



ARS 61ST ANNUAL MEETING

SEPTEMBER 25 & 26, 2015

SHERATON DALLAS HOTEL
DALLAS, TX

The ARS Welcomes Our 61ST Annual Meeting Guest Countries

China



Korea



Japan



Taiwan



Thailand



LIVE WEBSTREAMING!

ATTENTION OTOLARYNGOLOGISTS WORLDWIDE!

ATTEND THE AMERICAN RHINOLOGIC SOCIETY
2015 ANNUAL MEETING ONLINE

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

Saturday, September 26, 2015
8:00 am – 5:30 pm (US Central Daylight Time)

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



ROY CASIANO, MD

Presidential Welcome to the 61st Annual Meeting of the ARS

On behalf of the Board of Directors, it is my great honor and pleasure to welcome you to the 61st Annual Meeting of the American Rhinologic Society in Dallas. Under the direction of Program Chair, Peter Hwang, MD, and his program committee, we hope to offer an exciting, valuable, and enjoyable program. This will be the first year we have gone to a one and a half day schedule, with satellite programs, such as cadaver dissection labs, available for our participants. In addition, we will be broadcasting our first live international webcast of an ARS meeting. It is our sincere goal to provide program content that is broad and timely, as we recognize the wide array of interests and needs amongst our membership, regardless of whether you are a general otolaryngologist in a community practice, or an academic rhinologist.

This year's program will feature informative panels and will showcase ARS research, and our flagship journal, the International Forum of Allergy & Rhinology (IFAR). Once again, the Kennedy Lecture highlights the Annual Program. Our esteem colleague and friend, James Stankiewicz, MD, will deliver the 11th Annual Kennedy Lecture. A respected teacher, researcher, and clinician, Dr Stankiewicz will share his perspective and experience on endoscopic sinus surgical complications, over his 30 years of practice.

Finally, I must take a moment to recognize the true generosity of our corporate partners in support of our organization and endeavors. It is only through these strong relationships that we are able to realize our goals of excellence in education, training, research, and patient advocacy. On behalf of the entire Board of Directors, I am proud to say that these partnerships are stronger than ever with aligned strategic goals. Please join me in thanking our corporate partners by exploring the exhibits and visiting with them.

I believe this Annual Meeting of the ARS, the 61st in our history, will prove to be our finest yet as an organization. Please enjoy your time in Dallas and welcome to the ARS!

Roy R. Casiano, MD, FACS
President, American Rhinologic Society

P.S. Are you a member of the ARS? If not, please join us in advancing the field by becoming a member at this meeting. There are a lot of new and enhanced benefits of becoming a member, including free access to our new online educational materials, free registration to our annual Summer Sinus Symposium Meeting, as well as free subscription to IFAR, to name a few. Our staff will be readily available on site to assist you.



PETER HWANG, MD

President-Elect Welcome

Welcome to Dallas for the 2015 ARS Annual Fall Meeting!

It has been an honor to work with the Program Committee to develop this year's scientific program, now expanded to one and a half days. On behalf of the ARS, we are delighted to bring you the very best of rhinology from around the country and around the world.

This year's meeting embodies the ARS's vision for engagement in the global rhinology community. Our teaching faculty includes representatives of Australia, Canada, China, England, Japan, Lebanon, & New Zealand. We also warmly welcome our international delegates, including those from this year's guest countries: China, Japan, Korea, Taiwan, & Thailand. Finally, the ARS is delighted to be partnering with the Pan-American Association of Otorhinolaryngology to offer the first-ever live streaming webcast of the ARS scientific program. Saturday's full day program will be live-streamed to our colleagues in Latin America as well as to members of our guest countries in Asia. We hope you will join us in welcoming our international colleagues and celebrating the global community of rhinology at the International Reception, Friday evening at 7pm (registration required).

This year's scientific presentations were drawn from one of the largest pools of submissions to date. The quality of this year's submissions has been simply outstanding. The oral and poster presentations represent the cutting edge of rhinologic research, and I hope you share in my excitement in learning from our brightest and most innovative researchers. We are pleased to feature the highest rated abstracts in Friday afternoon's scientific session. I would like to thank the members of the Program Committee for their hard work in thoughtfully reviewing all of the abstract submissions, and for their participation as moderators of the scientific program.

In addition to presenting the latest scientific developments, we also hope that the ARS Annual Fall Meeting provides you a forum for discussion of challenging clinical topics and current controversies in clinical rhinology. I am grateful to the many thought leaders who have agreed to lend their expertise in serving on our panel presentations as panelists and moderators. We hope that you will leave Dallas with new ideas, fresh perspectives, and renewed enthusiasm for our field, all of which will ultimately be to the benefit of our patients.

A special thanks to Wendi Perez, the "brains" of our operation, without whom our meeting would simply not be possible. To Wendi, and the entire ARS administrative team, thank you for your tireless efforts, your skillful troubleshooting, and your dedication to the ARS.

Thank you for your continued support of the American Rhinologic Society. If you are not currently a member of the ARS, please take a moment to learn about the many benefits of membership and consider joining. Enjoy the meeting!

Peter H. Hwang, MD, FARS
ARS President-elect & Program Chair

American Rhinologic Society Executives - 2015



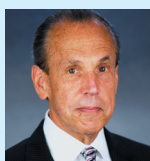
Roy Casiano, MD
President
University of Miami Hospitals
& Clinics
1120 NW 14th Street
5th floor, Clinical Research Bldg
Miami, FL 33136
Tel: 305-243-5290
Fax: 305-243-5291
Email: rcasiano@med.miami.edu



Peter Hwang, MD
President-Elect
801 Welch Road
Stanford, CA 94305
Tel: 650-725-6500
Fax: 650-725-8502
Email: phwang@ohns.stanford.edu



James Palmer, MD
Secretary
University of Pennsylvania
Medical Center
5 Ravdin, Division of Rhinology
3400 Spruce Street
Philadelphia, PA 19104
Tel: 215-662-7746
Fax: 215-614-0071
Email: secretaryars@gmail.com



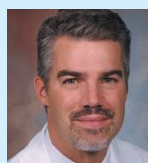
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Treasurer,
Executive Vice President
NYU Medical Center
345 E. 37th Street #306
New York, NY 10016
Tel: 646-754-1203
Fax: 646-754-1222
Email: josephjacobs@amrhso.com



Rodney Schlosser, MD
Treasurer-Elect
135 Rutledge Ave., Suite 1130
MSC 250550
Charleston, SC 29425
Tel: 843-792-7165
Fax: 843-792-0546
Email: schlossr@musc.edu



John DelGaudio, MD
First Vice President
Emory University
550 Peachtree Street, NE
11th Floor
Atlanta, GA 30308
Tel: 404-778-3381
Email: jdelgau@emory.edu



Richard Orlandi, MD
Second Vice President
Division of Otolaryngology-HNS
50 North Medical Dr., 3C120
Salt Lake City, UT 84132
Tel: 801-581-7515
Fax: 801-585-5744
Email: richard.orlandi@hsc.utah.edu



Timothy Smith, MD
Immediate Past President
Oregon Health & Science
University
Oregon Sinus Center
3181 SW Sam Jackson
Park Rd PV- 01
Portland, OR 97239
Tel: 503-494-7413
Fax: 503-494-4631
Email: smitthim@ohsu.edu



Wendi Perez
Executive Administrator
PO Box 495
Warwick, NY 10990
Tel: 845-988-1631
Fax: 845-986-1527
Email: wendi@amrhso.com

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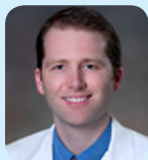


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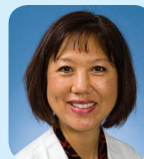
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ARS Mission Statement

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

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 12.75 *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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2014 - Present	Roy Casiano, MD

*Deceased

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For information on the Friends in Research Fund and/or how to support the fund, please contact Wendi Perez, ARS Administrator at wendi@amrhso.com or 845-988-1631.

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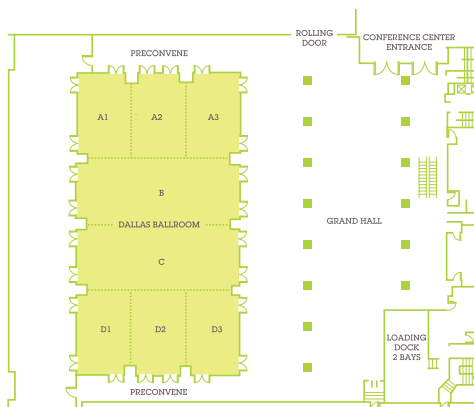
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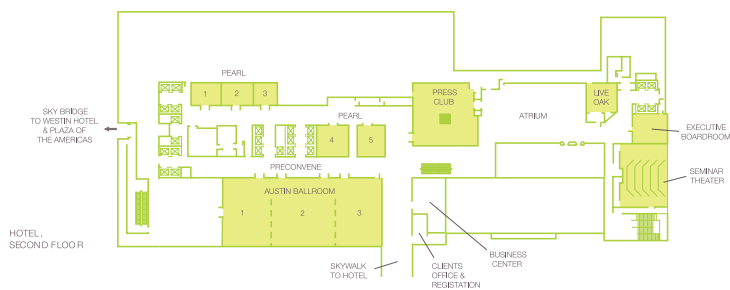
**List updated as of 9/9/15.*

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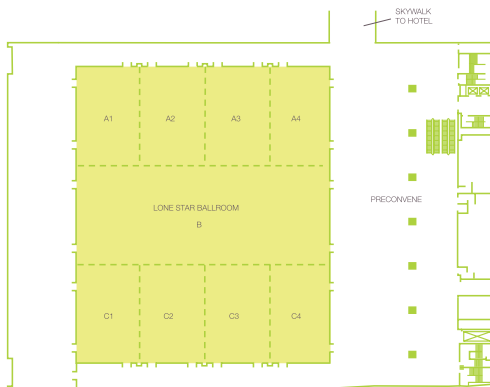
CONFERENCE CENTER, FIRST FLOOR



