influence billing patterns for NE. Billing patterns for distinct clinical scenarios are reported.

Conclusions

Significant variability exists among ARS respondents with regards to billing patterns for NE, despite the presence of guidelines.

Poster #087**Nasal obstruction is associated with increased risk of depression in chronic rhinosinusitis**

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Introduction

Chronic rhinosinusitis (CRS) is associated with an increased risk for depression. Because nasal obstruction is one symptom of CRS that is treatable by medical and surgical means, we sought to characterize its impact on the risk for depression in CRS.

Methods

Prospective cross-sectional cohort study of ninety-four patients with CRS. The risk for depression was assessed with the 2-item Patient Health Questionnaire (PHQ-2) while nasal obstruction was assessed with the Nasal Obstruction Symptom Evaluation (NOSE) instrument. Clinical and demographic characteristics that were collected included age, gender, aeroallergen hypersensitivity, polyp status and current use of intranasal steroids spray or irrigations. Regressions, controlling for the above characteristics, were performed to seek association between NOSE score and PHQ-2.

Results

Of the 94 patients included, mean age was 51.1 years, 48.9% were female, 54.9% had a history of aeroallergen hypersensitivity, 37.4% had nasal polyps and 44.7% were using a nasal corticosteroid spray or corticosteroid irrigation. The mean NOSE score was 47.3 and 29.8% of patients had PHQ-2 greater than 1. We found that NOSE score was associated with having PHQ-2 score that is greater than 1 (adjusted odds ratio =1.03, 95%CI: 1.01–1.05, P=0.001). Alternatively, a 23-point increase in NOSE score was associated with a 1.5 fold increase in PHQ-2 score (adjusted relative risk=1.02, 95%CI: 1.01–1.03, P<0.001).

Conclusions and Relevance

The impact of nasal obstruction is associated with an increased risk for depression in CRS patients. Addressing nasal obstruction may be helpful to reduce the risk of comorbid depression in CRS patients.

Poster #088**Navigate li: A randomized double-blind trial of opn-375, a fluticasone exhalation delivery system (flu-eds) for treatment of chronic rhinosinusitis with nasal polyps (nasal polyposis)**

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Background

The FLU-EDS uses a new intranasal technology capable of significantly greater posterior/superior deposition than standard nasal sprays, particularly to the osteomeatal complex where sinus ostia drain and polyps typically originate.

Methods

Randomized, 24 week (16 double-blind + 8 open-label), placebo-controlled study. Subjects (N=323, mean age=46, 87% prior intranasal steroids, 54% prior surgery) with CRSwNP and moderate-severe congestion were randomized to FLU-EDS doses of 93, 186, or 372µg bid or placebo EDS. All subjects received 372µg bid during the 8-week extension. Change in congestion scores (0-3) at 4 weeks and in bilateral polyp grade (0-6) at 16 weeks were co-primary endpoints

Results

Changes in both co-primary endpoints (congestion and polyp grade) were significantly superior to placebo for each dose of FLU-EDS (p<0.001 vs placebo, all comparisons). Polyp reduction increased further through Week 24 (p<0.006 all comparisons vs placebo+372µg). After 24 weeks, polyps were eliminated in at least one nasal cavity in ~25-30% of subjects on FLU-EDS vs 8.7% in the placebo+372µg group (p?0.014, all comparisons). SinoNasal Outcome Test (SNOT-22) improvement was superior in all FLU-EDS groups versus placebo (p<0.001), as were improvements in symptoms of rhinorrhea, facial pain/pressure, sense of smell, global impression of change and multiple measures of function and quality of life (p<0.05, all comparisons). The incidence of adverse events was similar to reports with traditional intranasal steroids.

Conclusions

FLU-EDS produced clinically and statistically significant improvement on multiple objective and subjective measures, and in patient-perceived outcomes demonstrating the advantages of targeted deposition from the intranasal exhalation delivery system.

POSTERS

Poster #089**Newly developed mouse olfactory behavior test using automatic video tracking system**

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The mouse is the most popular animal model in olfactory research and behavior test with odorant is of essential to determine olfactory phenotype. So far, mouse olfactory behavior test has not been standardized and its result could be affected by inter-observer variations. We tried to develop new mouse olfactory behavior test that can be assessed by automatic video tracking system with minimal inter-observer variation. The Smart 3.0 video-tracking video camera system was used to track automatically mouse behavior in the standard breeding cage with C57BL/6N mouse. We tested with basically 2 odorants for preference and avoidance test. The mouse behavior was recorded for 3 minutes and was analyzed by Smart 3.0 video-tracking system. For preference test, investigation time (how quickly find out the odorant) was measured. For avoidance test, time spent in sector away from odorant zone was measured. To confirm our experimental setting, anosmia mouse model prepared with intranasal administration of ZnSO₄ was also evaluated. All strains of mouse showed reproducible behavior pattern of preference or avoidance for odorants. Anosmia mouse model failed to show olfactory ability of preference or avoidance and this was well-matched by histologic changes by ZnSO₄. Automatic video tracking system successfully tracked and automatically calculated mouse behavior with good reproducibility. Our olfactory behavior test is simple and accurate method to evaluate the olfactory function of mouse. We suggest that our behavior test can be utilized as a possible standard method to search for features of olfactory phenotype in mouse model.

Poster #090**Novel exhalation nasal delivery systems (eds) may produce beneficial activity independent of delivered drug in inflammatory nasal diseases and migraine via exhaled Co2 and mucosal ph**

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Background

Nasal delivery of CO₂ (alone) has shown benefits in migraine and allergic rhinitis. An hypothesized action is via reduction in mucosal pH, which in turn desensitizes trigeminal nerves, reduces CGRP-release and mast cell degranulation. We investigated whether CO₂ in the exhaled air, essential to nasal drug delivery with Exhalation Delivery Systems, can produce pH changes similar to exogenous CO₂.

Methods

Disposable 1.6mm Versaflex pH catheters (SynMed, UK), Digitrapper pH-Z System pH sensors, AccuView software (Sierra Scientific Instruments, USA) were used. The pH-sensor was inserted 4-5 cm into the middle part of the nose in a healthy male during use of empty powder and liquid EDS. Measured pH changes and calculated CO₂ exposure were compared to published studies with concentrated exogenous CO₂ delivery.

Results

Exhalation delivery systems produced reduction in pH (0.2-0.3 pH units) similar to 15% and 45% CO₂ delivered passively in 3 second pulses. Calculated CO₂ exposure was: 1) passive cannula delivery (Shusterman 2003)=5 l/min/15% \times 3sec=37.5 ml CO₂ (12.5ml/sec), 2) Exhalation delivery=15-30 l/min/5% \times 3sec=37.5-75 ml CO₂ (12.5-25ml/sec), 3) Migraine (Spierings 2008) and Allergic Rhinitis (Casale 2008) 100% CO₂ (10ml/sec) treatment trials.

Conclusion

Exhalation delivery systems are estimated to produce similar mucosal pH changes and CO₂ exposure (ml/sec) to that achieved with exogenous CO₂ in successful treatment trials in nasal inflammatory disease (allergic rhinitis) and migraine. The mechanism of action and aerodynamics of exhalation delivery, including exhaled CO₂ and associated mechanisms like pressure, vibration and Nitric Oxide removal, may contribute, additively or synergistically, to clinical response in migraine and chronic rhinosinusitis.

Poster #091**Nut midline carcinoma: An under-recognized, highly lethal sinonasal tumor**

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Background

NUT midline carcinoma (NMC) is a rapidly progressive, poorly differentiated tumor that mainly affects the head, neck, and mediastinum. It is almost universally lethal, with a median survival of four months. It is characterized by a translocation of the nuclear protein in testis (NUT) gene on chromosome 15q14. With no defining histologic features, diagnosis must be made with a NUT immunohistochemical stain. Although fewer than ten sinonasal NMC cases have been reported, retrospective analyses of poorly differentiated sinonasal carcinomas have revealed that NMC is under-recognized. A Phase 1 clinical trial is currently underway for therapies targeting the NUT translocation.

Methods

Case report and review of literature

Results

A 37-year-old man with one month of nasal obstruction and proptosis was found to have a large mass filling the sinonasal cavity with intracranial extension. Biopsy was consistent with a poorly differentiated carcinoma. He underwent endoscopic craniofacial resection with gross total resection the following week. Subsequent immunohistochemical staining was positive for the NUT translocation. Within two weeks, he developed cervical lymphadenopathy and nodules in his posterior oropharynx consistent with regional metastases. He began concurrent chemoradiation on an urgent basis. Despite locoregional control, he developed bony metastases within three months and expired shortly thereafter.

Conclusion

NMC can be better recognized by testing for the NUT translocation in all rapidly progressive poorly differentiated sinonasal carcinomas. This may help to direct patients to clinical trials with targeted therapies and counsel them on prognosis.

Poster #092**Olfaction and sexuality in older adults in the United States**

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Background

Chemosensation plays an important role in sexual activity across a broad range of taxa. However, little is known about olfaction and sexuality in humans, especially related to aging. We sought to determine the relationship between olfactory function and sexuality in older adults.

Methods

The National Social Life, Health, and Aging Project is a representative, population-based study of home-dwelling US adults ages 62 to 90 (N = 2,094). Sexual attitudes and behaviors measured include initiation of, satisfaction with, frequency of, and receptivity to sex. Odor identification ability and odor sensitivity to n-butanol were measured using validated tests (Sniffin' Sticks). We assessed the relationship of these sexual parameters with olfactory function using multivariate ordinal logistic regression, adjusting for age, gender, ethnicity, education, cognitive function, depression, and physical health.

Results

Older adults with better odor sensitivity thought about sex more often (OR 1.07, 95% CI 1.00-1.15, $p = 0.042$). Those with better odor identification reported greater emotional satisfaction with their most recent partner (OR 1.11, 95%CI 1.01-1.23, $p = 0.035$). Results did not vary between men and women, nor between those with and without partners. Interestingly, olfactory function was not associated with frequency of sex ($p=0.5$).

Conclusion

Better olfactory function is associated with more sexual thoughts and greater emotional satisfaction in older, post-reproductive US adults. Our data are consistent with the concept that olfaction affects core emotional responses in humans. We speculate that these findings may be due to the evolutionarily ancient connection between the olfactory and limbic systems in the brain.

POSTERS

Poster #093**Outcomes after endoscopic dacryocystorhinostomy in the pediatric population**

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Introduction

A growing body of evidence demonstrates that endonasal endoscopic dacryocystorhinostomy (DCR) techniques provide comparable results to conventional external techniques in the adult population. The purpose of this study was to evaluate safety and outcomes of powered endoscopic DCR for the management of nasolacrimal duct obstruction with resulting epiphora in the pediatric population.

Methods

A retrospective review was performed of pediatric patients with epiphora secondary to both congenital and acquired nasolacrimal duct obstruction who underwent endoscopic DCR from July 2015 to May 2016 at a tertiary referral medical center. Operative and post-operative safety was assessed by intraoperative complications and post-operative pain requiring additional analgesia, crusting, bleeding, and revision rates. Main outcome measures were subjective improvement in epiphora and assessment of anatomic patency based on endoscopic evaluation.

Results

A total of 11 patients (age 8.91 years; 64% female), totaling 13 primary procedures, were available at a mean follow-up of 7.19 (range 4 – 10) months. There were no operative or post-operative safety issues. At the most recent follow up, mild intermittent postoperative epiphora or complete resolution of epiphora was noted in 100% (13/13) of procedures; complete resolution was recorded in 92.3% (12/13) of procedures. Anatomic patency based on endoscopic evaluation was noted in 100% (13/13) of procedure. 0% (0/11) of patients required revision DCR.

Conclusion

Results of endoscopic DCR in the pediatric population compare favorably to previously reported outcomes of success rate of adults. These results suggest consistent long-term relief of epiphora without additional risk of complication.

Poster #094**Outcomes of endoscopic sinus surgery for chronic rhinosinusitis following primary radiotherapy for nasopharyngeal carcinoma**

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Introduction

Chronic rhinosinusitis (CRS) is a downstream complication following radiotherapy for nasopharyngeal carcinoma (NPC). Endoscopic sinus surgery (ESS) is an accepted therapy for medically refractory CRS, but its efficacy in addressing CRS symptoms in patients with previously irradiated NPC is unclear.

Methods

All patients (n=26) with a history of primary radiotherapy for NPC referred to a tertiary rhinology center with available Sinonasal Outcome Test (SNOT-22) scores were retrospectively divided into two cohorts based on whether or not they underwent post-irradiation ESS for CRS (surgical group, n=13 and control group, n=13). Demographic and clinical characteristics were collected, and changes in SNOT-22 scores either 6-12 months postoperatively (surgical cohort) or following routine tumor surveillance (controls) were assessed.

Results

The median time following primary irradiation was 6.8 and 6.5 years in the surgical and control groups, respectively. The surgical cohort had statistically greater baseline SNOT-22 scores than the control group (45 vs. 14, p=0.0198). At 6-12 months, the surgical group demonstrated clinically and statistically significant improvements in SNOT-22 scores when compared to controls (15-point decrease vs. no change, p=0.0040), ultimately resulting in similar SNOT-22 scores for both groups (28 vs. 18, p=0.3687). The rhinologic, extranasal, and ear/face subdomain scores of the surgical group were significantly greater than those of the control group preoperatively (rhinologic: p=0.0010; extranasal: p=0.0179; ear/face: p=0.0068), but these disparities in subdomains resolved postoperatively (rhinologic: p=0.1461; extranasal: p=0.3131; ear/face: p=0.3401).

Conclusions

ESS is effective for the management of recalcitrant CRS symptoms related to radiation therapy for NPC.

Poster #095**Outcomes of modified sphenopalatine artery ligation within pterygopalatine fossa technique for severe and recurrent posterior epistaxis**

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Introduction

Posterior bleeds occur in approximately 5-10% epistaxis cases. Nasal packing may fail in up to 48% of patients. SPA ligation is now the most common surgical procedure performed for posterior epistaxis refractory to nasal packing. Here we demonstrate the results of modified SPA technique, ligating the vessel within the pterygopalatine fossa.

Methods

A retrospective analysis was performed. SPA ligation was performed after exploration of the pterygopalatine and artery ligated proximally.

Results

A total of 44 patients underwent the modified sphenopalatine artery ligation. BL SPA ligation was performed in 78% of inpts vs. 29% inpts. Hb/Hc levels were significantly lower in inpts and 39% required transfusion. HTN and anticoagulant use was identified in 55% and 70% respectively. Bleeding was reported to average 5 days for inpt group and 2 month average for outpt. Emergent visits prior to operative intervention were 2.8 inpt and 2 outpt, requiring an average of 2.2 packing trials in inpts vs. 1.1 in output ($p=0.0006$). Eight pts had SPA procedures at OSHs with failure to control bleeding. In contrast with our modified technique we observed a 100% success rate. There were no post-op complications or episodes of recurrence.