HOTEL, SECOND FLOOR



CONFERENCE CENTER, SECOND FLOOR



HOTEL, THIRD FLOOR



CONFERENCE CENTER, THIRD FLOOR



AM Rhinologic Society Scientific Meeting

Sheraton Dallas Hotel / Dallas Ballroom-Grand Hall-1st Floor

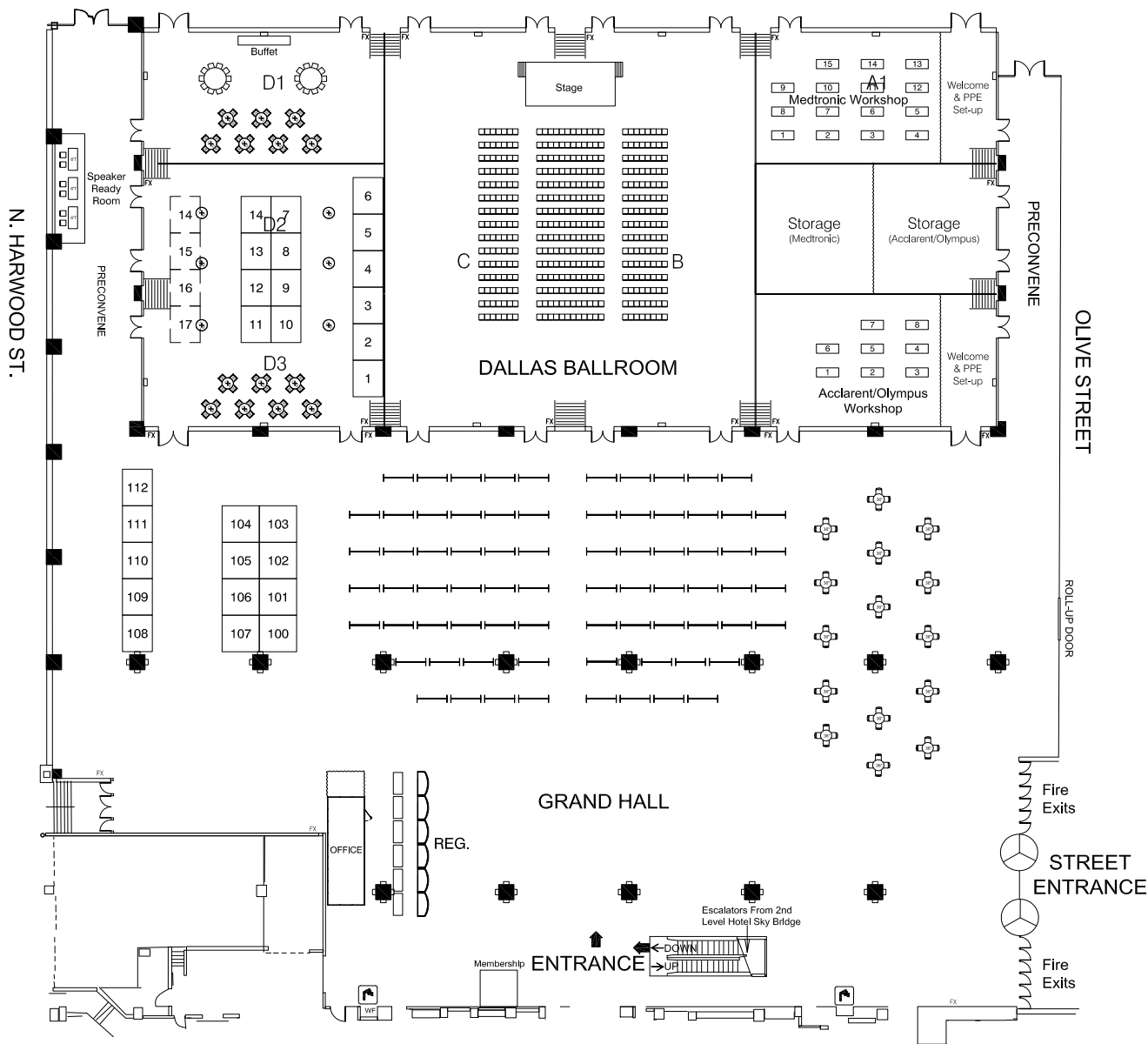


Exhibit Hall

- | | |
|---------------|---------------------------------------|
| Booth 1 | B3 Precision Medical Technologies LLC |
| Booth 2 | NeilMed Pharmaceuticals |
| Booth 3, 4, 5 | Medtronic Surgical Technologies |
| Booth 6 | Merck & Co., Inc. |
| Booth 7 | Lannett Specialty Pharma |
| Booth 8 | Carestream |
| Booth 9 | Modernizing Medicine |
| Booth 10 | InHealth Technologies |
| Booth 11 | Hemostasis LLC |
| Booth 12, 13 | Olympus America Inc. |
| Booth 14 | Teva Respiratory |

Showcase Booths (Grand Hall)

- | | |
|----------|-----------------------------------|
| 100 | Stryker |
| 101 | Meda Pharmaceuticals |
| 102 | Acclarent |
| 103 | Intersect ENT |
| 104, 105 | Smith & Nephew |
| 106 | Flagon |
| 107 | Entellus Medical |
| 108 | PolypVac by Laurimed |
| 109 | Xoran Technologies |
| 110, 111 | KARL STORZ Endoscopy-America Inc. |
| 112 | SinuSys Corp. |

PROGRAM AT A GLANCE

Friday, September 25, 2015

1:00pm – 5:30pm
Dallas Ballroom B/C

12:55pm

Welcome – ARS President and President-Elect

Roy Casiano, MD & Peter Hwang, MD

1:00pm

PANEL: Scary cases: Career-altering cases that changed the way I practice

Moderator: Michael Platt, MD

Panelists: Martin Citardi MD, Samer Fakhri MD, Donald Lanza MD, Ralph Metson MD

Session: **Top Rated Abstracts, Part 1**

Moderators: John DelGaudio, MD & Richard Orlandi, MD

1:40pm

High-throughput gene expression profiling reveals distinct patterns in chronic rhinosinusitis subtypes

Matthew A. Tyler, MD

1:47pm

Safety analysis of long-term budesonide nasal irrigations in patients with chronic rhinosinusitis post endoscopic sinus surgery

Ethan Soudry, MD

1:54pm

Long-term safety of high-volume sinonasal budesonide irrigations for chronic rhinosinusitis

Kristine A. Smith, MD

2:01pm

Resolve: Bioabsorbable steroid-eluting sinus implants for in-office treatment of recurrent sinonasal polyposis after sinus surgery: 6-month outcomes from a randomized, controlled, blinded study

Keith D. Forwith, MD

2:08pm

Cost utility analysis of endoscopic sinus surgery for chronic rhinosinusitis

George A. Scangas, MD

2:15pm

Discussion

2:20pm

AAAI Guest Speaker: Daniel Hamilos MD
Host-microbial interactions in chronic rhinosinusitis

2:45pm

Break with Exhibitors

3:10pm

PANEL: Biologic therapies for CRS: Where do we stand?

Moderator: Rodney Schlosser, MD

Panelists: Daniel Hamilos, MD, Joe Han, MD, Stella Lee, MD

Session: **Top Rated Abstracts – Part 2**

Moderators: Do-Yeon Cho, MD & Neil Bhattacharyya, MD

3:50pm

Staphylococcus aureus impairs the airway epithelial barrier in vitro

Zacki Malik, MBBS

3:57pm

Fighting sinus derived staphylococcus aureus biofilms in vitro with a bacteriophage-derived muralytic enzyme

Amanda Drilling, PhD

4:04pm

Correlation of T2r38 taste phenotype and sinonasal biofilm formation in chronic rhinosinusitis

Carl M. Truesdale, MD

4:11pm

Cluster analysis and prediction of treatment outcomes for chronic rhinosinusitis

Zachary Soler, MD

4:18pm

The Draf III mucosal grafting technique: Long-term follow-up

Elisa A Illing, MD

4:25pm

Discussion/Q&A

4:30pm

Film FESStival

Moderator Adam DeConde, MD

Panelists: Nithin Adappa, MD, Karen Fong, MD, Brian Rotenberg, MD MPH, Peter John Wormald, MD

5:15pm

Closing Remarks and Adjournment

7:00pm

International Welcome Reception honoring the 11th Annual David W. Kennedy Lecturer:

James Stankiewicz, MD

Location: Dallas Ballroom D1; Supported by: KARL STORZ Endoscopy-America, Inc., Intersect ENT, Medtronic Surgical Technologies, Olympus America Inc.

Saturday, September 26, 2015

Morning Session; 7:55am – 12:00pm; Dallas Ballroom B/C

Session will be live streamed to Latin American Countries as well as to our Guest Countries, co-sponsored by the Pan-American Association of Otorhinolaryngology.

7:55am

Welcome

8:00am

PANEL: Challenging cases of CRS: A global perspective

Moderator: Timothy Smith, MD, MPH

Claire Hopkins, DM, FRCS; Nobuyoshi Otori, MD; Brent Senior, MD; Peter John Wormald, MD, PhD; Bing Zhou, MD

8:50am

Introduction of the 11th Annual Kennedy Lecturer: Peter H. Hwang, MD**The 11th Annual Kennedy Lecture – James Stankiewicz, MD “Complications of Endoscopic Sinus Surgery: 30 Years Later”**

9:25am

Presidential Address: Roy Casiano, MD

9:35am

Break with Exhibitors

10:00am

PANEL: Interpreting the microbiome and its impact on clinical therapy

Moderator: Steve Pletcher, MD

Emily Cope, PhD; Richard Douglas, MD, PhD; Andrew Lane, MD; Alkis Psaltis, MD, PhD

10:40am

PANEL: Controversies in the management of sinonasal malignancy (Joint panel with the North American Skull Base Society)

Moderator: Eric Wang, MD

Alex Chiu, MD; Anderson Eloy, MD; Devyani Lal, MD; Ian Witterick, MD

11:20am

PANEL: Aspirin exacerbated respiratory disease: State of the art (joint panel with the American Academy of Otolaryngic Allergy)

Moderator: Matthew Ryan, MD

Panelists: David Khan, MD; Jamie Litvack, MD, MS; Amber Luong, MD, PhD

12:00pm

Lunch with Exhibitors

12:00-1:00pm

**Residents & Fellows Luncheon
Dallas Ballroom A1**

12:15-1:00pm

**Mentorship Program Luncheon
Dallas Ballroom C**

**Saturday, September 26, 2015
PM Session: Breakout A,
Dallas Ballroom B**

Session will be live streamed to Latin American Countries as well as to our Guest Countries, co-sponsored by the Pan-American Association of Otorhinolaryngology.

12:55pm

Welcome:

Jose Busquets, MD, Chairperson

Moderators: Melissa Pynnonen, MD & Thomas Higgins, MD, PhD

1:00pm

The chronic sinusitis action plan - A patient self-education instrument
Smriti Nayan, MD

1:07pm

Understanding patients' knowledge and expectations in endoscopic sinus surgery

Paul D. Neubauer, MD

1:14pm

A prospective cohort study comparing drivers of surgical intervention following maximal medical therapy for chronic rhinosinusitis

Zainab Farzal, BS

1:21pm

Patient-centered decision making: The role of the baseline SNOT-22 in predicting outcomes for medical management of chronic rhinosinusitis

Toby O. Steele, MD

1:28pm

Patients with chronic rhinosinusitis electing medical versus surgical treatment: emotional domain of the rhinosinusitis disability index associates with treatment selection

Quinn Orb, MD

1:35pm

Q&A

Moderators: Karen Fong, MD & Jose Busquets, MD

1:40pm

Olfactory-specific quality of life outcomes after endoscopic sinus surgery

Zachary M. Soler, MD

1:47pm

Office-based olfactory mucosa biopsies
Eric Holbrook, MD

1:54pm

A novel olfactory cleft endoscopy scale for patients with chronic Rhinosinusitis
Zachary M. Soler, MD

2:01pm

Sensitivity analysis and diagnostic accuracy of the brief smell identification test in patients with chronic rhinosinusitis

Edward El Rassi, MD

2:08pm

Efficacy of olfactory training in patients with olfactory loss: a systematic review and metaanalysis

Kelly R. Pekala, BA, MS

2:15pm

Q&A

2:20pm

PANEL: Olfaction: Advances in basic science and clinical treatment

Moderator: Eric Holbrook, MD

Panelists: Greg Davis, MD, Bradley Goldstein, MD, Zara Patel, MD, Justin Turner, MD

3:00pm

Break With Exhibitors

Moderators: Alkis Psaltis, MD & Nithin Adappa, MD

3:25pm

Long term stability of the post-surgical maxillary sinus microbiome

Andrew Lane, MD

(Presented by Ashleigh Halderman, MD)

3:32pm

DNase sensitive sinus bacteria and implications for sinus microbiome studies

Josh Carlton, BS

3:39pm

Message in the mold: Examining the fungal microbiome in subtypes of chronic sinusitis

Jonathan T. Gelber, BA

3:46pm

Antibacterial resistance in the microbiome of chronic rhinosinusitis patients

Arthur W. Wu, MD

3:53pm

Differences in the paranasal sinuses between germ-free and pathogen free mice

Ravi Jain, MBChB

4:00pm

Q&A

Moderators: Jonathan Ting, MD & Troy Woodard, MD

4:05pm

Endoscopic endonasal orbital cavernous hemangioma resection: Global experience in techniques and Outcomes

Benjamin Bleier, MD

4:12pm

Timing of endoscopic surgical decompression in traumatic optic neuropathy: A systematic review of the literature

Sandeep S. Dhaliwal, MD

4:19pm

A systematic review of the evidence base for vidian neurectomy in managing rhinitis

Tal Marshak, MD

4:26pm

Outcomes of revision modified endoscopic Lothrop procedure

David K. Morrissey, MBBS

PROGRAM AT A GLANCE

4:33pm

Outcomes of modified endoscopic Lothrop in aspirin exacerbated respiratory disease with nasal polyposis
David Morrissey, MBBS

4:40pm

Q&A

4:45pm

PANEL: Complex frontal sinus cases

Moderator: Marc Dubin, MD
Panelists: Rakesh Chandra, MD, Charles Ebert, MD, Stacey Gray, MD, Richard Orlandi, MD

5:25pm

Closing Remarks

5:30pm

Meeting Adjourned

5:45pm

President's Wine & Cheese Poster Reception

Grand Hall
(Supported by Intersect ENT)

Saturday, September 26, 2015
PM Session: Breakout B,
Dallas Ballroom A3

1:00pm

Welcome:

Erin O'Brien, MD, Chairperson

Moderators: Li-Xing Man, MD & Michael Platt, MD

1:00pm

Metastatic squamous cell carcinoma of the nasal cavity: A population-based analysis

Aykut A. Unsal, DO

1:07pm

Incidence of HPV identified in squamous cell carcinoma of the nasal cavity

Naweed Chowdhury, MD

1:14pm

Layered closure with simple bony onlay graft: An acceptable alternative to nasoseptal flap for anterior skull base reconstruction

Christopher R. Roxbury, MD

1:21pm

Mucosal-sparing options for endoscopic endonasal approach to the craniocervical junction

Alejandro Vazquez, MD

1:28pm

Internal carotid artery injury in endoscopic endonasal surgery: A systematic review

Oliver Y. Chin, BA

1:35pm

Q&A

Moderators: Jacqueline Corey, MD & Sarah Wise, MD

1:40pm

Inhibition of allergic responses by intranasal topical selective Nf-b inhibitor in murine model of allergic rhinitis

Dong-Young Kim, MD

1:47pm

TNF-alpha-mediated inflammation in chronic rhinosinusitis due to differential expression of type 1 and type 2 TNF-alpha receptors

Justin H. Turner, MD

1:54pm

T regulatory and Th17 cells in chronic rhinosinusitis with polyps

Dijana Miljkovic, MS

2:01pm

Connexin gap junction channels and chronic rhinosinusitis

Raymond JT Kim, MD

2:08pm

Doxycycline inhibits Tgf-β1-induced extracellular matrix production in nasal polyp-derived fibroblasts

Byungjin Kang, MD

2:15pm

Q&A

2:20pm

PANEL: Building a successful career in research: Pearls from the PI's

Moderator: Sarah Wise, MD
Panelists: Noam Cohen, MD, Tim Smith, MD, Rod Schlosser, MD, Andy Lane, MD

3:00pm

Break with Exhibitors

Moderators: Jeremiah Alt, MD, PhD & Sandra Lin, MD

3:25pm

Improvements in sleep-related symptoms after endoscopic sinus surgery in patients with chronic rhinosinusitis

Edward El Rassi, MD

3:32pm

Otologic outcomes after endoscopic sinus surgery

Neville W. Teo, MBBS

3:39pm

Pain and depression in patients with chronic rhinosinusitis: Does the evidence support a relationship?

Daniel R. Cox, MD

3:46pm

Impact of omalizumab therapy on medication requirements for chronic rhinosinusitis

Matthew J. Clavenna, MD

3:53pm

Characterizing human nasal airflow physiologic variables by nasal index

Aniruddha U. Patki, MD

4:00pm

Q&A

Moderators: Waleed Abuzeid, MD & Marc Tewfik, MD, MSc

4:05pm

Comparison of intranasal fluticasone and budesonide in post-operative endoscopic sinus surgery patients with chronic rhinosinusitis with polyposis

Paul D. Neubauer, MD

4:12pm

Placement of a steroid-releasing implant in maxillary and frontal sinus ostia:

3-month results of a prospective, multicenter, open label trial
William J. Brown, MD

4:19pm

Frontal sinus surgery and access of nasal irrigation

Henry P. Barham, MD

4:26pm

Cadaveric validation study of computational fluid dynamics model of sinus irrigations before and after sinus surgery

John R. Craig, MD

4:33pm

Topical antibiotic therapy after endoscopic sinus surgery: Prospective double-blind placebo controlled study

Mohammad H. Al-Bar, MD

4:40pm

Q&A

4:45pm

PANEL: Topical therapies for rhinosinusitis: A critical appraisal of the evidence

Moderator: Kevin Welch

Panelists: Noam Cohen, MD, Jivianne Lee, MD, Chris McMains, MD, Raymond Sacks, MD

5:25pm

Closing Remarks

5:30pm

Meeting Adjourned

5:45pm

President's Wine & Cheese Poster Reception

Grand Hall

(Supported by Intersect ENT)

**Saturday, September 26, 2015
PM Session: Breakout C,
Dallas Ballroom A2**

1:00pm

Welcome

Mark Zacharek, MD, Chairperson

Moderators: Elina Toskala, MD & Subinoy Das, MD

1:00pm

Evaluation of the safety of antimicrobial photodynamic therapy for refractory chronic rhinosinusitis

Shaun Kilty, MD

1:07pm

Antimicrobial photodynamic therapy for treatment of refractory chronic rhinosinusitis: A case series

Luis Macias-Valle, MD

1:14pm

Protective properties of nanodisk-amphotericin B (nd-amb) over commercially available amphotericin B In human nasal epithelia

Do-Yeon Cho, MD

1:21pm

"Mind DeGapp:" In vitro efficacy of deferiprone and gallium-protoporphyrin against S.aureus biofilms

Katharina Richter, MSc

1:28pm

The efficacy of rifampicin and doxycycline against intramucosal bacteria in chronic rhinosinusitis: Double-blinded randomized controlled trial

Raymond Kim, MD

1:35pm

Q&A

Moderators: Mark Zacharek, MD & Alla Solyar, MD

1:40pm

Impact of postoperative endoscopy upon clinical outcomes after endoscopic sinus surgery

Rodney Schlosser, MD

1:47pm

Acute radiology rarely confirms sinus disease in suspected recurrent acute rhinosinusitis

Alexander S. Zhang, MBBS

1:54pm

Cost effective selection between swab and tissue biopsy for conventional sinus cultures in chronic rhinosinusitis patients

Anastasios Maniakas, MD

2:01pm

Modeling risk factors associated with recurrence of nasal polyps after sinus surgery

Amber Luong, MD

2:08pm

To pack or not to pack? - A decision analysis model

Sagit Stern-Shavit, MD

2:15pm

Q&A

2:20pm

PANEL: Hemostasis in FESS: An evidence - based approach

Moderator: John DeGaudio, MD

Panelists: Amin Javer, MD, David Poetker, MD, Raj Sindwani, MD

3:00pm

Break with Exhibitors

Moderators: Ethan Soudry, MD & Brian Rothenberg, MD

3:25pm

Clinical implications of mucosal remodeling from chronic rhinosinusitis

Timothy Q. Do, Bmed

3:32pm

Fibroblast proliferation & vitamin D deficiency in chronic sinusitis

William W. Carroll, MD

3:39pm

Failure pressures of three rhinologic dural repairs in a porcine ex vivo model

Presented by Andrew B. Baker, BA

3:46pm

Outcomes of outpatient endoscopic repair of cerebrospinal fluid rhinorrhea

Austin S. Adams, MD

(Presented by Paul Russell, MD)