Discussion/Conclusion

Endoscopic sphenopalatine artery ligation has become the mainstay of treatment for posterior epistaxis. Significant bleeding obscures anatomy and the sphenopalatine artery course is varied. Resources are scarce and patients often undergo multiple emergent visits. Packing often results in failure. This study demonstrates sphenopalatine artery ligation within the pterygopalatine fossa yielded a 100% success rate.

Poster #096**Paradoxical chemesthetic intensification from upper respiratory infection (uri) induced anosmia**

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Introduction

Enhanced negative mucosal potential amplitudes in response to trigeminal stimulation are seen in those with anosmia. This suggests that trigeminal enhancement may occur concurrent with anosmia. Supporting this, a patient with intensification of chemesthetic components of flavor coincident with anosmia is described.

Methods

Case Report: A 59-year-old female with Hashimoto's thyroiditis presented with an abrupt loss of smell and taste coincident with a URI, without improvement, for five months since onset. This was unresponsive to amoxicillin and steroids. She notes smell as 5% of what it was prior to the URI. She affirms dysosmia and cacosmia, where cocoa butter smells like "greasy fried food". She denies phantosmia, palinosmia, and flavorful eructation. Her ability to taste is 10% of that before the URI. She tastes salt, sweet, and peanut butter, which is now preferred, all else being flavorless. She denies dysgeusia, phantogeusia, and palinoguesia. However, spicy, irritating flavor, like hot pepper and black pepper has increased to 110% of normal. These are now so intense she avoids them.

Results

Chemosensory test: Olfactory: Brief Smell Identification Test: 4 (anosmia). Retronasal olfaction: Jelly Bean Difference Test: 0 (anosmia). Gustatory: 6-n-propylthiouracil Disc Test: 8 (normal). Bulb Suction Nozzle Test: normal bilaterally. ENT examination: normal. Fiberoptic endoscopy: deviated septum. MRI of brain with or without infusion: normal. CT of sinuses: normal.

Conclusion

This suggests that olfaction acts to inhibit trigeminal perception, highlighting the need to test both sensory systems. This inhibition may be used to enhance hedonics of chemesthetically strong medications, thus promoting compliance.

POSTERS

Poster #097**Paranasal sinus opacification-to-pneumatization ratio applied as a rapid and validated clinician assessment**

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Background

The utility of clinician-applied instruments, particularly the Lund-Mackay score, in the assessment of paranasal sinus computed tomography (CT) in chronic rhinosinusitis (CRS) remains incompletely defined. The purpose of this study was to determine if a new approach to the evaluation of sinus CT could accurately predict the extent of opacification while remaining simple for clinician use.

Methods

Twenty-four sinus CT scans were measured for the percent of sinus opacification using three-dimensional (3D) volumetric analyses. The same scans were also evaluated using the Lund-Mackay score to measure opacification and the Assessment of Pneumatization of the Paranasal Sinuses (APPS) score to measure total sinus volume (TSV). Correlation analysis was performed for the Lund-Mackay to APPS score ratio as a predictor of percent opacification. Validation analysis was also performed to determine the optimal orientation for Lund-Mackay scoring, which has not previously been described.

Results

The Lund-Mackay to APPS score ratio was very strongly correlated with the percentage of sinus opacification measured by 3D volumetric analysis ($r=0.862$, $r\text{-sq}=0.743$, $p<0.001$). Lund-Mackay scoring was not statistically different between axial-only, coronal-only, or triplanar groups for interrater ($p=0.379$) and intrarater reliability ($p=0.312$).

Conclusion

The Lund-Mackay score is validated for rater reliability in multiple orientations. Using the APPS score as a measure of TSV, the Lund-Mackay-to-APPS ratio very strongly correlates with the percentage of sinus opacification by 3D volumetric analysis. Further study will be required to determine if this ratio is predictive of symptom severity.

Poster #098**Patient-reported outcomes in revision endoscopic sinus surgery - a systematic review**

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WITHDRAWN**Background**

Chronic rhinosinusitis with nasal polyposis is debilitating in terms of nasal obstruction. Revision endoscopic sinus surgery is performed on patients who fail primary endoscopic sinus surgery and includes techniques such as salvage endoscopic modified Lothrop, mega anrostomy, and canine fossa puncture, and nasalisation. Patient-reported outcomes are important in determining the efficacy of these procedures, and it is unknown if revision surgery has a meaningful impact on these parameters. A systematic review was performed to assess the current evidence for revision endoscopic sinus surgery.

Methods

A systematic review using the PRISMA guidelines was performed via the electronic databases of PubMed via MEDLINE, EMBASE, CINAHL, and the Cochrane Library from date of inception to September 2015. Two independent reviewers assessed studies using defined eligibility criteria, and also evaluated for bias.

Results

A total of 9 articles from 1750 studies initially found on the literature search met selection criteria for data collection and synthesis. Follow-up ranged from a mean of 6 months to 6.9 years. The most commonly reported outcomes was the SNOT-20 and SNOT-22 scales, the Rhinosinusitis Disability Index, and the Chronic Sinusitis Survey.

Conclusion

Patient-reported outcome systems for revision endoscopic sinus surgery include subjective interviews for facial pressure, rhinorrhoea, and obstruction. Instruments used in the assessment of the efficacy of revision endoscopic sinus surgery including the validated SNOT-20 demonstrated improvement in certain quality-of-life measures.

Poster #099**Pediatric rhinoplasty: A systematic review of the literature**

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Objectives

Pediatric rhinoplasty has traditionally raised numerous concerns, including its impact on growth and the psychological sequelae of undergoing a potentially appearance-altering procedure. Our objective was to critically evaluate available individual patient data relevant to pediatric rhinoplasty

Methods

A systematic review was conducted using PubMed/MEDLINE databases. Data extracted and analyzed from included studies included patient demographics, surgical indications, operative approaches, outcomes, complications, revision rates, and other clinical considerations.

Results

The search strategy yielded seven studies encompassing 253 patients. Patient age ranged from 7 months to 19 years, and two-thirds of patients were male. 41.7% reported antecedent trauma, and the most common overall surgical indications were "functional aesthetic" (24.5%) followed by cleft lip nasal deformity (15.8%). The majority (79.1%) underwent open approaches, and 71.1% of patients underwent concomitant septal intervention. The most frequently used grafting materials were septal cartilage (52.8%) and conchal cartilage (16.5%). Surgical outcomes were heterogeneous among these studies. Complication rates were only specified in 5 of the 7 studies and totaled 57 patients (39.6%). Aesthetic dissatisfaction (11.8%) and postoperative nasal obstruction (5.6%) were the most commonly reported complications. Revisions were performed in 13.5%.

Conclusion

Rhinoplasty appears safe in the pediatric population, with no major complications noted. Furthermore, this procedure can be used to address a wide range of pathologies. This study of 253 represents the largest pooled sample size to date; nonetheless, non-standardized outcome measures, minimal long-term followup data, and lack of discussion regarding psychological sequelae all contribute to the need for further high-quality studies evaluating this topic.

Poster #100**Pediatric sinonasal malignancies: A population-based analysis**

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Introduction

Pediatric Sinonasal Malignancies (PedsSNM) are rare and usually present with poor prognosis at the time of diagnosis. Herein we aim to investigate the epidemiology, tumor characteristics, and survival of PedsSNM using a population-based database to enrich the scant preexisting literature on this topic.

Methods

The Surveillance, Epidemiology, and End Results database was queried for patients between the ages of 0 to 18 years diagnosed with PedsSNM between the years of 1973 and 2013. Data on incidence, tumor characteristics, and survivorship were analyzed.

Results

The majority of 210 patients with PedsSNM were female (54.3%) and white (72.6%) with a mean age of 11 years. Overall incidence was 0.036 per 100,000 individuals between the years of 2000 to 2013. The nasal cavity was the most frequent site (37.1%), while rhabdomyosarcoma was the most common malignancy (50.5%). Grade IV classification (37.3%) tumors were the most common, with T3 (40.0%), N0 (80.0%), and M0 (100.0%) being the most frequent tumor characteristics. Five-, 10-, and 20-year disease-specific survival rates were 60.2%, 46.1%, and 20.6%, respectively. Grade I tumors exhibited the best 20-year survival ($p=0.0480$). Patients treated with surgery alone resulted in a 20-year survival of 50% ($p=0.0425$). There were no significant differences in survivorship between race, gender, histopathology, or primary site of tumor.

Conclusions

Although rare, PedsSNM often presents at late TNM stage. Grade IV rhabdomyosarcoma of the nasal cavity is most common tumor in this population. Surgery alone provides the most favorable 20-year disease-specific survival rate.

POSTERS

Poster #101**Psychological problems in children with ear and nose foreign body insertion**

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Introduction

Children with psychological disorders are prone to various unintentional injuries, one of the most common of which is foreign body inserting. In spite of the high incidence, the association is not studied yet.

Methods and Materials

This is a case control study in otorhinolaryngology and psychology departments, at a tertiary referral teaching hospital. One hundred five children (2 to 12 years old) who were referred for removal of foreign bodies in their ear or nose over a period of one year were selected for the study. Also, 155 children were selected from the same community as the controls, and were matched regarding age and sex. Parents were given the standard strengths and difficulty questionnaire (SDQ) for psychological evaluation of their child. The total score and also the subscales for emotional problems, hyperactivity disorders, conduct, psychological, and prosocial problems were recorded and statistical analysis was performed, and the significance level was set at $p < 0.05$.

Results

In the case group, 34 cases (%32.4) were suffering from foreign bodies in their ear, 70 cases (%66.7) in their nose, and just one case (%1) in both. Age and sex distribution in the two groups were comparable. There were significant differences of SDQ scores in total and the five subscale aspects (P value < 0.001).

Conclusion

Psychological problems are more common in children with foreign bodies than the controls. Thus physicians are recommended to consider referring these patients to the pediatric psychologist.

Poster #102**Quality measures in rhinology: Results of a national survey**

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Background

The initiatives to link health care payments to "value" or "quality" measures are becoming reality for many specialties within the US health care market. The impact of these initiatives on Rhinology is not yet clear. This survey means to provide an assessment of quality measure use within the American Rhinologic Society membership.

Methods

An online, anonymous cross-sectional survey of American Rhinologic Society (ARS) members was performed. We assessed the use of outcome measures and the adherence to current quality measures for rhinosinusitis.

Results

The survey was viewed by 295 ARS members and a total of 196 (85%) unique responses were captured. Practice setting varied; Academic/University (39%), Private Practice with Partners (31%), Solo Practice (12%). Only 44.3% of respondents use a specific outcome measure routinely in their practice. Of those, 83% use either the SNOT-20 or SNOT-22 and only 51% perform regular analyses of their outcome measures data, and do so only on an ad-hoc basis (60%). The use of CT scan did not significantly differ based on level of training. Completion of a fellowship in Rhinology or Anterior Skull Base Surgery was statistically significantly correlated with multiple practices including: use of an outcome metric in clinic (?2=4.6, $p=0.033$), use of an established grading system for CT scans (?2=5.8, $p=0.016$), and stringent use of antibiotics (?2=9.8, $p=0.043$).

Conclusions

There is variable use of outcome measures, grading scales and antibiotic use throughout practices among ARS members. Further work is needed to establish standard quality measures for use in rhinosinusitis patients.

Poster #103**Radiologic evaluation of the greater palatine canal relevant to endoscopic endonasal medial maxillectomy**

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Introduction

The greater palatine canal (GPC) is susceptible to trauma during endoscopic endonasal medial maxillectomy, potentially resulting in nerve injury. We performed a radioanatomic study of variations in the GPC on computed tomography (CT).

Methods

Fifty consecutive paranasal CT scans (100 sides) were analyzed. Measurements were standardized to surgical landmarks such as the inferior turbinate (IT) and floor of the nasal cavity (FNC) to assess variability and vulnerability of the nerve in endoscopic approaches. Measurements included the 1) incidence of maxillary sinus pneumatization posterior to the GPC, 2) distance from the posterior wall of the maxillary sinus to the GPC at the a) IT and b) FNC, 3) width of bone containing the GPC, 4) incidence of medial GPC dehiscence, and 5) angle of the GPC extending from the IT to FNC.

Results

Ninety-one percent of maxillary sinuses were pneumatized posterior to the GPC. The distance from the posterior wall of the maxillary sinus to the GPC was 2.8 ± 1.7 mm (range -2.3 to 5.9) at the posterior attachment of the IT and 4.1 ± 3.1 mm (range -6.3 to 11.9) at the FNC. The width of bone containing the GPC was 3.3 ± 1.3 mm (range 1 to 8.9), and the medial bony GPC was dehiscent in 38% of cases. In the sagittal plane, the angle of the GPC between the IT and the FNC was 31.9 ± 6.9 degrees (range 10.8 to 45).

Conclusions

The GPC has considerable anatomical variability relevant to surgical targets in medial maxillectomy. Preoperative review of CTs to assess vulnerability may prevent postoperative complications.

Poster #104**Rescue of failed in-office frontal sinus balloon dilation using computer image guidance**

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Introduction

Balloon sinus dilation (BSD) is a tool introduced in 2005 and then approved for office use in 2011. Numerous studies have proven the safety and efficacy of the procedure in the office setting under local anesthesia, however few studies have addressed management of patients who have failed initial office BSD.

Methods

A retrospective chart review of 16 patients who underwent in-office BSD of previously operated frontal sinuses with complete scar/closure of the frontal sinus outflow tract (FSOT). Between July 2011 and August 2014, 16 patients underwent in-office BSD of their frontal sinuses utilizing computer image guidance (CIG) after an initial attempt to dilate with a guide catheter (Acclarent, Inc.) was unsuccessful. The technique of penetrating the scar band was accomplished with a 90° CIG frontal sinus seeker followed by balloon catheter cannulation and dilation.

Results

This technique was successful in all but one patient who had a bony scar band that was impenetrable by the seeker. 12 of 16 patients required one procedure while three patients required two procedures to achieve patency. Success was determined by direct endoscopic visualization of the FSOT confirming patency at six months and statistically significant improvement in SNOT-20 scores.

Conclusion

CIG is a technology that is simple to incorporate in the office setting and extremely useful in accessing scarred frontal sinuses. This is the first report of in-office CIG in combination with BSD that allows for a safe and effective management protocol for severely scarred and previously inaccessible frontal sinuses.