3:53pm

Factors impacting cerebrospinal fluid leak rates in endoscopic sellar surgery

Tom T. Karnezis, MD

(Presented by Andrew B. Baker, BA)

4:00pm

Q&A

Moderators: Jonathan Liang, MD & Philip Chen, MD

4:05pm

Sinonasal quality of life following pituitary surgery

Jemma Cho, BA

4:12pm

Gender-specific analysis of outcomes from endoscopic sinus surgery for chronic rhinosinusitis

Devyani Lal, MD

PROGRAM AT A GLANCE

4:19pm

**Genotype of the bitter taste receptor
T2r38 is associated with sinonasal
quality of life in cystic fibrosis**

Alan D. Workman, BS

4:26pm

**Sino-nasal outcome test 22 in a control
population: A cross-sectional study and
systematic review**

Zachary Farhood, MD

4:33pm

**Canonical correlation analysis of nasal
endoscopy and SNOT-22 domain scores
at baseline among surgical patients with
chronic rhinosinusitis**

Adam S. DeConde, MD

4:40pm

Q&A

4:45pm

**PANEL: More than just the SNOT-22: An
update on objective and subjective
outcomes measures**

Moderator: Mickey Stewart, MD, MPH

Panelists: Luke Rudmik, MD, MSc., Zach

Soler, MD, MSc, Claire Hopkins, DM, FRCS

5:25pm

Closing Remarks

5:30pm

Meeting Adjourned

5:45pm

President's Wine & Cheese Poster

Reception

Grand Hall

(Supported by Intersect ENT)

PROGRAM ABSTRACTS

Friday, September 25, 2015

1:00pm – 5:30pm / Dallas Ballroom B/C

12:55pm

Welcome

ARS President and President-Elect Roy Casiano, MD
& Peter Hwang, MD

1:00pm

PANEL: Scary cases: Career-altering cases that changed the way I practice

Moderator: Michael Platt, MD

Panelists: Martin Citardi MD, Samer Fakhri MD, Donald Lanza MD, Ralph Metson MD

Session: Top Rated Abstracts, Part 1

Moderators: John DelGaudio, MD & Richard Orlandi, MD

1:40pm

High-throughput gene expression profiling reveals distinct patterns in chronic rhinosinusitis subtypes

Matthew A. Tyler, MD

Chris Russel, PhD

Dirk Smith, PhD

Samer Fakhri, MD

Martin Citardi, MD

Amber Luong, MD, PhD

Houston, TX

USA

Introduction:

A complete understanding of the pathophysiology is lacking in chronic rhinosinusitis (CRS). Sophisticated, high-throughput techniques available with modern bioinformatics assays can be leveraged to this end. Such studies are rare in CRS. This study represents a top-down, systems-based approach towards identifying the molecular profiles underlying different subtypes of CRS.

Methods:

We employ two complementary gene expression profiling techniques. Clustering analysis was performed using microarray data from 143 patients with allergic fungal rhinosinusitis (AFRS), CRS with nasal polyps (CRSwNP), CRS without nasal polyps (CRSsNP), aspirin-exacerbated respiratory disease (AERD), and healthy controls (HC). We also performed a pathway analysis using Ingenuity software in 85 patients with AFRS, CRSwNP, and HC.

Results:

Polyp subtypes of CRS (CRSwNP, AFRS, AERD) clustered separately from CRSsNP. Further analysis revealed four patterns of gene expression that separate AFRS, CRSwNP, CRSsNP and HC. The AFRS phenotype correlated with increased Type 2 inflammatory gene expression patterns, including IgE expression. This was supported with Ingenuity analysis, which correlated AFRS with an increase in adaptive immune signaling networks when compared to other subtypes. Both clustering and Ingenuity analysis revealed an inverse relationship between expression of cystatins and antimicrobial peptide clusters, histatin and lactitin, in CRS polyp subtypes.

Conclusion:

This study is the largest microarray analysis conducted in CRS. It confirms the feasibility of gene expression profiling in CRS and identifies several unique molecular patterns that discriminate different subtypes of CRS. Future studies will clarify the relevance of these patterns in support of more robust prognostic testing and targeted treatment protocols.

1:47pm

Safety analysis of long-term budesonide nasal irrigations in patients with chronic rhinosinusitis post endoscopic sinus surgery

Ethan Soudry, MD

Jane Wang, NP

Reza Vaezeafshar, MD

Laurence Katznelson, MD

Peter Hwang, MD

Petah Tikva

Israel

Background:

Although the safety of topical nasal steroids is well established for nasal spray forms, data regarding the safety of steroid irrigations is much more limited. We studied the effect of long-term budesonide nasal irrigations (>6 months) on hypothalamic-pituitary-adrenal axis (HPAA) function and intraocular pressure (IOP) in patients who had undergone endoscopic sinus surgery.

Methods:

Retrospective cross sectional analysis. Adrenal function was assessed by measuring serum cortisol 30 minutes after an intramuscular injection of 0.250 mg cosyntropin. IOP was measured using a handheld applanation tonometer.

Results:

48 patients were assessed, with a mean duration of budesonide irrigations of 22 months. Stimulated cortisol levels were abnormally low (below 18µg/dL) in eleven patients (23%). None reported to have symptoms of adrenal suppression. Three of four patients who repeated the study being off budesonide for at least a month returned to near normal levels. Logistic regression analysis revealed that concomitant use of both nasal steroid sprays and steroid inhalers was significantly associated with HPAA suppression ($p=0.024$, OR=30.4, CI=1.57-588). IOP was within normal limits in all patients.

Conclusions:

Long-term use of budesonide nasal irrigations is generally safe, but asymptomatic HPAA suppression may occur in selected patients. Concomitant use of both nasal steroid sprays and steroid inhalers is associated with an increased risk. These surprising findings should alert rhinologists to the potential risks of long term use of budesonide nasal irrigations and warrant monitoring for HPAA suppression in these patients before, during and after treatment.

1:54pm

Long-term safety of high-volume sinonasal budesonide irrigations for chronic rhinosinusitis

Kristine A. Smith, MD
 Brad Mechor, MD, FRCSC
 Gabrielle French, BSc
 Luke Rudmik, MD, MSc, FRCSC
 Calgary, AB
 Canada

Introduction:

Off label high-volume sinonasal budesonide irrigations are commonly used during the management of chronic rhinosinusitis (CRS). Although short-term use (4 to 8 weeks) has been demonstrated to be safe, the long-term effects on the hypothalamic-pituitary axis (HPA) are unclear. The objective of this study is to determine whether CRS patients on long-term (minimum > 12 months) budesonide irrigations have evidence of HPA suppression.

Methods:

Retrospective cohort study. Inclusion criteria were: 1) adult (age > 18 years), 2) guideline-based diagnosis of CRS, 3) previous endoscopic sinus surgery, 4) twice daily high-volume sinonasal budesonide irrigation (concentration of 1 mg per irrigation; total daily dose of 2 mg), and 5) a minimum of 12 month duration. Exclusion criteria included oral steroid use within 3 months of HPA testing. The primary outcomes were morning (AM) serum cortisol levels and, when indicated, cosyntropin stimulation levels.

Results:

A total of 30 patients fulfilled eligibility criteria and underwent HPA testing. Mean duration of budesonide irrigation therapy use was 39.7 months (3.3 years). The mean AM serum cortisol was 382.9 nmol/L (SD=156.7 nmol/L) (normal 200-650 nmol/L). Subsequent cosyntropin stimulation tests indicated no evidence of adrenal suppression.

Conclusion:

This study suggests that there is no evidence of HPA suppression in patients on long-term high-volume sinonasal budesonide irrigations.

2:01pm

Resolve: Bioabsorbable steroid-eluting sinus implants for in-office treatment of recurrent sinonasal polyposis after sinus surgery: 6-month outcomes from a randomized, controlled, blinded study

Keith Forwith, PhD, MD
 Joseph Han, MD
 David Yen, MD
 Pablo Stolovitzky, MD
 Rakesh Chandra, MD
 Louisville, Kentucky
 USA

Introduction:

Patients with recurrent sinonasal polyposis after endoscopic sinus surgery (ESS) have limited treatment options. Safety and efficacy were previously reported for a bioabsorbable sinus implant that elutes mometasone furoate for 3 months. Here we summarize longer-term outcomes.

Methods:

A randomized, controlled, blinded study with 100 CRSwNP patients who failed medical treatment and were considered candidates for revision ESS. Treated patients (N=57) underwent in-office implant placement. Control patients (N=43) underwent a sham procedure. Endoscopic grading at 3 months by clinicians was corroborated by an independent review of randomized video-endoscopies by a panel of three sinus surgeons. Six-month follow-up included endoscopic grading and patient-reported outcomes.

Results:

At 6 months, treated patients experienced significant improvement in Nasal Obstruction Symptom Evaluation score ($p=0.021$) and >2-fold improvement in mean nasal obstruction/congestion score [-1.06 (1.38) vs. -0.44 (1.36), $p=0.124$]. Endoscopically, treated patients experienced significant reduction in ethmoid sinus obstruction (ESO; $p<0.001$) and bilateral polyp grade (BPG; $p=0.018$) compared to controls. Panel review confirmed a significant reduction in ESO ($p=0.010$). In a subset of 67 patients with baseline polyp burden =2 bilaterally, BPG was significantly improved ($p=0.049$). At 6 months, 31% of treated patients were no longer indicated for repeat ESS, versus 11% of controls.

Conclusion:

The symptomatic and endoscopic improvements observed support the efficacy of the steroid-eluting implant for in-office treatment of CRSwNP after ESS. These longer-term study results demonstrate that the steroid-eluting implant represents a durable, safe and effective treatment strategy for this patient population.

2:08pm

Cost utility analysis of endoscopic sinus surgery for chronic rhinosinusitis

George A. Scangas, MD
 Brooke Su, BA
 Aaron Remenschneider, MD
 Mark Shrime, MD
 Ralph Metson, MD
 Somerville, MA
 USA

Objective:

To evaluate cost-effectiveness of endoscopic sinus surgery (ESS) compared to medical therapy for patients with chronic rhinosinusitis (CRS).