POSTERS

Poster #105**Retrosphenoid air cell: Case series and introduction of a new cell in the paranasal sinuses**

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Background

Despite the well-appreciated variability in sphenoid sinus anatomy, there are no documented cases of retrosphenoid cells in the literature to date. Mischaracterization of these cells as sphenoidal air cells (aka Onodi cells) may lead to incomplete surgery, increased risk of intraoperative complications, and ongoing patient symptomatology necessitating revision surgery.

Methods

A retrospective case-series of 2 adult patients and 1 pediatric patient was performed. The adult patients (AB and RG) presented with recalcitrant unilateral headaches while the pediatric patient presented with fever, headache and diplopia. All had evidence of ipsilateral sphenoid sinus opacification and a true isolated retrosphenoid cell on CT. Adult patients underwent image-guided sinus surgery, with the aim of developing an anatomic communication from the sphenoid to the retrosphenoid cell. The pediatric patient was treated conservatively with intravenous antibiotics and corticosteroids.

Results

Post-operatively, patient AB had significant improvement in headaches with weekly treatment of topical poloxamer gel impregnated with budesonide and 10% cocaine applied directly to the right retrosphenoid and sphenopalatine region. At 5 weeks post-operatively, patient RG noted a significant reduction in right-sided facial pressure and pain. The pediatric patient was successfully treated conservatively with no sequelae of the acute infection.

Conclusion

To our knowledge, this is the first description in the literature of a retrosphenoid cell. Careful review of pre-operative imaging is critical in the identification of this important anatomic variant, particularly in patients presenting with recalcitrant headaches.

Poster #106**Role of surgical treatment for olfactory neuroblastoma: Long-term outcomes from a single institution**

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Abstract

Olfactory neuroblastoma is an extremely rare malignant tumor arising in the cribriform plate, superior turbinate and superior nasal septum. Due to the rarity of these tumors, no universally accepted staging system is available; thus, there are many opinions about its origin, diagnosis, management and treatment outcome. Furthermore, there is no consensus on the optimal management, according to tumor stage. From January 1985 and December 2015, a retrospective review was performed of 35 patients with ENB who completed evaluations at our institution. Patient demographics, histopathology, type of initial and subsequent treatment modalities, and outcome were assessed. Overall 5-year survival was 67.3%, and disease-free survival at 5- years was 52.7%. In patients without cervical lymph node metastases, 5-year overall survival was 75.5%; however, this rate significantly dropped to 25% with cervical lymph node metastases ($P = 0.0323$). For each treatment modality, the only significant difference was for surgery with postoperative radiotherapy and/or chemotherapy (odds ratio for death 0.16). Interestingly, neoadjuvant chemotherapy is considered in locally advanced stages of ENB as a less invasive option to surgery, especially including navigation-assisted endoscopic treatment. In locoregional recurrence, successful salvage therapy include radical neck dissection and radiotherapy, but in case of distant metastasis, the prognosis was poor. Considering the higher local control rate and acceptable complication rate, surgery with adjuvant radiotherapy is a gold standard treatment option for olfactory neuroblastoma, especially with anterior skull base involvement.

Poster #107**Safety and efficacy of chitodex-deferiprone-gallium protoporphyrin treatment of staphylococcus aureus in a sheep model sinusitis**

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Objectives

This study aims to assess the safety and efficacy of Chitodex (CD) gel, combined with the novel antibiofilm agents Deferiprone and Gallium Protoporphyrin (CD-DG) as a topical treatment against *S. aureus* biofilms in vivo. Deferiprone and Gallium Protoporphyrin exert their antibiofilm effects by targeting the essential iron metabolism pathways of *S. aureus*.

Methods

To assess safety, 8 sheep were divided into two groups of 7 day treatments; (1) CD gel with twice daily saline flush, and (2) CD-DG gel with twice daily saline flush. Tissue morphology was analysed using histology and scanning electron microscopy (SEM). To assess efficacy we used a sheep sinusitis model where 15 sheep were divided into three groups of 7 day treatments; (1) twice daily saline flush (NT), (2) CD gel with twice daily saline flush, and (3) CD-DG gel with twice daily saline flush. Biofilm biomass across all groups was compared using LIVE/DEAD BacLight stain and confocal scanning laser microscopy.

Results

Histopathology and SEM analysis showed no toxic effects on sinus mucosa and ciliary morphology when comparing CD-DG to CD treated sheep. COMSTAT2 assessment of biofilm biomass showed a significant reduction in CD-DG treated sheep compared to NT controls (95% CI [0.3702, 8.278], $p < 0.05$, Two-way ANOVA analysis).

Conclusion

Results indicate that CD-DG is safe and effective against *S. aureus* biofilm in a sheep sinusitis model and could represent a viable treatment option in the clinical setting.

Poster #108**Safety of anterior skull base reconstruction with porous polyethylene implant**

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Introduction

Biocompatible porous polyethylene MEDPOR® implant has been described as an effective material for reconstruction of anterior cranial base defects after endonasal skull base surgery. Possible extrusion of this material has been of concern. The objective is to present our experience of extrusion when using this material.

Methods

A prospectively acquired database of endonasal endoscopic surgeries performed over an 11-year period at Weill Cornell Medical College starting in September 2005 to present was reviewed. Cases were divided into those where MEDPOR® was used for a "gasket-seal" closure versus as buttress for fat graft or gelfoam support. Location and use of a nasoseptal flap to cover the MEDPOR® was also analyzed.

Results

A total of 308 cases in which MEDPOR® was used for anterior skull base reconstruction. Post-procedure average follow up period was 11 months. Successful primary repair of intraoperative cerebrospinal fluid (CSF) leaks was achieved in 97.4% of the cases. Four cases of extrusion were identified (1.30%), of which only one (0.32%) developed chronic sphenoiditis requiring its removal in the operative room. Two cases each of "gasket-seals" (1.56%) and non-gasket closures (1.11%) extruded. In three of these, a nasoseptal flap (NSF) was not used as an overlay. None of the extruded cases developed a delayed CSF leak.

Conclusion

MEDPOR® implant is a safe and effective material to use for reconstruction of anterior cranial base defects. In the rare cases where extrusion occurs, no significant complications were associated with it. The addition of the NSF may protect against its extrusion.

POSTERS

Poster #109**Safety of topical probiotics for management of respiratory chronic rhinosinusitis**

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Purpose

In patients with colitis, 'transplanting' healthy fecal material can be lifesaving, suggesting that supplementation of the dysbiotic sinus microbiome with a topically-applied intranasal 'healthy' probiotic may offer a novel treatment for chronic rhinosinusitis (CRS). However, the safety of introducing exogenous bacteria to the upper respiratory passages for therapeutic purposes has never been explored in humans. We wished to verify if delivery of probiotic bacteria to the nasal and sinus passages was safe in individuals with chronic rhinosinusitis.

Method

Patients with CRS refractory to medical and surgical therapy were enrolled in a prospective unblinded trial. Following a 14-day washout period, patients were treated with a 14 day course of twice-daily nasal and sinus irrigations containing a live probiotic. Safety was monitored during the trial period and for 14 days afterward using questionnaire, otoscopy, sinus endoscopy, UPSIT-40 smell testing, and endoscopically-obtained sinus culture.

Results

The 24 patients who received sinus probiotic therapy all successfully completed the course of treatment. There were no major adverse events noted at the level of the sinus mucosa, middle ear cavity, or lower respiratory tract. No patient experienced any significant infections during the trial or decrease in sense of smell.

Conclusion

In our study, BID topical intranasal administration of probiotic solution for 14 days was well tolerated, without adverse events or new infections. These results demonstrate that topical probiotics can be safely administered to patients with CRS, even those having previously undergone endoscopic sinus surgery.

Poster #110**Short- and long-term morbidity in patients with acute invasive fungal rhinosinusitis**

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Introduction

Acute invasive fungal rhinosinusitis (AIFRS) is a rapidly progressive and often fatal infection of the paranasal sinuses. The purpose of this study was to evaluate both short- and long-term morbidity and related procedures in patients diagnosed with AIFRS.

Methods

A retrospective review was performed to identify all AIFRS patients treated between January 2000 and December 2015 at a single academic tertiary care medical center. Information regarding short-term (within 30 days of diagnosis) and long-term (greater than 30 days after diagnosis) surgical interventions, as well as patient demographics and survival were analyzed.

Results

A total of 36 patients were identified. Twenty-one patients survived to discharge, with 12 dying of disease during initial hospital admission, and 3 being discharged to hospice care, for a total survival rate of 58%. Surviving patients underwent an average of 1.9 AIFRS-related operating room procedures (range 1-5) within 30 days of diagnosis, compared to 1.1 procedures (range 0-5) in non-surviving patients ($p < 0.05$). Surviving patients underwent a mean of 0.5 procedures beyond 30 days. Procedures among surviving patients included FESS (21 patients), orbital exenteration (7), maxillectomy (6), orbitotomy/orbital decompression (4), tracheotomy (4), palate resection (2), and rhinectomy (1). Revision/completion FESS was required in 3 patients within 30 days, and in 4 patients thereafter. Two patients required reconstruction with a myocutaneous free flap.

Conclusion

Analysis of surgical morbidity related to treatment of AIFRS shows that up to one-half of surviving AIFRS patients will be left with long-term deficits. Most procedures for AIFRS are performed within 30 days of diagnosis, with a small minority of patients requiring revision FESS or other procedures after discharge.

Poster #111**Silent sinus syndrome: A preventable progressive acquired condition**

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Introduction

Silent Sinus Syndrome (SSS) has been defined as a condition of maxillary sinus atelectasis with orbital floor resorption presenting as enophthalmos and hypoglobus, unassociated with prior trauma, surgery, or other symptoms. We believe this presentation represents a late stage of an acquired process, and identification of earlier stages can prevent progression to later stages.

Methods

SSS publications through June 2015 were identified on Medline. Inclusion required gender, age, past medical history, side, signs and symptoms, radiologic findings, and treatment. Cases were classified according to disease progression as early (uncinate lateralization +/- maxillary sinus contraction), intermediate (early + maxillary changes with increased orbital volume w/o enophthalmus), late (intermediate + enophthalmus/hypoglobus) and advanced (late + midfacial collapse).

Results

18 articles were included. 30 patients with 31 cases (one bilateral) were identified. Gender and side distribution was similar. 5 were classified as early presentation, 3 as intermediate, 19 as late and 4 as advanced. 2 cases had a previous normal sinus CT, and a case of late presentation with a previous CT scan showing findings similar to an early presentation, showing the progressive nature of the condition. Additional unpublished examples of progression of disease and stage examples will be presented.

Conclusion

SSS is a progressive acquired condition which is most frequently identified in the late stages. Recognition of the findings in earlier stages of the disease can prevent progression to late findings. The acquired origin of this pathology is supported by evidence of cases with normal previous CT scans.

Poster #112**Simplifying endoscopic frontal sinusotomy for trainees: The "corridor" approach**

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Objective

Endoscopic frontal sinus surgery is an important skill set every Rhinologist has to develop during training. However, trepidation exists amongst trainees dealing with this anatomical region. We present a surgical method of simplifying the anatomy, so all trainees can gain confidence and skill in accessing the frontal sinus safely and consistently.

Methods

Using intraoperative photographs and videos we explain how to access the frontal sinus through a simple "corridor". Using a 70 degree angled scope, the surgeon stays within the "corridor" so damage to the skull base, anterior ethmoidal artery and orbit is prevented. Anatomical landmarks are the lamina papyracea, the lateral wall of the middle turbinate, the anterior wall of the bulla ethmoidalis and the frontal beak. In significant disease, the frontal beak is used as a safe and reliable landmark to enter the frontal sinus. The outflow tract is then widened safely within the boundaries of the corridor.

Results

Trainees have found this method extremely easy to comprehend and feel safe in the knowledge that as long they operate within the "corridor" no harm will come to the patient. They gain surgical confidence in frontal sinusotomy quickly and safely under expert supervision.

Conclusion

By using a simple and safety-centred approach to the frontal sinus, surgical confidence and technical skill acquisition improves dramatically. Use of the frontal beak is a safe, reliable and consistent landmark when faced with severe inflammatory disease.

POSTERS

Poster #113**Single blinded prospective introduction of a preoperative imaging checklist for endoscopic sinus surgery**

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Introduction

Preoperative identification of critical sinonasal anatomical landmarks using computed tomographic (CT) is critical to performing safe and effective endoscopic sinus surgery (ESS). Our objective was to determine if the introduction of a systematic preoperative sinus CT checklist improves identification of critical anatomic variations in sinus anatomy in patients undergoing ESS.

Methods

A prospective single-blinded cohort study was conducted. Otolaryngology residents were asked to identify critical surgical sinus anatomy on preoperative CT scans before and after introducing a systematic approach to reviewing sinus CT scans. The percentage of correctly identified structures was documented and compared using a two sample t-test.

Results

A total of 57 scans were reviewed with 28 pre-implementation and 29 post-implementation. Implementation of the sinus CT checklist improved identification of critical sinus anatomy from 24% to 84% correct ($p < 0.001$). All residents, both junior and senior, demonstrated significant improvement in identification of sinus anatomical variants, including anatomical variants not directly included in the systematic review implemented.

Conclusion

The implementation of a preoperative ESS radiographic checklist improves identification of critical anatomical sinus variations in a training population.

Poster #114**Sinonasal adenoid cystic carcinoma: A population-based analysis of 694 cases**

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 USA

Introduction

To analyze the demographics, survival, and treatment efficacy of sinonasal adenoid cystic carcinoma (SNACC).

Methods

Retrospective population-based analysis of SNACC in the SEER database between 1973-2013.

Results

694 SNACC patients were identified, of which 53.2% were female and 46.8% were male. Whites were most commonly affected (77.1%). SNACC most commonly arose from the maxillary sinuses, followed by the nasal cavity. The majority of SNACC cases presented as stage IV disease. Nodal and distant metastases were present in 3.6% and 7.1% of all cases respectively. Overall 5-, 10-, and 20-year disease-specific survival (DSS) rates were 66.5%, 41.1%, and 17.6%, respectively. The presence of distant metastasis dropped the 5-year DSS rate from 64.5% to 20.0%. Cases treated with combined surgery and adjuvant radiotherapy had a slightly improved 5-year DSS rate to surgery alone (73.5% vs. 72.5%). Surgery alone resulted in higher 10- and 20-year DSS rates (54.2% and 36.8%) when compared to combined therapy (44.2% and 15.5%), radiotherapy alone (10.8% and 0%), and no surgery or radiotherapy (9.3% and 0%).