Methods:

The study design consisted of a cohort-style Markov decision-tree economic model with a 31-year time horizon. A cohort of 489 patients who underwent ESS for CRS were matched one to one with a cohort of 489 patients from the national Medical Expenditures Survey Panel (MEPS) database who underwent medical management for CRS. Utility scores were calculated from responses to the EQ-5D instrument in both cohorts. Decision-tree analysis and a ten-way Markov model utilized published event probabilities and primary data to calculate long-term costs and utility. The primary outcome measure was incremental cost per quality-adjusted life year (QALY). Multiple sensitivity analyses were performed.

PROGRAM ABSTRACTS

Results:

The reference case demonstrated the ESS strategy to cost a total of \$30012.11 and produce a total of 14.85 QALYs. The medical management strategy cost a total of \$23320.44 and produced a total of 14.08 QALYs. The incremental cost effectiveness ratio (ICER) for ESS versus medical therapy alone was \$8690.48 per QALY. These results were robust to one-way analysis and probabilistic sensitivity analysis.

Conclusion:

This study soundly demonstrates the value of ESS as a cost effective intervention compared to medical therapy alone for the management of patients with CRS.

2:15pm

Discussion

2:20pm

AAAI Guest Speaker: Daniel Hamilos MD

Host-microbial interactions in chronic rhinosinusitis

2:45pm

Break with Exhibitors

3:10pm

PANEL: Biologic therapies for CRS: Where do we stand?

Moderator: Rodney Schlosser, MD

Panelists: Daniel Hamilos, MD, Joe Han, MD, Stella Lee, MD

Session: Top Rated Abstracts – Part 2

Moderators: Do-Yeon Cho, MD & Neil Bhattacharyya, MD

3:50pm

Staphylococcus aureus impairs the airway epithelial barrier in vitro

Zacki Malik, MBBS

Eugene Roscioli, PhD

Jae Murphy, MBBS

Judy Ou, MBBS

Ahmed Bassiouni, MD

Peter-John Wormald, MD

Woodville South, SA

Australia

Background:

Chronic rhinosinusitis (CRS) is a cluster of disorders that result in sinonasal mucosal inflammation. *Staphylococcus aureus* (*S. aureus*) is associated with severe and recalcitrant CRS. The purpose of our study was to investigate the effect of *S. aureus* on respiratory epithelial barrier structure and function.

Methods:

Conditioned media from *S. aureus* reference strains (ATCC 13565, 14458, 25923) was applied to air-liquid interface (ALI) cultures of primary human nasal epithelial cells (HNECs) transepithelial electrical resistance (TEER) was measured to assess cell-to-cell integrity. Electron microscopy was used to gauge the ciliated area and tight junctions (TJ). Additionally, the expression of the TJ protein Zona Occludens-1 (ZO-1) was examined via immunofluorescence. Statistical analysis was performed using ANOVA with pairwise Bonferroni-adjusted t-tests.

Results:

Secreted products applied to ALI cultures from *S. aureus* strain 13565 caused a concentration-dependent decline in electrical impedance compared to controls, reference strain 14458 and 25923 ($P < 0.001$). Electron microscopy showed a distinct separation between adjacent cells apically, in the region of TJs. The ciliated area was not affected, however ZO-1 expression became discontinuous in HNECs exposed to the 13565 strain's conditioned media.

Conclusion:

Conditioned media of the *S. aureus* strain 13565 damages the airway epithelium by disrupting the TJs between primary human nasal epithelial cells grown at an ALI. These findings suggest that strain-specific *S. aureus* secreted product(s) compromise epithelial barrier function, which may constitute one of the roles played by *S. aureus* in the pathophysiology of recalcitrant CRS. Further research is required to uncover the relevant molecular mechanisms.

3:57pm

Fighting sinus derived staphylococcus aureus biofilms in vitro with a bacteriophage-derived muralytic enzyme

Amanda Drilling, PhD

Clare Cooksley, PhD

Chun Chan, MD

Peter-John Wormald, MD FRACS

Sarah Vreugde, MD, PhD

Adelaide, South Australia

Australia

Background:

Staphylococcus aureus biofilms are a nidus for exacerbation of infectious conditions including chronic rhinosinusitis (CRS). Resistance of biofilms to current therapeutics stresses the need for the development of novel anti-biofilm strategies. The chimeric muralytic enzyme P128 was specifically engineered to target *Staphylococcus* sp. by combining the cell wall binding domain of lysostaphin and the peptidoglycan degrading murein hydrolase derived from phage K. This study assessed the anti-biofilm activity of P128 against sinus derived *S. aureus*.

Methods:

Biofilms from *S. aureus* ATCC 25923 and three sinus derived methicillin sensitive and resistant CRS clinical isolates were grown for 48 hours and treated with various concentrations of P128 (0 - 100 µg/mL) for 2 and 24 hours, using the minimum biofilm eradication concentration (MBEC) assay and Alamar Blue (AB) assay. Biofilm present on the MBEC pegs was stained with LIVE/DEAD BacLight stain, imaged using confocal scanning laser microscopy and biomass determined by COMSTAT2 computation. In the AB assay, biofilm was measured by assessing the cell viability. Results were assessed using a Kruskal-Wallis test with a Wilcoxon post hoc and Bonferroni correction.

Results:

Both the MBEC and AB assay indicated that P128 was effective against in vitro *S. aureus* biofilms with significant reductions in biofilm of up to 95.5% at concentrations = 12.5µg/mL for all tested strains.

Conclusion:

The engineered chimeric endolysin P128 was observed to be an effective anti-biofilm agent against *Staphylococcus aureus*. Further study will proceed into the appropriate application of P128 to ensure both an economically and clinically feasible preparation.

4:04pm

Correlation of T2r38 taste phenotype and sinonasal biofilm formation in chronic rhinosinusitis

Carl M. Truesdale, MD
Nithin Adappa, MD
David Kennedy, MD
Noam Cohen, MD, PhD
James Palmer, MD
Danielle Reed, PhD
Ypsilanti, MI
USA

Background:

Sinonasal biofilms have been demonstrated in specimens collected from chronic rhinosinusitis (CRS) patients. Evidence is mounting that biofilms contribute to CRS therapeutic failure. Recently, the bitter taste receptor T2R38 has been implicated in the regulation of the nasal mucosa's innate immune response. TAS2R38 gene polymorphisms affect receptor functionality and contribute to variations seen in sinonasal innate defense and taste perception of one of its ligands, the bitter compound phenylthiocarbamide (PTC).

Objectives:

In a population of CRS patients, we sought to indirectly determine if a correlation between T2R38 taste function and sinonasal biofilm formation existed.

Methods:

Endoscopically guided sinonasal cultures were obtained prospectively from CRS patients with evidence of mucopurulence. In vitro biofilm formation was assessed with a modified Calgary Biofilm Detection Assay. Patients' phenotypic expression of the bitter taste receptor T2R38 was evaluated with PTC taste test. Linear regression was used to determine the level of significance between mean in vitro biofilm formation levels and mean PTC taste test intensity ratings across CRS patients.

Results:

Sinonasal cultures were obtained from 59 patients, with 42 of the 59 samples demonstrating in vitro biofilm formation. Analysis revealed a linear association between biofilm formation and PTC taste intensity ratings ($p=0.019$) for all patients.

Conclusions: In vitro biofilm formation from clinical isolates is directly correlated with to PTC taste sensitivity in CRS patients.

4:11pm

Cluster analysis and prediction of treatment outcomes for chronic rhinosinusitis

Zachary Soler, MD, MSc
J. Madison Hyer, MS
Luke Rudmik, MD, MSc
Viswanathan Ramakrishnan, PhD
Timothy, Smith, MD, MPH
Rodney Schlosser, MD
Charleston, SC
USA

Background:

Current clinical classifications of chronic rhinosinusitis (CRS) based upon polyp or eosinophil status have weak prognostic utility regarding treatment outcomes. Simplified discriminant analysis based upon unsupervised clustering has identified novel phenotypic subgroups in CRS, but prognostic utility is not known.

Objective:

To determine if discriminant analysis and clustering improves prognostication in patients choosing surgery versus continued medical management.

Methods:

A multi-institutional, prospective study of patients with CRS who failed initial medical therapy completed the SinoNasal Outcome Test (SNOT-22) and Rhinosinusitis Disability Index (RSDI) at baseline and then after self selection of continued medical management or surgical treatment. Objective measures included Brief Smell Identification Test (B-SIT), CT and endoscopy scoring, as well as demographic information. Discriminant analysis based upon total SNOT-22, age and missed productivity was performed to place patients into 5 clusters and compare SNOT-22 and RSDI outcomes for surgical versus continued medical treatment.

Results:

Complete data was available on 690 patients and baseline differences in demographics, comorbidities objective disease measures and patient reported outcomes were similar to previous clustering reports. Three of five identifiable clusters had improved SNOT-22 and RSDI outcomes with surgical intervention when compared to continued medical management. These differences were sustained at 18 months of follow up. Two of five clusters had similar outcomes when comparing surgery to continued medical management.

Conclusion:

A simplified discriminant analysis based upon three common clinical variables is able to cluster patients and provide prognostic information regarding surgical treatment versus continued medical management in patients with CRS.

PROGRAM ABSTRACTS

4:18pm

The Draf III mucosal grafting technique: Long-term follow-up

Elisa A Illing, MD
Do Yeon Cho, MD
Kristen Riley, MD
Bradford Woodworth, MD
Birmingham, AL
USA

Objective:

The Draf III procedure is an effective endoscopic approach to the treatment of frontal sinus disorders, but has a significant restenosis rate. The objective of the current study is to assess long term success of the Draf III mucosal grafting technique.

Methods:

Patients undergoing Draf III with mucosal grafting technique were prospectively enrolled. Demographics, indication for surgery, anterior-posterior (AP) diameter of frontal ostium, and complications were recorded. Failure was defined a priori as closure \geq 50% of the intraoperative AP diameter at last clinical follow up.

Results:

Eighty-nine patients requiring Draf III with mucosal grafting were enrolled, 59 of which (average age 55, range 15-84 years) had at least one year of follow up (average 36 months, range 12-79) and were included in the analysis. Reasons for the procedure included chronic rhinosinusitis with frontal ostium stenosis (n = 33), tumor (n = 22), and cerebrospinal fluid leak (n = 4). Average preoperative Lund-Mackay score was 13.4 \pm 7.5. Average intraoperative AP diameter was 10.9 \pm 1.9 mm. The procedure was highly effective with 97% (57/59) of patients maintaining a patent frontal sinus ostium (>50% intraoperative AP diameter) for the duration of follow-up (average postoperative diameter 9.6 \pm 2.3 mm). However, the two Draf III failures remained patent, did not need further intervention, and were considered clinically successful. Three patients required reoperation for reasons unrelated to closure of the Draf III.