Conclusions

This study represents the largest cohort of SNACCs to date. Factors that confer a survival benefit in SNACC include possessing low grade histologies, M0 disease, and presenting primarily in the nasal cavity. Overall low rates of nodal metastasis may not warrant the use of elective neck dissections without clinical suspicion. Modalities of therapy that includes surgery greatly improves survival. Adjuvant radiotherapy appears to improve five-year disease free intervals without impacting long term survival.

Poster #115**Sinonasal rhabdomyosarcoma: A population-based analysis**

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Introduction

Sinonasal rhabdomyosarcoma (SNMRS) is a rare soft tissue malignancy with a poor prognosis. Despite these characteristics, most data in the literature has been limited to case reports, institutional reviews, and scant population-based cohort studies. Herein we aim to investigate the epidemiology, prognostic factors, and survival rates of SNRMS.

Methods

The Surveillance, Epidemiology, and End Results database was utilized to analyze incidence and survival trends for SNRMS between 1973 and 2013. Information regarding incidence, demographic, clinicopathologic factors, and therapeutic options were evaluated.

Results

The majority of 286 cases with SNRMS were white (73.9%). Overall incidence was 0.018 per 100,000 individuals between the years of 2000 to 2013. The nasal cavity was the most frequent site (30.1%), and alveolar rhabdomyosarcoma was the predominant histologic subtype (54.9%). Five-, 10-, and 20-year disease-specific survival rates were 35.1%, 25.4%, and 12.0%, respectively. Smaller tumor size was associated with better survival. Regional nodal metastasis did not significantly affect 5- or 10-year survival. Patients without distant metastasis at time of diagnosis had a more favorable 5-year survival rate compared to those who presented with metastasis (38.6% vs. 3.8%, $p=0.0002$). Surgery had the most favorable 5-, 10-, and 20-year survival rate; however, this finding did not reach significance ($p=0.059$).

Conclusion

Sinonasal rhabdomyosarcoma is rare, with nasal cavity being the most frequent primary site. While regional metastasis did not affect survival, distal metastasis had a profound negative effect on survival.

Poster #116**Sinus mucoceles - a variant of chronic rhinosinusitis (crs): Presentation and management**

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Introduction

Sinus mucoceles (SM) can present urgently with proptosis and skull base erosion after remaining undetected for years. The objective of this report is to describe our experience with SM in a tertiary rhinology practice, specifically focusing on temporal relation to previous surgery and interventions undertaken and to highlight that this form of CRS can be asymptomatic yet still warrant surgical intervention.

Methods

Retrospective case-series report of patients diagnosed with SM from 2012-2016 in a tertiary rhinology practice. Patient demographics, presenting symptoms, exam findings, mucocele location, prior surgical interventions, surgical pathology and treatments are described.

Results

54 patients were diagnosed with 61 SM. The most common location was in the frontal sinus (36.1%). Though headache/pressure was a common complaint occurring in 61% of our cohort, SM was incidentally detected in 14.8%. Seventy-two percent (72.2%) had prior sinus surgery, 13% had a history of head trauma, while 27.8% had no history of sinus surgery. The average amount of time between prior surgery and SM formation was 17 years. Interestingly, 20.5% of patients with prior sinus surgery had a history of frontal sinus obliteration. 79.6% patients underwent surgery for their SM, while 18.5% were advised observation. All patients undergoing sinus surgery for an incidentally found mucocele had sinus inflammation identified histopathologically.

Conclusions

These data raise important guideline points for the management of CRS patients. The chronic nature of CRS and potential complications can require lifelong monitoring. Decision to obtain imaging for headache as a main complaint needs to be made carefully with consideration for patient history.

POSTERS

Poster #117**Solving the problem of post-operative airway**

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Objectives

To evaluate the effectiveness, safety and patient satisfaction with a new intranasal airway device inserted at the end of an intranasal procedure.

Study Design

150-patient clinical study testing the airway's performance. Included in the study is an assessment of, and comparison with, packing devices which include an attached airway which purports to provide a satisfactory airway during the immediate post-operative period.

Methods

Study subsets compared patient experiences with and without the airway device in place. Another study subset, in which all the patients had prior intranasal surgery without an airway, compared the patient experience with the airway as contrasted with their prior experience.

Results

146 of the 150 patients completed the study. Detailed surveys assessed the patient experiences. Overall patient satisfaction rate was 98%. There were no significant complications.

Conclusion

This new device has proven to be successful in its mission of satisfying patients and improving the safety and quality of their nasal surgery experience.

Poster #118**Sphenoid sinus meningoencephaloceles: Diagnosis and management with long term follow-up**

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Introduction

The objective of this paper is to review our operative experience with sphenoid sinus meningoencephaloceles at a single institution. We have completed a retrospective review of 19 cases of sphenoid sinus meningoencephaloceles that were resected and repaired by combined endoscopic and open techniques with long term follow-up at our institution.

Methods

All patients underwent transnasal endoscopic approach initially to ascertain the full extent of the lesion. The sphenoid face was identified, sinus opened, and origin of the encephalocele determined. Encephaloceles with far lateral extension required combined open transmaxillary/infratemporal fossa approach through the maxillary sinus face and posterior wall. A combination of abdominal fat, tissue cement, and local vascularized middle turbinate or septal flaps were used to create a watertight closure of the defect. Lumbar drains were selectively inserted to decrease pressure on the encephalocele skull base origin and on CSF leak repair sites when defect size or leak pressure dictated.

Results

Initially, 4 patients (21%) had post-operative CSF leaks with one developing meningitis; all underwent a subsequent successful re-operation. In long term follow-up, no patient has had symptoms of recurrence. Post-operative mean follow-up is 1030 days/2.8 years.

Conclusion

Meningoencephaloceles of the sphenoid sinus present a diagnostic and operative challenge to skull base surgeons. Combined endoscopic and transfacial/sublabial techniques assist in early diagnosis and surgical resection/repair. Our experience with this technique has obviated the need for a craniotomy. Our extended post-operative follow-up indicates that all cases have healed over the site of meningoencephalocele origin and show no signs of recurrence.

Poster #119**Studying the effect of standardized honey on mucosal healing of the nose and paranasal sinuses after polypectomy**

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Background

Nasal polyposis (NP) is a chronic inflammatory disease. Attempts have been made to find alternative or supplementary treatments which could diminish the need for steroids or even substitute them in this regard. Honey has several anti-microbial, anti-oxidant, healing and anti-inflammatory properties proved by several studies, but data regarding the use of honey in nasal polyposis are scant.

Methods

In this double blind placebo-controlled clinical trial, 28 patients with the diagnosis of nasal polyposis underwent functional endoscopic sinus surgery (FESS). Besides common post-op medications, normal saline and diluted processed honey were used in the two nostrils of each patient. Two endoscopic follow-ups using Philpott-Javer (P-J) scoring system was performed to assess healing and recurrence of polyps in either sides.

Results

In total 28 patients completed the study. Patients' mean age was 38.03 ± 11.9 years. Fifteen (57.7%) patients had positive prick test and also 15 (57.7%) had dense eosinophilic infiltrate in their surgical specimens. Total P-J scores was not significantly different in the 1st and 2nd visits between the two arms, whereas only the ethmoid sinus showed score improvement in the honey arm ($p=0.00$), while the total score was not different ($p=0.17$). Five-point reduction in the mentioned score did not differ between the two groups ($p=0.41$).

Conclusions

Diluted honey seems have some effect in reducing post-operative edema and recurrence of nasal polyps at least in the ethmoid sinus, however in general the positive effect did not show significant changes

Poster #120**Subclassification of chronic rhinosinusitis at a tertiary care center**

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Introduction

Chronic rhinosinusitis (CRS) remains one of the most common chronic diseases worldwide. By dividing CRS into specific distinguished entities, an individualized management plan can be developed for each CRS-subclass in order to improve treatment outcomes and quality of life.

Objective

1. Subclassification of all CRS patients who attended the ENT clinic
2. Correlation between classes: quality-of-life (QoL), total IgE, Asthma, AFS and computed tomography (CT)

Study Design

Retrospective analysis of prospectively collected data

Methods

Demographic data, QoL questioner and CT scores were obtained. CRS was divided into six phenotypic subclasses: aspirin-exacerbated respiratory disease (AERD), asthmatic sinusitis with and without allergy, nonasthmatic sinusitis with and without allergy, and allergic fungal sinusitis (AFS). Histopathologies of nasal polyps were recorded.

Results

Sixty-Two patients were included in the study, with ages ranging from 18 to 80 years of age (median age, 41 years). There were 40% female and 60% male. There were 29 non asthmatic sinusitis without allergy (NASsA), 16 asthmatic sinusitis without allergy (ASsA), 7 asthmatic sinusitis with allergy (AScA), 6 allergic fungal sinusitis (AFS) and 2 for each of aspirin-exacerbated respiratory disease (AERD) and non asthmatic sinusitis with allergy (NAScA).

Asthmatic sinusitis, and AERD patients had higher QOL and CT scores. Each asthmatic sinusitis without allergy (ASsA) and non asthmatic sinusitis without allergy (NASsA) had low total IgE. Each allergic fungal sinusitis and non asthmatic sinusitis with allergy (NAScA) had higher IgE.

Conclusion

Well-characterized and distinct groups of CRS have been defined for targeted treatment.

POSTERS

Poster #121**Subjectively dysosmic normosmia: A case report**

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 USA

Objective

A case is presented where, after smell loss, odors could be characterized based on distorted olfactory cues, resulting in a normal smell identification test.

Methods

Case report: A 48 year old right handed male whiskey connoisseur, nine months prior to presentation developed a severe upper respiratory infection (URI) associated with loss of ability to smell and taste, which persisted despite prednisone and acupuncture. Four months after the URI, he noted distorted odors, which were chemical like of different qualities depending upon the odor. Concurrently distorted taste also presented itself, so that there was either no taste at all or disgusting chemical like taste, each food with a different quality. Since then he has developed his own "odor language" where he can identify odors not based on how he recalls them but by pairing the new distorted odor with sensory cues from the environment.

Results

Chemosensory Tests: Olfactory Testing: Brief Smell Identification Testing (BSIT): 9 (Normosmia). Alcohol Sniff Test (AST): 2 (Anosmia). Retronasal Smell Testing: Retronasal Smell Index: 1 (Abnormal). Gustatory Testing: 6-n-Propylthiouracil Disk Taste Testing: 7 (Normogeusia). Other: CT and MRI of the brain and sinuses: normal.

Discussion

Disparity between the normal BSIT and complaints of anosmia may be due to adaptive learning rather than true normal smell. On the other hand, a test of threshold, the AST, confirms his deficiency. Caution should be heeded when utilizing a smell identification test alone as the indicator of anosmia.

Poster #122**Surgical approach for pterygopalatine fossa and infratemporal fossa tumors under nasal endoscope**

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Objective

To explore the best surgical approach for pterygopalatine fossa (PPF) and infratemporal fossa (ITF) tumors under nasal endoscope.

Materials and Methods

Thirty four inpatients with PPF and ITF tumors received resection under nasal endoscope from 2005 to 2015. The pathological diagnoses included a variety of benign and malignant tumors. Twenty three of the cases were male and eleven were female, aged 18-73 years old. All patients were treated under nasal endoscope with general anesthesia. Surgical approaches, complications and treatment outcomes were analyzed statistically.

Results

Surgical approaches included (1) 4 cases of anterior lacrimal recess, (2) 9 cases of the Middle Meatus of maxillary sinus posterior wall, (3) 16 cases of enlarged Middle and Inferior Meatus and (4) 5 cases of Caldwell-Luc combined with posterior lateral wall of maxillary sinus. 91.2%(31/34) of the cases were total resection and 8.8%(3/34) were subtotal resection. Post-op complications included 3 cases of facial numbness, 2 cases of active bleeding, 1 case of cerebrospinal fluid leakage, 1 case of diplopia and 1 case of decreased vision. At 6 months to 10 years follow-up examinations, the recurrence rate of benign tumor was 8%(2/25) and the 3-year survival rate of malignant tumor was 76.8%.

Conclusion

Endoscopic resection of PPF and ITF tumors has certain advantages, including clear field of vision, minimally invasive, shorter operative time and fewer complications. However, the choice of surgical approach should be decided based on the nature and location of the tumor, the availability of the operation equipment, and the skills of the surgeons.

Poster #123**Surgical management of meningocele under a navigation system in university of Chile Clinical Hospital: Report of 2 clinical cases**

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 Santiago, Metropolitana
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Introduction

the cerebrospinal fistulae it is an abnormal communication between subarachnoid space and pneumatized portion of the skull base. In persistent leaks, it is required a surgical repair because of the risk of meningitis, cerebral abscess and pneumocephalus. Endoscopic extracranial approach is the gold standard. There are many techniques and materials for repair, but selection depends on the availability of them, location, size and flow amount of the fistulae. One of the principal risks is to damage intracranial noble structures, that can be minimized with the help of technologies like image guided surgery.

Objectives

To present 2 clinical cases of spontaneous CSF leak in anterior base skull associated to meningocele that were operated through image guided surgery in our center.

Materials and Method

The diagnoses were confirmed by a CT cisternography and preoperative B2 transferrin. The location was confirmed by an intraoperative fluorescein lumbar puncture. Both surgeries were made with a navigator assisted endoscopic transnasal approach. We used a Stryker equipment with an infrared light optic system and contour based record. The repair was made with fat and free grafts, checking closure with a Valsalva maneuver.

Results

In both cases, the surgical procedure was successful, with right repair of the anatomical defect, without damaging intracranial noble structures. Headaches and auto limited vertigo were postoperative symptoms presented. There were no intraoperative nor postoperative complications recorded

Poster #124**The application of a free nasal floor mucosal graft in endoscopic sinus surgery**

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Background

Numerous reconstructive techniques and materials have been reported for repair of skull-base defects, CSF leaks and coverage of denuded bone, including pedicled vascularized flaps and free mucosal grafts. This study introduces the novel technique of harvesting and transferring a free nasal floor mucosal graft, and discusses our experience with application of this technique.

Methods

Retrospective review of 8 patients (mean age 57.8, all male) treated with image-guided endoscopic sinus surgery for chronic rhinosinusitis or tumors. Intraoperative free mucosal graft repair was performed for large skull-base defects after resection of esthesioneuroblastoma (n=2), coverage of denuded mucosa/osteoneogenic bone (n=3), and iatrogenic CSF leak with frontal sinus osteoma coverage (n=3). Repair was performed in an overlay or underlay fashion with a multilayer approach in cases of a large skull-based defect. Patients underwent endoscopic assessment at 6-days, 5 and 12-weeks post-operatively for assessment of healing and CSF leak.

Results

Minimal crusting was identified at the donor site in all patients at 6-days with no evidence of CSF leak. In cases of exposed bone/mucosal stripping, no hyperostosis was noticed at the recipient site. All patients had complete healing at the donor site and recipient site with minimal morbidity at 5 and 12-weeks without evidence of recurrent CSF leak.

Conclusion

The novel use of nasal floor mucosal free grafts in endoscopic surgery offers the advantage of ease of harvest, coverage of large defects, multiple applications of use, and minimal donor site morbidity when compared to alternative tissue grafts currently utilized in sinus and skull-base surgery.

POSTERS

Poster #125**The co-occurrence of flavor temporal summation & first taste syndrome: A case report**

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Introduction

First taste is a phenomenon whereby the first bite of food is flavorful but dissipates over a few bites. Temporal summation of taste is the condition whereby initially food has no taste, but over time, the flavor appears. The presence of both these syndromes in one individual has not heretofore been described.

Methods

Case study: This 57-year-old right-handed male developed an upper respiratory tract infection associated with persistent loss of sense of smell and taste. For most foods he can taste 65% of the flavor with the first bite, but with rapid decrement, so that by the fifth bite he has 0% of flavor, which remains absent for the remainder of the meal. However, for instance strawberries, he initially has no ability to taste and after four bites the taste appears at 60% of normal, persisting for the entire meal.

Results

Chemosensory testing: Olfactory: Brief Smell Identification: 7 (hyposmia). Quick Smell Identification: 3 (normosmia). Pocket Smell Identification: 2 (hyposmia). Alcohol Sniff: 4 (anosmia). Olfactometer Identification: Right (R) 17 (normosmia), Left (L) 16 (hyposmia). Snap phenylethyl alcohol threshold: L -3.5 (hyposmia), R >-2.0 (anosmia). Retronasal Smell Index: 3 (abnormal). Gustatory: Propylthiouracil Disc: 1 (ageusia). Threshold normogeusic to hydrochloric acid; mildly hypogeusic, 10-30%, to sucrose; ageusia to sodium chloride, urea, and phenylthiocarbamide. Saxon Test: 8 grams (normal). CT and MRI of brain and sinuses: normal. Fiberoptic endoscopy: normal.

Discussion

Both first taste and temporal summation indicate problems within the chemosensory system. Query into these in others with chemosensory complaints is warranted.

Poster #126**The first taste syndrome distorted by dysgeusia: Pathological variant of a pathological condition**

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 USA

In first taste syndrome, in those complaining of taste deficit, the first bite is flavorful which dissipates within a few bites. First taste syndrome with dysgeusia, instead of true taste, has not heretofore been described.

Methods

Case study: A 52 years old right handed female, six years prior to presentation, noted new onset of loss of taste and smell for which she underwent treatment with antibiotics, prednisone and nasal polypectomy, followed by return of smell and taste for five months, until they gradually faded away to total absence where they remain today. She describes dysgeusia, whereby she did not taste vanilla coffee but rather has a distorted sweet taste. This would occur only for the first sip, after which the flavor would disappear for at least two hours. This dysgeusic taste on first taste occurs almost daily.

Results

Chemosensory testing: olfaction: Brief Smell Identification: 6 (anosmia). Alcohol Sniff: 0 (anosmia). Pocket Smell: 1 (anosmia). Olfactometer Identification: Left (L) 6, Right (R) 6 (anosmia). Snap phenylethyl alcohol threshold: L > -2.0, R > -2.0 (anosmia). Retronasal Smell Index: 0 (abnormal). Gustatory: Propylthiouracil Disc Taste: 5 (normogeusia).

Discussion

This may represent pathological olfactory or gustatory pathways that are rapidly adapting; more severely dysfunctional than persistent dysgeusia, where the dysgeusic pathological pathway is not stable enough to sustain the discharge, leading to hyperadaptation and dysgeusic disappearance. Query as to the perceived degree of the authenticity of the first taste in first taste syndrome is warranted.

Poster #127**The horizon sign and frontal bar as two consistent and reliable landmarks to confirm frontal sinus localization during endoscopic sinus surgery (ESS)**

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Introduction

Endoscopic frontal sinus surgery can be challenging given anatomic complexities, proximity to critical structures, and surgical field characteristics, while computer navigation systems may be costly and inaccurate. We therefore define two specific, endoscopic frontal sinus landmarks that can assist all surgeons in reliable confirmation of frontal sinusotomy during ESS.

Methods

The frontal horizon sign was defined as the anterior curvature of the posterior table as it extends towards the calvarium, and the frontal bar as the bony sagittal septation at the anterior and posterior table junction within the superior frontal recess. Draf 2a sinusotomy was first performed on 12 heads/21 frontals cadaveric specimens, with endoscopic evaluation for dual landmarks. Results were compared to pre-dissection, blinded CT analyses. Additionally, Draf 2a frontal sinusotomies were prospectively assessed for reliability of dual landmark localization intraoperatively.

Results

The horizon sign was reliably identified in 21/21 (100%) cadaveric frontal sinuses using 30°, 45°, and 70° endoscopy. Frontal bars were present in only 17/21 (81%) frontal sinuses by CT. Using 0°, 30°, 45°, and 70° rigid endoscopes, increasing sensitivities of detection from 5%, 76%, 81%, and 88% for the frontal bar were identified endoscopically, with 75% specificity noted for all angled endoscopes. Reliable detection of dual landmarks was found intraoperatively in varied operative fields and primary and revision FESS using increasing endoscopic angulation, and confirmed using computer navigation.

Conclusions

The horizon sign and frontal bar are two sensitive and specific endoscopic landmarks that can aid all endoscopic surgeons in reliable frontal sinus localization during ESS.

Poster #128**The many faces of inverted papilloma**

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Objectives

Inverted papilloma (IP) is a relatively uncommon tumor of the nasal cavity. Although benign, IP has the potential for local destruction and can occasionally present a diagnostic challenge for otolaryngologists. We present two highly unusual presentations of IP and discuss the radiologic and intraoperative findings in these cases.

Case

A 46 year-old male presented with a history of nasal obstruction and chronic rhinosinusitis. He was found to have a large fungiform lesion with near complete erosion of the skull base. A 57 year-old patient presented similarly with longstanding nasal obstruction. She was found to have a large tumor filling the right nasal cavity extending through the septum and into the frontal sinus. She had near complete ossification of her tumor.

Results

Both patients were taken to the operating room and underwent successful removal of their IP. The 46 year-old male was noted to have adherence of tumor to underlying dura with bone erosion along the skull base, planum, sella, and over the carotids and clivus. The 57 year-old woman had a right nasal cavity mass that was diffusely ossified from its pedicle along all its branch points, and had eroded through the septum posteriorly and into the left nasal cavity. After excision, the final pathology of both lesions was IP.

Conclusions

Despite its benign nature, IP may have highly atypical presentations and has the potential for massive destruction. Otolaryngologists should be aware of the wide variability of IP and the challenge of diagnosis and surgical management in these patients.

POSTERS

Poster #129**The role of achromobacter xylosoxidans positive nasal cultures in patients with refractory chronic rhinosinusitis**

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 USA

Background

Bacteria appear to play a role in chronic rhinosinusitis (CRS); their role as instigator vs propagator is poorly understood, especially with less common bacteria like *Achromobacter xylosoxidans* which are only rarely reported on bacterial sinus cultures in the literature. This study aims to examine patients with CRS and culture positive *Achromobacter* with respect to clinical and microbiological characteristics, risk factors, and recalcitrance.

Design/Methods

All patients who grew *Achromobacter xylosoxidans* on sinus cultures from August 2013 to May 2016 underwent retrospective chart review.

Setting

Tertiary Rhinology Practice.

Results

11/11 patients underwent previous FESS (mean 2.0). These patients had undergone an average of 3.18 courses of oral antibiotics over the past 24 months. 4/11 patients grew bacteria in addition to *Achromobacter*, most commonly *Staphylococcus aureus*. For patients treated with antibiotics, 88.8% reported improved symptoms and 77.7% showed improved endoscopy findings. The only oral antibiotic effective against *Achromobacter* was TMP/SMX. Of the seven patients with repeat cultures following the *Achromobacter* positive culture, 60% of those who received oral antibiotic therapy were positive for *Achromobacter* on repeat culture compared with 100% of those who did not receive oral antibiotics.

Conclusions

This is the first literature to examine the characteristics of patients with *Achromobacter* to our knowledge. *Achromobacter* infection in the sinuses may be a post-surgical disease, but oral TMP/SMX antibiotic seems to be effective in controlling it. Whether *Achromobacter* is an instigator of recalcitrant disease or a bystander is unclear at this time and warrants further investigation.

Poster #130**The role of serratia marcescens positive nasal cultures in patients with refractory chronic rhinosinusitis**

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 USA

Background

Bacteria appear to play a role in chronic rhinosinusitis; their role as instigator vs propagator is poorly understood, especially with less common bacteria like *Serratia Marcescens* which are only rarely reported on bacterial sinus cultures in the literature. The goal of this study was to examine patients with CRS and culture positive *Serratia* with respect to clinical and microbiological characteristics, risk factors, and recalcitrance.

Design/Methods

All patients who grew *Serratia Marcescens* on sinus cultures from August 2013 to May 2016 underwent retrospective chart review

Setting

Tertiary Rhinology Practice

Results

21/23 patients with *Serratia* had previous FESS (mean 1.87). These patients had undergone an average of 3.44 courses of oral antibiotics over the past 24 months. 13/23 patients grew bacteria in addition to *Serratia*, the most common being *Staphylococcus aureus* and *Pseudomonas aeruginosa*. For patients treated with antibiotics 53% showed improved symptoms and 60% had improved endoscopy findings. The only oral antibiotics effective against *Serratia* were levofloxacin and TMP/SMX. Of the ten patients with repeat cultures following the *Serratia* positive culture 43% who had antibiotic therapy were positive for *Serratia* on repeat culture compared to 33% who had no antibiotic treatment.

Conclusions

This is the first literature to examine the characteristics of patients with *Serratia* to our knowledge. *Serratia* infection in the sinuses may be a post-surgical disease, but oral TMP/SMX antibiotic seems to be effective in controlling it. Whether *Serratia* is an instigator of recalcitrant disease or a bystander is unclear at this time and warrants further investigation.

Poster #131**The use of topical anaesthetic in poloxamer-407 gel for the treatment of recalcitrant atypical facial pain**

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Background

Poloxamer-407 is a gel-like polymer with unique thermoreversible properties that remains liquid in cool temperature but reverts to a gel at higher temperatures. It can be loaded with topical anaesthetics (bupivacaine, cocaine) and applied to target neuropathic pain sites within the sinuses in patients with chronic headache and atypical facial pain. The advantage to its use is the prolonged contact time with the sinus mucus membrane (2-5 days). This study aims to examine the effectiveness of topical anaesthetic impregnated poloxamer-407 in the treatment of recalcitrant atypical facial pain.

Methods

A retrospective review of post-functional endoscopic sinus surgery patients with no evidence of sinus inflammation (Lund-Kennedy Score=0) and recalcitrant atypical facial pain was performed. Topical anaesthetic impregnated poloxamer-407 was applied to the ipsilateral sphenopalatine ganglion region. Visual analog scores (VAS) for pain (on a scale of 0-10) were obtained pre and post-application. Paired t-test was used to test the difference in VAS pre and post-application.

Results

Eight patients (7-females, 1-male; mean age=53.6 years) were reviewed. There was a significant reduction in VAS for pain (mean difference=5.75, 95% CI=3.62-7.88, p-value=0.0002). The mean application interval was 10.6 days and duration of relief of >24 hours was seen in 75% of patients. No systemic absorption or adverse events were reported.

Conclusion

Poloxamer-407 impregnated with topical anaesthetic is an effective treatment option for patients with recalcitrant headache and atypical facial pain. Poloxamer-407 offers the advantages of application under direct visualization in the office setting, longstanding pain control, and reduced need for systemic pain therapy.

Poster #132**Topical nasal anesthesia using cocaine hydrochloride 4%, 10% or placebo: Preliminary safety results from an ongoing phase 3 randomized clinical trial**

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 USA

Introduction

Cocaine is the only topical anesthetic that decongests the nasal mucosa. Most studies evaluating cocaine for topical nasal anesthesia used doses <200mg. A randomized, prospective, multicenter, double-blind, placebo-controlled, parallel-group phase 3 study compared the safety of 4% and 10% cocaine hydrochloride to placebo for office nasal procedures.

Methods

156 patients presenting for an intranasal procedure were randomized to placebo (n=40), 4% cocaine (40mg/ml, n=57), and 10% cocaine (100mg/ml, n=59). Rayon pledgets saturated with up to 4ml of the study drug were placed in the nose for 20 minutes. Subjects with heart disease, uncontrolled hypertension, abnormal ECG, anesthesia difficulties, drug abuse, pseudocholinesterase deficiency or pheochromocytoma were excluded.

Results

Blood pressure elevations (>10mmHg) occurred in 111/116 (96%) cocaine patients and 31/40 (78%) placebo patients. Moderate to severe hypertension (>150 systolic or >100 diastolic) occurred in 13 (23%) cocaine 4% patients, 9 (15%) cocaine 10% patients and 4 (10%) placebo patients. Heart rate increased >20 beats per minute (BPM) in 33 (28%) cocaine patients and 8 (20%) placebo patients, exceeding 115 BPM in only 3 patients, one after 4% cocaine and 2 after 10% cocaine. One cocaine-treated patient had a mild T-wave inversion in AVF and III, while a placebo-treated patient developed a right bundle branch block. No patient required any treatment for adverse events.

Conclusions

Topical application of cocaine hydrochloride 4% and 10% applied on rayon pledgets in doses =400mg (4ml) was tolerated well for 20 minutes in selected, healthy individuals. Common side effects included elevated blood pressure and heart rate.

POSTERS

Poster #133**Trans-nasal topical sphenopalatine ganglion block using the choanacath choanal occlusion catheter in the treatment of migraine headache**

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Background

The SPG and sphenopalatine fossa are accessible via a trans-nasal approach.

Accordingly, there is a need for a device, method and/or system that not only has the capability to quickly, accurately and comfortably locate the SPG target, providing direct contact; but that also mitigates aspiration by isolating the nasopharynx from the distal airway, creating a favorable environment through which direct SPG contact is further sustained.

Hypotheses

SPG block procedure with 2% viscous lidocaine delivered through the ChoanaCath Choanal Occlusion Catheter, will be an effective abortive treatment for episodic migraines.