Conclusion:

Common causes of failure following Draf III procedures include osteoneogenesis and stenosis. This study provides long-term data demonstrating excellent outcomes using the mucosal grafting technique.

4:25pm

Discussion/Q&A

4:30pm

Film FESStival

Moderator Adam DeConde, MD
Panelists: Nithin Adappa, MD, Karen Fong, MD, Brian Rotenberg, MD MPH, Peter John Wormald, MD

5:15pm

Closing Remarks and Adjournment

7:00pm

International Welcome Reception honoring the 11th Annual David W. Kennedy Lecturer, James Stankiewicz, MD

Location: Dallas Ballroom D1; Registration is required.
Supported by: KARL STORZ Endoscopy-America, Inc., Intersect ENT, Medtronic Surgical Technologies, Olympus America Inc.

PROGRAM ABSTRACTS

Saturday, September 26, 2015 PM Session: Breakout Room A Dallas Ballroom B

Session will be live streamed to Latin American Countries as well as to our Guest Countries, co-sponsored by the Pan-American Association of Otorhinolaryngology.

12:55pm

Welcome:

Jose Busquets, MD, Chairperson

Moderators: Melissa Pynnonen, MD & Thomas Higgins, MD, PhD

1:00pm

The chronic sinusitis action plan - A patient self-education instrument

Smriti Nayan, MD, FRCSC
Martin Desrosiers, MD, FRCSC
Doron Sommer, MD, FRCSC
Marc Tewfik, MD, MSc, FRCSC
Ian Witterick, MD, FRCSC
Erin Wright, MD, FRCSC
Toronto, Ontario
Canada

Objective:

Chronic rhinosinusitis (CRS) requires ongoing management. Written action plans in asthma improve health outcomes in adults. Like asthma, patients with CRS can better manage their exacerbations by increasing certain medications at the beginning of an episode. Unlike asthma though, there are currently no published patient self-education written action plans for CRS. We sought to develop an action plan for CRS.

Methods:

The chronic sinusitis action plan (CSAP) was developed in both English and French and with the aims of increasing knowledge of symptoms and recognition of exacerbations as well as the associated treatments. It is divided into 3 categories: baseline, exacerbation and emergency. The developed CSAP was then validated through expert consensus based on Delphi techniques with a Likert-based survey and by patients using a survey with dichotomous questions to seek consensus.

Results:

The CSAP has gone through two separate validation phases. Seven rhinologists with a tertiary practice validated the CSAP through expert consensus and all agreed (score of 4/5) that the CSAP described the important symptoms and associated management for the three categories of CRS. Sixteen patients were a part of the second validation phase and a 100% felt that the CSAP was a very helpful instrument and that their physicians should use it.

Conclusions:

The preliminary results of the CSAP indicate that this is an important patient self-education tool that both patients and their rhinologists can easily use for CRS. Prospective validation of the CSAP is now required to determine if it changes important clinical outcomes.

1:07pm

Understanding patients' knowledge and expectations in endoscopic sinus surgery

Paul D. Neubauer, MD
Abtin Tabaei, MD
Fayanne, Francis MPH
R. Peter Manes, MD
New Haven, CT
USA

Introduction:

The potential for patient misconceptions about endoscopic sinus surgery (ESS) has significant implications for the informed consent process. An understanding of patients' baseline knowledge and sources of information regarding ESS would improve surgeons' ability to counsel patients pre-operatively and provide effective educational materials.

Methods:

A prospective patient survey was performed at two independent tertiary care medical centers. Patients who were offered ESS as part of routine rhinology care were queried about expectations, knowledge and sources of information regarding ESS. The survey was administered before pre-operative counseling took place.

Results:

Of the thirty patients who completed the survey, 67% of patients reported doing research on ESS before the visit. The most common sources of information were word of mouth(65%), webmd.com(40%), other physicians(40%), and Youtube(35%). The most important factors researched included risks(95%), benefits(85%), and recovery related issues(70%). Patients commonly thought that ESS was associated with minor risks only(50%). 27% of patients believed that general anesthesia would not be necessary. Patients most often believed they would need ongoing medical therapy rarely(67%) or occasionally(20%). A range of responses were noted regarding early postoperative symptoms and recovery time.

Conclusions:

This study identified a disparate and often inaccurate patient understanding of ESS including significant misconceptions about risks, anesthesia, and need for ongoing therapy, among others. Patients obtain their information from a variety of sources including peers, other doctors and the Internet. Awareness of the gaps in patient knowledge and the sources of information will improve pre-operative counseling.

1:14pm

A prospective cohort study comparing drivers of surgical intervention following maximal medical therapy for chronic rhinosinusitis

Zainab Farzal, BS
Ana Lemos-Rodriguez, MD
Satyan Sreenath, MD
Brent Senior, MD
Charles Ebert, Jr., MD, MPH
Adam Zanation, MD
Chapel Hill, NC
USA

Introduction:

Presently, insufficient data exist analyzing the drivers of surgical intervention following maximal medical therapy (MMT) in patients with chronic rhinosinusitis (CRS). The objective of this study was to compare pre- and post-MMT changes in Lund-Mackay (LM) scoring and QOL surveys to analyze their respective roles in surgical decision-making for CRS.

Methods:

A prospective, single cohort study was performed with patients who underwent MMT for CRS (N=40). We compared changes in pre- and post-MMT LM scores and QOL surveys including Rhinosinusitis Disability Index (RSDI) and Chronic Sinusitis Survey (CSS) in operative and non-operative groups following MMT.

Results: There was a significantly smaller change in LM score in the operative group before and after MMT (operative: 1.65 (SEM, 0.82) vs. non-operative: 5.22 (SEM, 1.54), $p=0.039$). Additionally, mean pre- and post-MMT LM scores were significantly higher in the surgical group compared to the non-surgical group (pre-MMT: $p=0.036$; post-MMT: $p<0.001$). No significant difference was found in the change of RSDI or CSS scores between the two groups (RSDI-operative: 3.30 (SEM, 5.20) vs. non-operative: 10.09 (SEM, 5.57), $p=0.309$) (CSS-operative: 5.95 (SEM, 5.29) vs. non-operative 8.54 (SEM, 7.36), $p=0.747$). Change in each CSS and RSDI domain was also not significant between the two groups.

Conclusions:

Our study suggests that change in radiologic disease burden as evidenced by LM scores is the prime driver for surgical decision-making by otolaryngologists following MMT in patients with CRS. These changes more reliably predict the need for surgical intervention following MMT when compared to changes in QOL questionnaires.

1:21pm

Patient-centered decision making: The role of the baseline SNOT-22 in predicting outcomes for medical management of chronic rhinosinusitis

Toby O. Steele, MD
 Luke Rudmik, MD, MSc
 Jess Mace, MPH
 Adam DeConde, MD
 Jeremiah Alt, MD, PhD
 Timothy Smith, MD, MPH
 Sacramento, CA
 USA

Introduction: For patients with chronic rhinosinusitis (CRS), the decision to elect continued medical management vs. surgery is complex and involves tradeoffs between benefits, risks, and overall effectiveness of each therapy. The purpose of this study is to evaluate baseline scores and outcomes of patients meeting surgical criteria but electing continued medical management to allow for improved patient counseling.

Methods: Patients with CRS electing medical management were enrolled in a prospective, multi-institutional, cohort study. Patients were stratified into pre-treatment Sino-nasal Outcome Test (SNOT-22) subgroups based on 10-point score increments (e.g. 10-19,20-

29,30-39,etc) to capture potential outcome differences by baseline SNOT-22 disease burden. The proportion of patients achieving minimal clinically important difference (MCID>9 points) and relative improvement (%) for each score category were calculated.

Results: Ninety-nine CRS patients with a pre-treatment SNOT-22 mean score of 45.2[16.6] were followed for an average of ~15 months. The majority of participants electing medical therapy failed to improve one MCID (57%) with mean overall relative score improvement of 16%. Participants with baseline scores of 70-79 (n=4) or >80 (n=3) had the greatest probability of achieving MCID (75% and 67%, respectively), while participants with low baseline SNOT-22 scores (10-19) did not achieve MCID (0%).

Conclusion: Over 50% of CRS patients electing continued medical management failed to improve one MCID. Those reporting worse disease severity by SNOT-22 score were more likely to improve in a clinically meaningful way with medical management. The incorporation of pre-treatment SNOT-22 evaluations should be considered to improve counseling and patient-centered decision making in CRS.

1:28pm

Patients with chronic rhinosinusitis electing medical versus surgical treatment: emotional domain of the rhinosinusitis disability index associates with treatment selection

Quinn Orb, MD
 Adam DeConde, MD
 Jess Mace, MPH
 Toby Steele, MD
 Timothy Smith, MD, MPH
 Jeremiah Alt, MD, PhD
 Salt Lake City, UT
 USA

Introduction:

The Rhinosinusitis Disability Index (RSDI) consists of multiple subdomains shown to be useful in studying CRS. The objective of this study was to determine if RSDI subdomain scores are associated with selection of treatment modality (endoscopic sinus surgery (ESS) or continued medical management (CMM)) in subjects with CRS.

Methods:

Patients with CRS were prospectively enrolled into a multi-institutional cohort study. Following an initial period of medical management, patients elected to undergo treatment with either ESS or CMM. Baseline RSDI total and subdomain scores were compared between patients electing different treatment modalities.

Results:

A total of 684 subjects were enrolled with 122 (17.8%) electing CMM and 562 (82.2%) electing ESS. When compared to patients undergoing CMM, patients electing ESS exhibited significantly higher mean baseline RSDI total scores (mean [SD]: 48.1 [24.9] vs. 40.1 [24.1]; $p=0.001$) and subdomain scores (emotional: 13.2 [9.1] vs. 10.4 [8.3]; $p=0.001$; functional: 15.3 [8.9] vs. 12.6 [8.4]; $p=0.002$; and physical: 19.6 [9.3] vs. 17.1 [9.6]; $p=0.007$). Emotional subdomain scores were found to be the most associated with choice of treatment modality.