Results

Eight women, presented for treatment with headaches satisfying ICHD-II criteria for migraine. All patients reported a high degree of satisfaction during the procedure with essentially no coughing, choking or aspiration symptoms and no adverse effects were reported subsequent to performing the procedure; although two reported improved nasal breathing. One patient with near-daily headaches, requested a secondary optional treatment at the 2 week interval and remained essentially headache-free for the subsequent 2 weeks.

Conclusion

The ChoanaCath Choanal Occlusion Catheter is a precise, safe and effective technique to accurately deliver topical, trans-nasal analgesics to the SPG mucosa; larger medication volumes can be retained directly in the SPG region for longer sustained duration of treatment time without the risk of aspiration inherent in other trans-nasal delivery methods. Further investigation is certainly warranted related to technique efficacy, especially studies comparing efficacy of ChoanaCath and other trans-nasal delivery devices.

Poster #134**Trans-sphenoidal pituitary surgery effects on obstructive sleep apnea in patients with acromegaly: A systematic review and meta-analysis**

(Presented by Andrew Thamboo, MD, MHSc)

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Acromegaly is a chronic disease related to an excessive growth hormone (GH) and insulin-like growth factor secretion, most commonly as a result of a pituitary adenoma. There is a high incidence of obstructive sleep apnea among patients diagnosed with acromegaly. The introduction of endoscopic transnasal transsphenoidal pituitary surgery has significantly decreased the risks and morbidities of surgical treatment. It remains unclear, however, whether directed pituitary surgery has a significant effect in reducing OSA indices among this population of patients.

Objectives

A systematic review and meta-analysis to assess whether treatment of acromegaly by means of endoscopic transnasal transsphenoidal excision of pituitary adenoma has any significant long-term effects on the hypopnea index and oxygen desaturation index among patients with acromegaly and a comorbid diagnosis of OSA.

Methods

Systematic review of all studies relating to transsphenoidal pituitary adenectomy in acromegalic patients with obstructive sleep apnea. A search was performed on Scopus, MED-LINE, Pubmed and The Cochrane Library, initially September 3 2015, with an update on October 10, 2015. In our meta-analysis our primary outcome was to evaluate the pre- and post-surgical values for AHI as well as secondary outcome for GH, ODI and IGF-1 values.

Results

Three studies (21 patients) were included. The mean age was 46.6±10.7 years old and a body mass index (BMI) of 28.7±2.4kg/m². Our meta-analysis showed significant treatment effect for AHI (p=0.003) and IGF-1 (p<0.0001). One study reported GH values, which significantly improved following TSS (p<0.05). No studies included ODI.

Conclusion

Included studies reported an improvement on OSAS following TSS and hormonal control.

Poster #135**Tuberculosis of the middle ear and sinonasal cavities**

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Outcomes Objective

1. Recognize a rare presentation of tuberculosis (TB) involving the middle ear and sinonasal cavities.
2. Consider tuberculosis in the differential diagnosis of necrotic-appearing ear or nasal disease.

Introduction/Methodology

Tuberculosis otitis media is an insidious and uncommon cause of otorrhea. Nasal tuberculosis is another rare manifestation of this chronic granulomatous infectious disease. We report an unusual case of an African American patient with tuberculosis of both the middle ear and nasal passage.

Results

A 52-year-old female presented initially with left facial paresis, hearing loss, dizziness, chronic otorrhea, tinnitus and complaints of recurrent sinusitis. The patient underwent a left-sided tympanomastoidectomy, facial nerve decompression, and tympanic membrane graft placement. Inflammatory granulation tissue was found to have eroded through the left tympanic membrane, filling up the middle ear space and extending into the mastoid cavity. She developed progressively worsening necrosis in the left nasal cavity and severe nasopharyngeal stenosis. Inferior turbinate biopsies with culture analysis identified *Mycobacterium tuberculosis*, and sputum analysis was positive for acid fast bacilli. The patient was managed with 9 months of anti-tubercular antibiotic therapy, several surgical debridements, and nasopharyngeal dilations with significant improvement in clinical status.

Conclusion

Both nasal and ear tuberculosis are considered to be very rare manifestations of the infection. It is important to consider tuberculosis in patients with complex and chronic presentations of necrotizing ear and nasal pathology.

Poster #136**Usefulness of the trans-septal approach to sphenoid sinus lesions in endoscopic endonasal sinus surgery**

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Introduction

Endoscopic approaches to the sphenoid sinus (SS) are now facile and safe thanks to development of advancements in instrumentation (e.g., high-definition cameras, navigation systems, third generation microdebriders, etc.). However, some complex cases of SS disease remain challenging. In this study we review the usefulness of trans-septal approach to such cases.

In our practice in Tokyo, Japan, indications for this trans-septal approach include: 1) complex anatomy (small SS, obstructing Onodi cell); 2) severe inflammatory disease requiring complete removal (fungal sinusitis, eosinophilic sinusitis); 3) tumors.

Surgical approach

Endoscopic submucosal resection of the septal cartilage and bone as needed is first done. The posterior portion of the vomer which marks the anterior wall of the SS is then easily identified. The anterior wall of the SS is removed using a straight forceps and sphenoid punch, exposing and connecting both SS. The septa of the left and right sides are then removed.

Outcomes and conclusion

Between 2010 and 2015, 35 patients with SS diseases (17; complex anatomy, 14; severe inflammation, 4; tumor) underwent trans-septal SS surgery in ESS. There were no complications. Recurrence of disease was found in only 1 case, one of fungal sinusitis. Our protocol for treating complex SS disease via trans-septal access serves as an acceptable and reliable alternative for difficult-to-manage SS disease.

POSTERS

Poster #137**Using a perfusion-based human cadaveric specimen with intrathecal fluorescein as a simulation training model in repairing cerebrospinal fluid leaks during endoscopic endonasal skull base surgery**

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Objective

To develop a simulation model for endoscopic endonasal repair of skull base cerebrospinal fluid (CSF) leaks.

Methods

Fluorescein-dyed saline was infused with a perfusion pump into the intrathecal space of a cadaver and a CSF leak was deliberately created in the suprasellar arachnoid. Otolaryngology and neurosurgical residents then practiced a standard endoscopic endonasal approach to repair the CSF leak using a combination of fat, fascia lata, and pedicled nasoseptal flaps. Likert scale questionnaires assessing pre and post training confidence, gain of new knowledge and techniques and increased safety were administered to participants after completion of simulation.

Results

All participants endorsed gain of new knowledge (4.88 ± 0.35), new technique (5.00 ± 0.00), and felt safer performing the procedure (5.00 ± 0.00). Average pre-procedure confidence was 2.00 ± 0.93 and average post-procedure score was 3.88 ± 0.84 ($p < 0.01$). All trainees reported a realistic experience enhanced by addition of the perfusion model.

Conclusions

As endoscopic skull base surgery continues to rapidly evolve, achieving competency in skull base reconstruction and repair of high flow CSF leaks will be an increasingly essential component of the otolaryngologic training process. The addition of a fluorescein-dyed intrathecal perfusion system to a cadaveric simulation scenario can produce a realistic training model for developing CSF leak repair skills using various grafts and pedicled naso-septal flaps.

Poster #138**Voice outcomes after endoscopic sinus surgery in patients with chronic rhinosinusitis with nasal polyposis**

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Introduction

The purpose of this study was to assess voice outcomes after ESS in patients with CRSwNP.

Methods

A retrospective review was performed of patients with CRSwNP who underwent ESS from July 2015 to May 2016 at a tertiary referral medical center. Main outcome measures were subjective improvement in patient-reported outcomes (PROMs), using the Sino-Nasal Outcome Test (SNOT-22) and Voice Handicap Index (VHI-10).

Results

A total of 50 patients (age 47.9 years; 48% female); 65% revision, 35% primary, were available at a follow-up of 3 months. At the 3 month follow up, both SNOT-22 and VHI-10 were improved from preoperative values (-41.8 and -14.7 respectively).

Conclusion

Successful treatment of sinonasal disease can help to improve voice outcomes in patients with CRSwNP. There are inherent differences in the long term outcomes of the results beyond three months based on practice patterns of ongoing medical management but our results are interesting in showing early improvement in voice outcomes.

Poster #139**Balloon sinuplasty technique for improvement of symptoms in chronic sinusitis patients**

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Background

This study examines patient outcomes for balloon dilation of the sinuses coupled with turbinate reduction, septoplasty, and ethmoidectomy. The hybrid procedure, called the Honrubia Technique™, is a novel approach to balloon sinuplasty (BSP) performed in-office rather than in the OR, incorporating a traditional balloon procedure with use of general anesthesia. The technique allows the surgeon to perform turbinate reduction, septoplasty, ethmoidectomy, and more aggressive irrigation of the sinuses without additional discomfort to the patient.

Methods

734 patients undergoing the procedure and meeting the inclusion criteria for the study were surveyed prior to surgery, and at 2 and 5 weeks post-operatively regarding recurrent symptoms due to rhinosinusitis and rhinitis. The survey of choice was the Sino-Nasal Outcome Test (SNOT-22), which includes ratings (scale 0-5) on a set of 22 symptoms related to sinus infections.

Results

Prior to surgery, patients had a median value of 59 for the SNOT-22 score. At two weeks post-surgery, the SNOT-22 score was a median value of 19, and the SNOT-22 median value at five weeks post-surgery was 14.

Conclusions

SNOT-22 scores are dramatically lower post-surgery by a remarkable 45 points on average, denoting a 67.8% decrease in symptoms, indicating an overall dramatic improvement in patient outcomes. The results show that the Honrubia Technique™ offers better immediate results and provides improved patient outcomes for chronic sinusitis sufferers.

Poster #140**Assessing the impact of dynamical changes in the nasopharynx on perception of nasal patency**

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Background

Perception of nasal patency has been reported to be strongly associated with airflow resistance from nostrils to choanae rather than nostrils to nasopharynx. However, what is less known is whether dynamical changes in nasopharynx morphology can affect sensation in nasal patency as determined by airflow resistance from nostrils to choanae. This study uses computational fluid dynamics modeling to investigate the relationship between changes in nasopharynx morphology and nasal patency.

Methods

Three-dimensional (3D) models of the nasal cavity from 10 (5 Normal and 5 Nasal Airway Obstruction (NAO)) subjects were created from computed tomography images. The size of the inferior half of the nasopharynx in each subject's 3D (Baseline) model was virtually modified in a systematic manner to create 4 constricted and 5 dilated nasopharynxes of varying sizes. Airflow simulations were conducted in all models under steady turbulent conditions, targeting 15L/min, 30L/min and 40L/min flow rates, respectively.

Results

In the normal models, trans-nasal resistance (NR) from nostrils to choanae in the Baseline model was 0.248Pa.min/L, 0.442Pa.min/L, and 0.555Pa.min/L for 15L/min, 30L/min and 40L/min flow simulations, respectively; while NR (Mean ± Standard Deviation) in constricted models were 0.248±0.0001Pa.min/L, 0.438±0.001Pa.min/L, and 0.553±0.003Pa.min/L, respectively; and 0.247±0.001Pa.min/L, 0.438±0.002Pa.min/L, and 0.557±0.004Pa.min/L in dilated models. Similarly, in the NAO models, Baseline NR was 2.493Pa.min/L, 3.495Pa.min/L, and 4.057Pa.min/L for 15L/min, 30L/min and 40L/min flow simulations, respectively; 2.51±0.004Pa.min/L, 3.527±0.012Pa.min/L, and 4.103±0.018Pa.min/L for constricted; and 2.501±0.008Pa.min/L, 3.531±0.015Pa.min/L, and 4.113±0.018Pa.min/L for dilated models, respectively.

Conclusion

Our results suggest that dynamical changes in nasopharynx morphology do not impact nasal patency.

POSTERS

Poster #141**Comparison of sinonasal squamous cell carcinoma with and without association of inverted papilloma**

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Introduction

Sinonasal squamous cell carcinoma (SSCC) accounts for less than 1% of all malignancies, but represents 70-80% of sinonasal cancer. Approximately 7% of SSCC is associated with inverted papilloma (IPSCC). Studies comparing patients, outcomes, and treatment of SSCC and IPSCC are absent in the literature.

Methods

Retrospective case-series of SSCC including IPSCC patients from Cleveland Clinic and Indiana University from 1995 to the present. Records were analyzed for demographics, tumor characteristics, treatment, and outcomes.

Results

The study comprised 117 SSCC patients, 29 of which were IPSCC. Basic demographics were similar between the two groups. The maxillary sinus was most commonly involved, followed by the nasal cavity. Nodal metastasis was more likely in non-IPSCC patients (18% vs 0%, $P=0.02$). Patients were divided into high and low TNM stage disease, which demonstrated more common nodal metastases in high-stage non-IPSCC (25% vs 0%, $P=0.003$). Upfront treatment was surgery in 84% of non-IPSCC and 97% of IPSCC ($P=0.12$). Rates of therapeutic radiation and chemotherapy were similar among all non-IPSCC and IPSCC. However, when including only low-stage TNM disease, chemotherapy was more common in IPSCC ($p=0.03$). Overall survival averaged 5.5 and 3.4 years for non-IPSCC and IPSCC ($P=0.12$); disease free survival was 4.8 and 2.9 years respectively ($P=0.18$).

Conclusion

Although SCC with and without inverted papilloma association are considered different diseases, their demographics and outcomes appear similar. There is a significant difference in treatment chemotherapy offered more frequently in lower stage IPSCC. Further study is needed.

Poster #142**Efficacy of chitodex-budesonide-mupirocin treatment of staphylococcus aureus in a sheep model sinusitis**

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Objectives

Efficient delivery of anti-inflammatory and antibiofilm treatments for patients with recalcitrant chronic rhinosinusitis (CRS) continues to be a challenge. Current management options lack sufficient contact time with the sinus mucosa for the active agents to exert their full effect. This study aims to assess the efficacy of Chitodex gel, combined with an anti-inflammatory agent Budesonide and an antibiofilm agent Mupirocin (CD-BM) for treatment of *S. aureus* biofilms in vivo.

Methods

Using a sheep sinusitis model, 15 sheep were divided into three groups of 7 days treatments with (1) twice daily saline flush (NT), (2) Chitodex gel (CD) with twice daily saline flush, and (3) CD-BM with twice daily saline flush. The anti-inflammatory effect was graded histologically by a blinded independent pathologist. The antibiofilm effect was assessed comparing the biofilm biomass across all groups using LIVE/DEAD BacLight stain and confocal scanning laser microscopy.

Results

Histopathological analysis showed no significant differences between the different groups in the degree of inflammation, epithelial thickness, goblet cell hyperplasia, oedema and fibrosis. COMSTAT2 assessment of biofilm biomass showed a significant reduction in CD-BM treated sheep compared to NT controls (95% CI [0.2665 to 8.330], $P<0.05$, two-way ANOVA analysis).

Conclusion

Results indicate that CD-BM is effective against *S. aureus* biofilms in a sheep sinusitis model and could represent a viable treatment option in the clinical setting for recalcitrant CRS.

Poster #143**Real life trial in high-risk chronic rhinosinusitis patients**

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Objectives

Chronic rhinosinusitis (CRS) remains a challenging inflammatory disease to treat, while its population demonstrates variable outcomes to the current treatment therapies. We have conducted a real life clinical trial in a high-risk CRS population to evaluate the demographic, biochemical and microbial factors associated with failure of standard treatment therapy.

Methods

We conducted a prospective trial in our tertiary care center and included 75 patients (35F/40M) at high-risk of disease recurrence following endoscopic sinus surgery (ESS) and nasal irrigations with budesonide respules. Blood samples, microbial swabs, and Sino-Nasal Outcome Test (SNOT-22) were retrieved from patients preoperatively (Visit-1) and four months postoperatively (Visit-2). Failure was characterized as an ethmoidal mucosal oedema score of more than 1/3. Data were analyzed using a Student's T-test and a Pearson's Chi-squared test, with $p < 0.05$ deemed statistically significant.

Results

Thirty-seven patients (49%) had treatment failure at Visit-2. Previous ESS ($p=0.003$), the presence of Gram-negative bacteria ($p=0.042$), specifically *Pseudomonas aeruginosa* ($p=0.049$), and *Staphylococcus aureus* ($p=0.006$) were all statistically significantly associated with treatment failure. Patients failing treatment had increased SNOT-22 scores (22.9 vs. 32.4; $p=0.056$). Lastly, failure rates were significantly higher in revision cases (60%) than in primary ESS cases (25%) ($p=0.007$).

Conclusion

While primary ESS cases tend to have favorable outcomes, we demonstrate that close to two thirds of patients undergoing revision ESS are at risk of failing therapy. There is therefore a clear need to properly understand the phenotype of revision ESS patients and develop alternative predictive algorithms and therapeutic strategies to be incorporated in patient management.

Poster #144**Utility of balloon sinuplasty in patient with chronic sinusitis in the U.S.**

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Introduction

Over the past decade, the use of balloon sinuplasty has increased widely in the U.S. Since its introduction, and following the addition of balloon sinus codes in 2011, no large-scale, population-based studies have examined its use among chronic rhinosinusitis (CRS) patients.

Methods

We conducted a retrospective cohort study using administrative health data from the Clinformatics Data Mart database, a database of one of the nation's largest commercial health insurance programs. Patients with a diagnosis of CRS in each calendar year (2011-2014), listed in any position on any inpatient or outpatient claim, were included. We assessed the prevalence of sinus surgery across all calendar years and performed multivariate analyses.

Results

There is an increase in the utility of balloon sinuplasty as a stand-alone procedure from 5% in 2011 to 22.5% in 2014. Hybrid procedures continued to be the most commonly performed sinus procedure over the study period. Results from our multivariable analyses found an increase in balloon sinuplasty and hybrid procedures over the years 2011-14. Regarding the site of sinus surgery, patients with frontal sinus surgery were 4.61 (4.22, 5.03) times more likely to have a balloon-only procedure; and 6.54 (5.77, 7.42) times more likely to have a hybrid procedure relative to conventional functional endoscopic sinus surgery (FESS).

Conclusion

An increase in the prevalence of balloon sinuplasty from 2011 to 2014 was coupled with a small decrease in conventional FESS. Patients with frontal sinus surgery were more likely to have a balloon or hybrid procedure relative to conventional FESS.

CASE REPORT/POSTERS

CR Poster #001

A case of nasal nk/t-cell lymphoma diagnosed following ESS for chronic sinusitis

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Nasal natural killer (NK)/T-cell lymphoma shows destructive ulceration, granulation, and necrosis in the sinonasal lesion, and the pathological diagnosis is known to be difficult. We experienced a case with NK/T cell lymphoma in the nasal cavity, who was diagnosed following endoscopic sinus surgery (ESS) for chronic sinusitis.

A 53-year-old female was referred to us because of high fever and severe right facial pain following ESS. The initial diagnosis was right chronic maxillary sinusitis, and she underwent ESS at the first hospital. Computed tomography indicated no sign of malignancy such as bony destruction at that time. She went to the second hospital because of the right lasting buccal pain and high fever one month after initial surgery. Biopsy was performed, and the diagnosis showed inflammatory change without sign of malignancy. Although intravenous administration of high dose of prednisolone and antibiotics, improvement of her symptoms were not obtained. Subsequently, she was referred to Showa University Hospital and biopsy was performed again, then she was diagnosed as nasal NK/T-cell lymphoma finally from the resected mucosa of the posterior wall of the maxillary sinus and the inferior turbinate.

She was treated by dexamethasone, etoposide, ifosfamide and carboplatin (DeVIC) regimen for 3 cycles and radiotherapy of 50Gy, and complete remission (CR) was achieved. No recurrence was seen 6 months after the treatments although long-term follow-up is needed.

CR Poster #002

A rare case of biphenotypic sinonasal sarcoma

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Purpose

To present a rare case of sinonasal and skull base malignancy.

Case Report

A previously healthy 52-year-old male presented with a 6-month history of nasal bridge and right eye swelling, accompanied by ipsilateral epistaxis. Exam revealed tenderness of the right nasal bridge and mild right proptosis. Flexible and rigid nasal endoscopy demonstrated a right-sided exophytic mass visible between the middle turbinate and nasal septum. CT and MRI showed a large right-sided mass centered in the ethmoid sinus with expansion towards the skull base, cribriform plate, and right medial orbit. Intraoperative frozen section analysis was consistent with a spindle cell neoplasm. Definitive resection was deferred until permanent pathology given the associated morbidity with skull base resection. Permanent pathology returned as a malignant low-grade sinonasal sarcoma with myogenic and neurogenic features. Immunostaining showed positive staining for S100, BCL2, SMA, HHF35, and desmin, and negative staining for CD31, CD34, beta-catenin, and EMA. Histopathology and immunostaining were consistent with low grade biphenotypic sinonasal sarcoma. Patient is planning to undergo anterior craniofacial resection in the future.

Discussion

Low-grade sinonasal sarcoma with myogenic and neurogenic features is a newly described type of sinonasal malignancy with only about 40 reported cases in the Otolaryngology literature. Its spindle cell histologic appearance can lead to inaccurate pathological classification, thus affecting surgical intervention and management.

Conclusion

Malignant low-grade sinonasal sarcoma with myogenic and neurogenic features is a rare and challenging diagnosis, but should be kept in the differential diagnosis of sinonasal tumors to avoid delay in diagnosis.

CR Poster #003**A severe and unique case of inverted papilloma with diffuse condemned mucosa and oro- antral fistula**

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Inverted papilloma is an uncommon lesion of the sinonasal passages. There are only about 1 in 100,000 cases per year. The histology of these lesions is very characteristic with hyperplastic epithelial layers that grow endophytically into the underlying stroma. They are typically benign lesions but can have aggressive features such as bone invasion. Additionally, in rare cases, they can undergo malignant transformation to a squamous cell carcinoma.

This case is of a 30 year old female with left inverted papilloma that was found to be very extensive resulting in a type of "condemned mucosa syndrome". The patient presented to a tertiary care center after a biopsy was positive for inverted papilloma at an outside institution. On presentation, the patient had inverted papilloma involving the septum, nasal floor, and inferior turbinate. There were skip lesions and an oro- antral fistula. She underwent initial wide local excision, and then had a recurrence and returned to the operating room for a further, more aggressive resection. Despite very aggressive resection, the lateral margin was positive. Nearly all the mucosa of the left nasal cavity was involved with papilloma, which the authors are describing as a type of "condemned mucosa syndrome" making resection difficult. The following is a description (with photographs) of this unique and challenging case of diffuse papilloma.

CR Poster #004**Acinic cell carcinoma of the nasal cavity: Case report and review of the literature**

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Introduction

Acinic cell carcinoma (ACC) is a rare, slow-growing salivary malignancy most commonly seen within the parotid gland. Few cases are reported arising from minor salivary glands and fewer from within the nasal cavity. We present the case of 60-year-old-man diagnosed with ACC of the nasal cavity and review the relevant literature.

Methods

A 60-year-old male presented to rhinology clinic with right nasal obstruction and intermittent epistaxis. On endoscopic exam, he was found to have a large sinonasal mass. The patient reported that this was biopsied approximately 5 months prior, and records obtained demonstrated ACC. CT scan was obtained which demonstrated no skull base or orbital involvement. The patient underwent endoscopic resection during which two attachment points to the mid and anterior septum were noted.

Results

Final pathology demonstrated ACC with negative margins and no evidence of perineural or lymphovascular invasion. No further adjuvant treatment was pursued.

Conclusions

ACC of the nasal cavity is a rare malignancy primarily treated via surgical excision and adjuvant radiation for adverse features. Recognition of this rare malignancy is important to prevent confusion with other malignant entities and to adequately guide treatment.

CASE REPORT/POSTERS

CR Poster #005

Case report: Nasopharyngeal angiofibroma in a 32-year-old man

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Introduction

We report an interesting case of a nasopharyngeal angiofibroma arising de novo in a 32 year old man. Previous reports of this entity have generally listed the maximum age in the upper twenties which makes this patient's presentation particularly interesting.

Case Description

A 32-year-old male was transferred to our hospital with severe nasal hemorrhage after biopsy of a left nasopharyngeal mass. His past medical history was significant for rhabdomyosarcoma of the right orbit status post radiation. Review of previous imaging performed three years prior demonstrated no obvious lesion of the nasopharynx. He was brought to the operating room where brisk bleeding was encountered from a sizable fibrous mass filling the entire nasopharynx. A pedicle was identified along the posterolateral nasal cavity wall just anterior to the anterior cushion of the torus tubarius. Minimal if any lesion was isolated from the pterygopalatine fossa. Final pathology revealed an angiofibroma weakly staining positive for androgen receptor.

Discussion

As the reported age of patients presenting with nasopharyngeal angiofibroma has extended beyond adolescence many have recommended eliminating the juvenile component from the nomenclature. Despite this, and given the patients prior history of malignancy this diagnosis was not truly entertained by the referring or receiving surgeons. To our knowledge this is one of the oldest patients presenting with a de novo JNA in his 4th decade of life confirming that this diagnosis must be considered in all those with large nasopharyngeal masses.

CR Poster #006

Cerebral abscess due to penetrating frontal sinus stenting: A case report

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Background

Frontal sinus surgery has known challenges given proximity of the frontal sinus to the skull base and orbit, and the complex anatomy of its outflow tract. Postoperative care is directed at minimizing frontal sinus stenosis, which may be managed by the use of temporary or permanent frontal sinus stents. We report a case of frontal sinus stenting causing violation of the skull base, and subsequently leading to intracranial abscess formation.

Methods

Retrospective review of a single case at a tertiary academic medical center.

Results

A 44-year-old male patient underwent endoscopic sinus surgery for chronic rhinosinusitis at an outside facility, with placement of a Rains frontal sinus stent. Postoperatively, the patient experienced bloody, progressing to clear rhinorrhea which self-resolved, with improvement in his sinonasal symptoms. Two months later, he reported a severe headache and experienced a seizure while driving. During work-up of multiple spine fractures, CT demonstrated a Rains stent extending through the cribriform plate and into the anterior cranial fossa. An MRI further demonstrated a 2 cm frontal lobe abscess. He underwent emergent surgery via an endoscopic approach to remove the stent and to drain the abscess, with reconstruction of the skull base defect with a nasoseptal flap. Postoperatively, he has recovered well, returning to his baseline preoperative mental status.

Conclusion

Frontal sinus surgery is often challenging due to its complex anatomy. We report the first case of a patient with frontal lobe abscess due to a frontal sinus stent.

CR Poster #007**First report: Granulomatosis with polyangiitis complicated by carotid blowout**

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Introduction

Granulomatosis with polyangiitis is characterized by glomerulonephritis and respiratory tract necrotizing granulomas. In the upper airway, this can result in erosion of the skull base, in extreme circumstances, having catastrophic consequences. Reconstruction options for the anterior skull base is limited, given adjacent nasal tissue may be involved. Several methods have been described for these situations. We present a rare complication of catastrophic bleeding from the internal carotid artery in a patient with necrosis of the anterior skull base as result of untreated GPA and subsequent successful reconstruction of the skull base with tunneled, endoscopically placed pericranial flap.

Methods

Case report and review of the literature for skull base reconstruction in erosive pathologic processes of the paranasal sinus.

Results

We report the first case of a carotid blowout secondary to extensive involvement of the palate, septum, and skull base from untreated GPA. The patient was emergently intubated and packed, and the carotid artery coiled by interventional neurosurgery. A pedicled pericranial flap was then tunneled into the nasal cavity via an osteotomy to cover the exposed carotid vessel. The patient survived, and in six-month follow-up her graft site at the anterior skull base was well healed without further complications

Conclusions

The first manifestations of GPA occur overwhelmingly in the head and neck. Uncontrolled GPA can result in skull base erosion, exposure, and blowout of the carotid artery. Reconstruction of the region with non-diseased tissue and medical management to correct the underlying immunologic defect can be successful in these difficult situations.

CR Poster #008**Incidental finding of nasal glomus tumor during operative treatment for Cushing's disease**

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Introduction

Glomus tumors are benign mesenchymal neoplasms arising from specialized thermoregulatory structures called glomus bodies. Though encountered in the head and neck, few reports exist of nasal cavity glomus tumors.

Methods: Case Report

Case presentation: We present a 58-year-old woman with Cushing's disease who was found to have an incidental polypoid mass of the left nasal cavity on preoperative imaging in preparation for a non-otolaryngology assisted microscopic pituitary microadenoma resection. The patient reported approximately one year of left-sided congestion and obstruction but otherwise no symptoms of chronic sinusitis. Computed tomography and MRI scans revealed a polypoid mass of the left nasal cavity medial and posterior to the middle turbinate, with a small amount of osteitic bone in the posterior ethmoids.

Results/Management

Left total ethmoidectomy and maxillary antrostomy with complete excision of the polypoid mass was performed prior to microscopic transsphenoidal pituitary resection. Permanent pathology and immunohistochemical staining confirmed a diagnosis of glomus tumor, with positive for vimentin and muscle specific actin. No immunohistochemical stains were positive for epithelial derivation. At recent follow-up, there was no sign of persistent or recurrent tumor and pre-operative symptoms had resolved.