PROGRAM ABSTRACTS

Conclusions:

Patients with CRS electing ESS had worse baseline RSDI total and subdomain scores compared to those electing CMM. Although both rhinologic and non-rhinologic symptoms contributed to the selection of treatment modality, emotional symptoms appeared to exhibit the greatest influence on patient-centered treatment decisions.

1:35pm

Q&A

Moderators: Karen Fong, MD & Jose Busquets, MD

1:40pm

Olfactory-specific quality of life outcomes after endoscopic sinus surgery

Zachary M. Soler, MD
Rodney Schlosser, MD
Jeremiah Alt, MD, PhD
Vijay Ramakrishnan, MD
Jess Mace, MPH
Timothy Smith, MD, MPH
Charleston, SC
USA

Introduction:

Olfactory loss is a cardinal symptom of chronic rhinosinusitis (CRS) and can affect 40-80% of patients. However, common sinus-specific quality-of-life (QOL) instruments include only single questions related to olfaction. Few studies have explored olfactory outcomes after surgery utilizing validated, olfaction-specific QOL questionnaires.

Methods:

Patients with CRS were enrolled from 3 centers across North America into a prospective cohort study. Patients completed the short modified version of the Questionnaire of Olfactory Disorders (QOD-NS) and the 40-item Smell Identification Test (SIT-40) before and at least 6 months after endoscopic sinus surgery (ESS). Multivariate linear regression was used to determine whether specific demographic, comorbidity, or disease severity measures were independently associated with QOD scores at baseline or predicted change after surgery.

Results:

A total of 121 patients, equally split between genders, were enrolled with an average age of 48 years (range: 18-80). Baseline total QOD-NS scores were significantly associated with SIT-40 scores, with a moderate strength of correlation ($R_s=0.400$; $p<0.001$). The average QOD-NS score improved after ESS (35.7 ± 13.0 vs. 39.7 ± 12.2 ; $p=0.006$). Allergy, polyps, and steroid dependent conditions were found to be independently associated with worse preoperative QOD-NS scores, while septal deviation was associated with better QOD-NS scores. Baseline computed tomography (CT) scores were the only variable which significantly predicted change in QOD-NS after surgery.

Conclusion:

Olfaction-specific QOL is worse in patient with polyps and comorbid allergy. Significant improvements in olfaction-specific QOL are seen after ESS, with the greatest gains seen in those with worse CT scores at baseline.

1:47pm

Office-based olfactory mucosa biopsies

Eric Holbrook, MD
Lina Rebeiz, BS student
James Schwob, MD, PhD
Boston, MA
USA

Introduction:

Requests from researchers for olfactory mucosal biopsies are increasing as a result of advances in the fields of neuroscience and stem cell biology. Published studies report variable rates of success in obtaining true olfactory tissue, often below 50%. In cases where biopsies are not obtained carefully and confirmed through histological techniques, erroneous conclusions are made. Attention to the epithelium alone without submucosal analysis may add to the confusion. A consistent biopsy technique can help rhinologists obtain higher yields of olfactory mucosa. Confirmatory tissue staining analysis assures olfactory mucosa has been obtained thereby strengthening clinical correlations and scientific conclusions.

Methods:

Biopsies of the septum within the anterior olfactory cleft were obtained under endoscopic guidance in an office procedure room using topical local anesthetic (lidocaine). After mucosal incision, a small, cupped, otology biopsy forcep was used to obtain specimens approximately 2 mm in size. Specimens were sectioned and analyzed with immunohistochemistry for presence of olfactory epithelium and/or olfactory fascicles.

Results:

A total of 14 subjects were biopsied in this analysis. Four subjects had biopsies in the operating room (OR). The remaining ten underwent biopsies in the clinic. All biopsies obtained in the OR revealed evidence of olfactory mucosa. A total of eight out of ten (80%) clinic biopsies revealed evidence of olfactory mucosa. No complications were encountered.

Conclusion:

High yields of olfactory mucosa can be obtained safely in an office-based setting. Technique, including attention to the area of biopsy, and confirmatory analysis are important in assuring presence of olfactory tissue.

1:54pm

A novel olfactory cleft endoscopy scale for patients with chronic Rhinosinusitis

Zachary M. Soler, MD, MSc
J Madison Hyer, MS
Tom Karnezis, MD
Rodney Schlosser, MD
Charleston, SC
USA

Introduction:

Olfactory loss affects a majority of patients with chronic rhinosinusitis (CRS). Traditional objective measures of disease severity, including endoscopy scales, focus upon the paranasal sinuses and often have weak correlation to olfaction.

Methods:

Adults with CRS were prospectively evaluated by blinded reviewers with a novel Olfactory Cleft Endoscopy Scale (OCES) that evaluated discharge, polyps, edema, crusting and scarring of the olfactory cleft. Objective olfactory function was assessed using "Sniffin' Sticks" testing, including composite threshold-discrimination-identification (TDI) scores. Olfactory-specific quality-of-life was evaluated using the short modified version of the Questionnaire of Olfactory Disorders (QOD-NS). Inter- and intra-rater reliability was assessed among 3 reviewers for OCES grading. Multivariate linear regression was then used to test associations between OCES scores and measures of olfaction, controlling for potential confounding factors.

Results:

The OCES score was evaluated in 38 patients and had a high overall reliability (ICC=0.92; 95% CI: 0.91-0.96). The OCES significantly correlated with objective olfaction as measured by TDI score ($p<0.001$), with TDI score falling by 1.13 points for every 1 point increase in OCES score. Similar significant associations were found for threshold, discrimination, and identification scores ($p<0.003$ for all) after controlling for age, gender, race, and reviewer/review. The OCES was also highly associated with patient-reported QOD-NS scores ($p=0.009$).

Conclusion:

A novel olfactory cleft endoscopy scale shows high reliability and correlates with both objective and patient-reported olfaction in patients with CRS. Further studies to determine prognostic value and responsiveness to change are warranted.

2:01pm

Sensitivity analysis and diagnostic accuracy of the brief smell identification test in patients with chronic rhinosinusitis

Edward El Rassi, MD
Jess Mace, MPH
Toby Steele, MD
Jeremiah Alt, MD, PhD
Zachary Soler, MD, MSc
Timothy Smith, MD, MPH
Portland, OR
USA

Introduction:

The Brief Smell Identification Test (BSIT) is an abbreviated version of the Smell Identification Test (SIT) used to assess olfactory function. Although the BSIT can be efficiently administered in under 5 minutes, the accuracy of the BSIT in relation to the SIT in patients with chronic rhinosinusitis (CRS) is unknown.

Methods:

Patients with CRS were recruited as part of an ongoing multi-institutional observational cohort study. A total of 183 participants provided both BSIT and SIT olfactory function scores during initial enrollment. Linear associations between BSIT and SIT scores were evaluated using Pearson's correlation coefficients (Rp). Sensitivity and specificity of BSIT scores were determined using SIT scores as the 'gold standard'.

Results:

A strong bivariate linear association was found between BSIT and SIT scores (Rp=0.893; $p<0.001$) for all participants. A significantly

lower proportion of patients were identified as having abnormal olfaction using the BSIT compared to the SIT (47% vs. 68%, respectively; $p<0.001$). Using a score of < 8 as a cut-point for abnormal olfactory function, the BSIT demonstrated a sensitivity of 63% and specificity of 88% with an overall accuracy of 71%. Increasing the cut-point to < 9 resulted in an increased sensitivity of 86%, a specificity of 76%, and an improved overall accuracy of 83%.

Conclusion:

In patients with CRS, BSIT scores strongly correlate with SIT scores, however, the BSIT underestimates olfactory dysfunction as defined by the suggested cut-point of < 8 . Increasing the cut-point to < 9 increased the sensitivity and accuracy of the BSIT.

2:08pm

Efficacy of olfactory training in patients with olfactory loss: a systematic review and metaanalysis

Kelly R. Pekala, BA, MS
Rakesh Chandra, MD
Justin Turner, MD, PhD
Nashville, TN
USA

Objective:

Olfactory loss is a challenging clinical problem with few proven therapeutic options. Early experimental results with olfactory training (OT) suggest that this novel therapy may be an effective intervention for olfactory dysfunction of multiple etiologies. The aim of this study was to systematically review currently available studies that assess the efficacy and outcomes of OT in patients with olfactory loss.

Methods:

A comprehensive systematic literature review was performed with the assistance of a reference librarian using the Medline, PsycInfo, Google Scholar, Embase, and Proquest databases. Eligible studies were extracted based on defined inclusion criteria and the effect of OT on objective olfactory function was evaluated qualitatively and by meta-analysis.

Results:

A total of eleven studies with 639 patients were identified and systematically reviewed. Sufficient data for meta-analysis was available for 4 studies. Patients receiving OT experienced a statistically significant improvement in the TDI (Threshold, Discrimination, Identification) score compared to control patients (standard mean difference [SMD] 1.38; $p = 0.02$). Improvement in olfactory function was observed in discrimination (SMD 1.17; $p = 0.009$) and identification (SMD 1.11; $p = 0.03$), but not in olfactory thresholds (SMD 0.00; $p = 0.98$).

Conclusion:

Olfactory training is a promising modality for the treatment of olfactory dysfunction. Results of this systematic review and meta-analysis suggest that it may be an effective treatment for olfactory dysfunction due to multiple etiologies. Additional high quality studies are needed to define indications, outcomes, and duration of therapy for this novel therapy.

PROGRAM ABSTRACTS

2:15pm

Q&A

2:20pm

PANEL: Olfaction: Advances in basic science and clinical treatment

Moderator: Eric Holbrook, MD

Panelists: Greg Davis, MD, Bradley Goldstein, MD, Zara Patel, MD, Justin Turner, MD

3:00pm

Break With Exhibitors

Moderators: Alkis Psaltis, MD & Nithin Adappa, MD

3:25pm

Long term stability of the post-surgical maxillary sinus microbiome

Andrew Lane, MD

Syed Khalil, PhD

Emmanuel Mongodin, PhD

Baltimore, MD

USA

Introduction:

Understanding of the paranasal sinus microbiota's role in CRS is complicated by wide inter-individual variability as well as variation based on anatomic location and time. How much the microbiome changes over prolonged intervals within individuals is largely unknown. Knowledge of individuals' core sinus microbiota in health and disease may help elucidate host factors shaping microbial communities.