Discussion

Glomus tumors are exceedingly rare in the nasal cavity. Patients typically present with symptoms of nasal cavity obstruction, pain, rhinorrhea, and epistaxis, with a nasal mass found subsequently on endoscopy. The authors present a case of glomus tumor in the nasal cavity found incidentally on imaging.

Conclusion

Though rare, glomus tumor should be considered in the differential of nasal cavity mass.

CASE REPORT/POSTERS

CR Poster #009

Inflammatory myofibroblastic pseudotumor masquerading as invasive fungal sinusitis

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Objectives

Inflammatory myofibroblastic pseudotumor (IMT), part of the inflammatory pseudotumor (IPT) family, has proven difficult to diagnose due to its shared presenting features with multiple diagnoses. Histopathologically similar to non-specific inflammatory changes, this space-occupying lesion is characterized by myofibroblasts in a bed of prominent small lymphocytes and plasma cells. We present a case involving an initially misdiagnosed sinonasal lesion.

Methods

Case report and literature review.

Results:

A 57 year-old woman with a several month history of severe right-sided headache with facial pain developed acute worsening of blurry vision and right lid ptosis. Imaging revealed a destructive sinonasal lesion. The patient was initially diagnosed with invasive fungal sinusitis by another provider due to saprophytic fungal hyphae on pathology review. The patient's disease progressed while on intravenous antifungal therapy. Repeat biopsy and endoscopic examination and pathology review revealed an inflammatory process consistent with IMT. The lesion was rapidly responsive to intravenous steroid therapy.

Conclusions

The IPT family of diagnoses is a commonly missing pathology within a differential diagnosis for an expansile sinonasal mass given its rarity. It is important for the clinician to keep IPT within the differential when encountering a large sinonasal mass because early identification of this condition can lead to better treatment and minimize the unnecessary care provided to these patients. Moreover, the current treatment strategy for IMT primarily involves medical therapy.

CR Poster #010

Long-term follow up of a patient with malignant transformation of inverted papilloma into sinonasal undifferentiated carcinoma

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Introduction

Inverted papillomas(IP) are benign sinonasal neoplasms accounting for 0.5-4% of all nasal tumors. They have been known to transform into squamous cell carcinoma in 5-15% of cases. Rarely, transformations to other malignancies have been reported. Here we report a case of malignant transformation of IP into sinonasal undifferentiated carcinoma(SNUC).

Methods

Case presentation with review of literature; IRB exempt.

Results

Patient is a 62-year-old male who presented in February 2007 with four months of nasal airway obstruction. He had a long history of exposure to fumes, chemicals, dusts, and solvents as a professional painter. He had a 45 pack-year history of smoking and years of alcohol abuse. He was found to have a left ethmoidal IP and pathologic review discovered a focus of malignant transformation into SNUC. Total resection was achieved at the time of surgery and he underwent concurrent chemoradiation therapy postoperatively. He was followed closely postoperatively with frequent nasal endoscopy examinations and imaging as indicated. After eight years of close follow up, he still remains disease-free.

Conclusions

IP is known to transform into squamous cell carcinoma. Here reported is a case of malignant transformation into SNUC, a much more uncommon and aggressive lesion. We explore the role of organic solvents, carcinogens, and HPV in the pathogenesis of malignant transformation. Recent research into theorized biomarkers of malignant transformation is reviewed. The observed differences between primary SNUC and malignant transformation into SNUC are discussed. Finally, the treatment and prognosis of these lesions is debated.

CR Poster #011**Metastatic hepatocellular carcinoma with initial presentation in the sphenoid and cavernous sinuses**

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Outcomes Objective

1. Recognize a rare presentation of undiagnosed hepatocellular carcinoma metastasizing to the sphenoid sinus with extension into the cavernous sinus.
2. Consider the possibility of a metastatic tumor in patients presenting with sphenoid sinusitis.

Introduction/Methods

Nervous system involvement as the initial presentation of hepatocellular carcinoma (HCC) has been rarely reported. We describe a case of an African American patient with a metastatic sphenoid sinus mass originating from an undiagnosed hepatocellular carcinoma.

Results

A 63-year-old male with a one-week history of worsening right lower extremity weakness presented to the emergency department with complaints of diplopia, blurred vision, retro-orbital pain and evidence of complete left-sided ophthalmoplegia. An MRI of the brain exhibited a rapidly growing soft tissue mass centered at the lateral wall of the left sphenoid sinus with cavernous sinus invasion and extension through the orbital apex. The patient underwent a neuroendoscopic endonasal resection of the mass. Positive immunohistochemical stains for CD10, polyclonal CEA, and arginase favored grade 2 HCC. A large enhancing mass of the right lobe of the liver subsequently confirmed the diagnosis on CT imaging. On follow-up imaging three months later, the HCC had unfortunately markedly progressed, and the patient was placed in hospice care.

Conclusion

The sphenoid sinus is an extremely unusual site of metastasis from an asymptomatic HCC. It is important to consider metastatic cancers in patients with neurological findings and a sphenoid mass.

CR Poster #012**Polyostotic fibrous dysplasia of the inferior turbinate: A case report and review of literature**

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Introduction

Fibrous dysplasia is a sporadic bony lesion characterized by replacement of normal bone by fibrous tissue and woven bone. The clinical presentation of fibrous dysplasia is variable and patients may exhibit involvement of a single bone (monostotic fibrous dysplasia) or multiple bones (polyostotic fibrous dysplasia). While the craniofacial skeleton is frequently involved in polyostotic cases, occurrence in the sinonasal tract is rare with the maxillary sinus most frequently affected.

Methods

We report a polyostotic case of fibrous dysplasia of the inferior turbinate and ethmoid sinus in a 64-year-old woman who initially presented with nasal obstruction, nasal congestion, and poor CPAP tolerance secondary to high pressure requirements. Nasal endoscopy revealed an enlarged left inferior turbinate abutting the nasal septum, right septal deviation and mucoid drainage from the right middle meatus. Computed tomography demonstrated ground glass density and expansion of the left ethmoid sinus and inferior turbinate, suggestive of fibrous dysplasia.

Results

The patient underwent successful resection of the left inferior turbinate bony tumor via an endoscopic medial flap turbinoplasty with use of the ultrasonic bone aspirator in conjunction with septoplasty and right inferior turbinate submucous resection. Post-operatively, endoscopy revealed a well healed mucosal flap with an excellent nasal airway by the 4 week follow up.

Conclusion

There have only been four reports of fibrous dysplasia of the inferior turbinate, two monostotic cases and two polyostotic cases. This is the first case of polyostitic fibrous dysplasia involving the inferior turbinate successfully treated with medial flap turbinoplasty reported in the United States.

CR Poster #013**Presentation, workup and management of penetrating trans-orbital and trans-nasal injuries: A case report and systematic review**

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Introduction

A foreign body penetrating the brain through the anterior skull base after passing transorbitally or transnasally is a rare occurrence. These penetrating intracranial injuries are most commonly seen in the pediatric population and occur mainly due to falls or motor vehicle collisions.

Methods

We performed a systematic review of the literature on the presentation, workup and management of trans-nasal or trans-orbital penetrating foreign body (FB) injury with a case report of a 53 year old female that presented with a trans-orbital penetrating rose bush branch injury. We searched Medline and Embase resulting in 215 total titles that were then narrowed based on inclusion/exclusion criteria to 70 articles for full text review. Articles that discussed FB injury that did not involve the paranasal sinuses, humans, or were not in English were excluded.

Results

Our patient suffered a penetrating branch with a superior medial orbital entry point traversing the lamina papyracea and fovea ethmoidalis resulting in CSF otorrhea and frontal lobe contusion. We also review the previously reported demographics, mechanism, workup, medical, surgical management and complications of these types of injuries.

Conclusions

Trans-nasal and trans-orbital penetrating foreign body injuries are a relatively uncommon occurrence but when they do occur require rapid workup and interdisciplinary management to prevent acute and delayed complications.

CR Poster #014**Primary cholesterol granuloma of the sphenoid sinus without petrous apex involvement**

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Cholesterol granulomas are well-described lesions that most commonly involve the petrous apex of the temporal bone. Other craniofacial locations, such as the paranasal sinuses and orbits have been reported on rare occasions in the literature. We report a unique case of a primary cholesterol granuloma of the sphenoid sinus without petrous apex involvement. A 67 year old Caucasian female with a history of chronic rhinosinusitis and previous sinus surgery at age 37 presented on referral from an outside otolaryngologist after noting an isolated right sphenoid sinus opacification with erosion of the lateral sphenoid wall and planum sphenoidale on CT scan that was initially concerning for a mucocoele. In light of the patient's complaints of changes to her vision, as well as proximity of the lesion to the orbital apex on imaging, an Ophthalmology consultation was obtained which ruled out optic nerve involvement. She was taken the operating room for revision sphenoidotomy, where pathologic analysis of the debris isolated to the right sphenoid sinus was found to be consistent with a cholesterol granuloma. While isolated cholesterol granulomas of the sphenoid sinus are highly unusual, their diagnosis can be confirmed by careful radiographic and histopathologic analysis. Timely intervention to both diagnose and debride these lesions carries a good prognosis with a low likelihood of disease recurrence.

CR Poster #015**Sinonasal phosphaturic mesenchymal tumor: A rare entity and review of the literature**

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Objectives

Phosphaturic mesenchymal tumors (PMT) are extremely rare neoplasms. Most often PMT appear in the appendicular skeleton and extremities, however 5% are found in the head and neck region, 50% of which appear in the sinonasal cavity. Often misdiagnosed, PMT is associated with tumor-induced osteomalacia, a paraneoplastic process. Patients often present with vague symptoms such as muscle weakness, bone pain, and pathologic fractures. Additionally, PMT has been associated with malignant transformation and metastasis. After proper identification, complete surgical resection is curative and will reverse the paraneoplastic process. We present a new case of PMT in the sinonasal cavity.

Methods

Case report and review of the literature.

Results

A 37-year-old woman presented with nasal mass history of nasal obstruction. She had undergone partial resection of a nasal 9 months prior with pathologic diagnosis of "small blue cell/spindle cell neoplasm of uncertain histogenesis". Repeat pathologic examination was sought and diagnosis of sinonasal phosphaturic mesenchymal tumor was diagnosed. Residual tumor was removed via endoscopic approach.

Conclusions

PMT is an extremely rare entity in the head and neck region with only 33 case reports. Patients may present with vague symptoms, which can delay diagnosis and put patients at risk for malignant transformation or metastasis. Correct identification and complete surgical resection is paramount for cure and reversal of any paraneoplastic process.

CR Poster #016**Sinonasal renal cell-like adenocarcinoma: A case report and histologic review**

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Background

While similar with respect to presentation and anatomic considerations, Sinonasal malignancies can exhibit significant histologic heterogeneity. Sinonasal renal cell-like adenocarcinoma (SNRCLA) is one entity with its own unique histopathologic features, recognition of which is of the utmost importance for diagnosis and treatment. Our objective is to report a case of SNRCLA with an emphasis on the histologic considerations and review of the literature.

Methods

We present a case of a patient with SNRCLA. Hematoxylin-and-eosin (H&E) slides and immunohistochemistry were reviewed as well as nasal endoscopy and surgical approach.

Results

A 48-year old male presented with nasal congestion and epistaxis. Endoscopy revealed a friable, vascular mass occupying the right nasal cavity. Computer tomography (CT) and magnetic resonance imaging (MRI) were obtained revealing a heterogeneously enhancing mass extending from the cribriform to the level of the inferior turbinate without intracranial extension. Selective embolization was performed prior to biopsy in the operating room. Frozen sections were thought to be consistent with angiofibroma and endoscopic resection was performed without complication. Final pathology revealed the ultimate diagnosis of SNRCLA. Imaging did not demonstrate evidence of a renal primary. The patient is currently without evidence of recurrence one year post-operatively.

Conclusions

SNRCLA is a newly described entity named for its resemblance to renal cell carcinoma (RCC). While RCC is the most common neoplasm to metastasize to the paranasal sinuses, SNRCLA histologically mimics RCC without evidence of metastatic disease. Once identified, treatment with adequate surgical resection can result in low rates of recurrence without significant morbidity.

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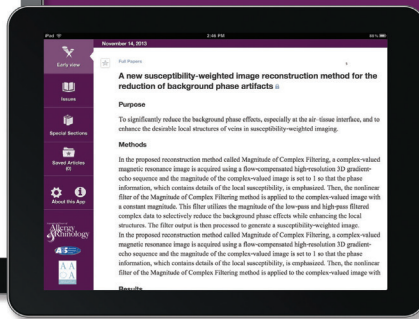
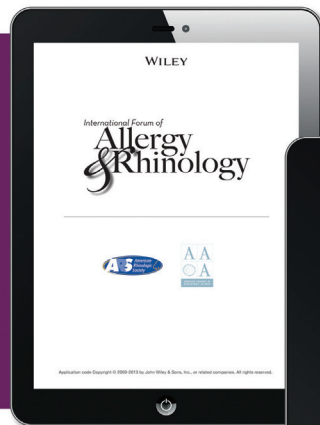
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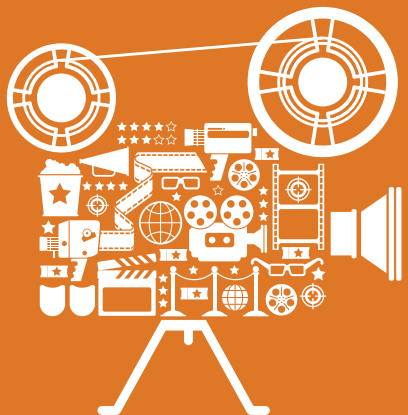
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FALL FILM FESTIVAL

The ARS will again be featuring the **Fall Film Festival** - a **video seminar** featuring the most educational, unique and impressive videos of cases, complications and challenges submitted by the membership.

The videos were reviewed by an appointed committee and rated equally on rarity of pathology, technical complexity, novelty of procedure, educational value, and production quality. The top-rated videos (time-permitting) will be showcased at the meeting with an opportunity for the video editors to introduce each clip and respond to questions from the audience.



2017 Meetings

COSM 2017

April 27-28, 2017

Manchester Grand Hyatt
San Diego, California

ARS 6th Summer Sinus Symposium

July 14-16, 2017

Omni Shoreham Hotel
Washington DC

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ARS 63rd Annual Meeting

September 8-9, 2017

Renaissance Chicago
Downtown Hotel
Chicago, Illinois

Find membership & meeting details online at:

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