Methods:

Maxillary sinus swabs were obtained from 40 subjects with prior antrostomies, including subjects without sinusitis and CRS patients with and without polyps. Repeat swabs were obtained 2-4 years after the initial collection. Total DNA from swab eluents were extracted, and the sinus microbiota characterized using 16S rRNA gene PCR amplification and Illumina MiSeq sequencing, followed by taxonomic classification.

Results:

Maxillary sinus microbiota differed widely in composition among subjects, but consistent features emerge when comparing samples from individual subjects obtained years apart. In most subjects, a stable core sinus microbiota was suggested, with overall fluctuation in relative abundance of individual bacterial species and overall diversity. While alterations in bacterial relative abundance may be associated with CRS subtypes, greater similarity existed in microbiota of individual subjects across time than between subjects in the same disease cohort.

Conclusion:

The paranasal sinus microbiota of individuals can display features of long-term stability over years, while also harboring significant variation. The concept of an individualized core sinus microbiota has implications for understanding the role of bacteria in CRS pathogenesis as well as for determining host factors that help establish and maintain a characteristic stable bacterial community structure.

3:32pm

DNase sensitive sinus bacteria and implications for sinus microbiome studies

Josh Carlton, BS

Amanda Jenkins, BS

Tara Carr, MD

Alex Chiu, MD

Eugene Chang, MD

Tucson, AZ

USA

Introduction: Over the past several years, there has been tremendous interest in the sinus microbiome and how it relates to disease. However, standards for sample collection have not been established and the mechanism of how the microbe affects the host sinus is not known.

Objective: In this study, we identified the relative human and bacterial DNA contribution in three sample collection methods: brush, tissue, and swab. Moreover, we describe a novel technique in which DNase-sensitive DNA from dead and damaged cells is removed, thereby distinguishing between alive vs dead bacteria in the sinus.

Methods: Duplicate patient samples were collected from patients undergoing sinus surgery using brushes, tissue, and swabs. One sample was placed in DNase, while the other in control buffer. Routine DNA extraction with beadbeating was performed. Quantitative PCR using bacterial vs human-specific primers was performed to identify the bacterial versus human contributions.

Results: This study determined that the total DNA concentration in a sample was significantly less if it was treated with DNase (Control:36.38 ng/ μ L, DNase:29.97 ng/ μ L). Additionally, we found that the bacterial to human DNA percentages were higher in brushes and swabs when compared to tissue samples after quantitative PCR. (Mean: Brush:4.4%, Swab:4.0%, Tissue:2.0%).

Conclusion: Our findings suggest that the use of brushes and swabs maximize bacterial yield, and greater than 15% of the bacteria collected are DNase sensitive. Further studies after 16S pyrosequencing will determine which bacterial populations are living versus degraded in the sinus microbiome.

3:39pm

Message in the mold: Examining the fungal microbiome in subtypes of chronic sinusitis

Jonathan T. Gelber, BA

Steven Pletcher, MD

Emily Cope, PhD

Andrew Goldberg, MD

Nashville, TN

USA

Introduction:

Fungal hypersensitivity and fungal microbiome dysbiosis are possible etiologies of chronic sinusitis. The sinus fungal microbiome is not well characterized; Malassezia has only recently been described in the sinuses. The goals for this study were to verify Malassezia as a dominant component of the sinus microbiome, to speciate sinus Malassezia, and to compare the fungal diversity in CRS subtypes with known fungal association to chronic rhinosinusitis with polyps (CRSwNP) and healthy controls.

Methods:

28 patients were enrolled and categorized as CRSwNP (n=15), mycetoma (n=3), allergic fungal rhinosinusitis (AFRS, n=3), or healthy control (n=7). Brush samples were taken from ethmoid or maxillary sinus mucosa and tested for DNA from 7 index fungi using quantitative PCR. Index fungal species were chosen based upon existing data of the sinus fungal microbiome.

Results:

Malassezia species were detected in 68% of patients, without variation among clinical phenotypes (p=0.99). Malassezia restricta was more commonly detected than Malassezia globosa (p=0.049). Presence of one Malassezia species predicted the presence of the other (p=0.035). Aspergillus was identified in 2/3 mycetoma patients (both A. fumigatus) and 2/3 AFRS patients (one A. fumigatus, one A. flavus). Aspergillus was absent in control or CRSwNP patients (p=0.002).

Conclusions:

Malassezia species are common members of the sinus microbiome. Malassezia restricta and Malassezia globosa, dermatologic pathogens and components of normal skin microbiome, had not previously been characterized beyond the genus level in the sinuses. Aspergillus was frequently identified in patients with evident fungal sinus disease, but not found in control or CRSwNP patients.

3:46pm

Antibacterial resistance in the microbiome of chronic rhinosinusitis patients

Arthur W. Wu, MD

Martin Hopp, MD, PhD

Manjula Gunawardana, PhD, PhD

Marc Baum, PhD

Los Angeles, CA

USA

Introduction: The sinonasal microbiome has been implicated in the phenotype of chronic rhinosinusitis. This study's purpose is to determine the microbiome phenotype in patients undergoing endoscopic sinus surgery at the Cedars-Sinai Sinus Center.

Methods: Sinus biopsies were taken from 50 patients undergoing ESS. Using qPCR, we measured the 16S rRNA gene copy number per 10ng DNA, quantifying bacterial abundance. Eleven patients with high bacterial abundance and one control with low abundance were analyzed using a qPCR array targeting 87 antibiotic resistance genes.

Results: 48 of 50 specimens had significant bacterial presence. 56 antibiotic resistance targets were not found in any specimens. 13 targets were detected in >3 specimens. Two targets (OXA-2 and -23), corresponding to Class-D β -lactamase resistance, were found in all specimens. The ratio of virulence gene copy number to bacterial copy number was calculated, and the median \pm SD was 0.11 \pm 0.11 for all samples, except for the control (1.57 \pm 1.04). This sample was the only sample positive for Staphylococcus aureus. No significant correlation between bacterial abundance and CT score or SNOT-22 score was found.

Conclusion: Only a small subset of virulence genes was present in the majority of patients, correlating to β -lactamase and fluoroquinolone resistance. The lone patient with Staphylococcus aureus had the highest ratio of virulence/bacterial copy number, potentially suggesting S. aureus' importance in genetic virulence in the microbiome of CRS. However, in this small sample size we could not demonstrate that bacterial abundance or measures of microbiome virulence correlate with objective or subjective measurements of disease severity.

3:53pm

Differences in the paranasal sinuses between germ free and pathogen free mice

Ravi Jain, MBChB

Sharon Waldvogel-Thurlow, Cert. MLT

Richard Darveau, PhD

Richard Douglas, MD

Grafton, Auckland

New Zealand

Background:

The role of bacteria in the etiology of chronic rhinosinusitis (CRS) has not been fully understood. Commensal bacteria may have a significant impact on the development of the paranasal sinuses and the mucosal immunity, as they do in the gut. Studying germ-free mice (GFM) may provide some insight into the effect of commensal bacteria on sinus structure and mucosal function.

Methods:

The paranasal sinuses of five GFM were compared to five pathogen-free normal mice. Mice heads underwent computed tomography and images compared for pneumatization and geometry of the sinuses. Histologically, slides were examined by light microscopy and compared for mucosal thickness, epithelial thickness, cilia, collagen, numbers of goblet cells and CD3/ CD45 lymphocyte populations.

Results:

No differences were seen radiologically between groups. Overall, GFM were found to have less mucosal thickness (? 15.2 \pm 10.3 μ m, p = 0.004), less epithelial thickness (? 5.5 \pm 5.1 μ m, p = 0.037), more collagen (? 5.8 \pm 3.2%, p < 0.001) and fewer goblet cells (? 29.3 \pm 10.6, p < 0.001). Sub-analysis by region (anterior, middle or posterior sections) revealed significant differences for GFM in the middle (less mucosal thickness, epithelial thickness and cilia, more collagen) and posterior sections (less goblet cells). Both lymphocyte populations were reduced in GFM, however this was not significant.

Conclusions:

Commensal bacteria appear to have a significant effect on paranasal sinus mucosal histology. The results of this study suggest the possibility that changes in the commensal bacteria may be implicated in the pathogenesis of CRS.

4:00pm

Q&A

PROGRAM ABSTRACTS

Moderators: Jonathan Ting, MD & Troy Woodard, MD

4:05pm

Endoscopic endonasal orbital cavernous hemangioma resection: Global experience in techniques and outcomes

Benjamin Bleier, MD
Paolo Castelnuovo, MD
Paolo Battaglia, MD
Boston, MA
USA

Background: Endoscopic orbital surgery represents the next frontier in endonasal surgery. The current literature is largely comprised of small, heterogeneous, case series with little consensus regarding optimal techniques. The purpose of this study was to combine the experience of multiple international centers to create a composite of the global experience on the endoscopic management of a single type of tumor, the orbital cavernous hemangioma(OCH).

Methods: Retrospective study of techniques for endoscopic OCH resection from 6 centers on 3 continents. Only primary data from strictly endoscopic resection of OCHs were included. Responses were analyzed to qualitatively identify points of both consensus and variability among the different groups.

Results: A total of 23 patients, 10(43.5%) male and 13(56.5%) female were collected. The majority of lesions were intraconal (60.9%). The mean surgical time was 150.7+/-75.0(mean+/-S.D.) minutes with a mean blood loss of 82.65+/-49.6 mL. Binarial approaches(26.1%) were used exclusively in the setting of intraconal lesions which were associated with a higher rate of incomplete resection(31.3%), postoperative diplopia(25.0%), and the need for reconstruction(37.5%) than extraconal lesions. Orthotropia and symmetric orbital appearance were achieved in 60.9% and 78.3% of cases, respectively.

Conclusions: Extraconal lesions were managed similarly however greater variability was evident for intraconal lesions. These included the laterality and number of hands in the approach, methods of medial rectus retraction, and the need for reconstruction. The increased technical complexity and disparity of techniques in addressing intraconal OCHs suggests that continued research into the optimal management of this subclass of lesions is of significant priority.

4:12pm

Timing of endoscopic surgical decompression in traumatic optic neuropathy: A systematic review of the literature

Sandeep S. Dhaliwal, MD
Brian Rotenberg, MD, MPH, FRCSC
London, Ontario
Canada

Introduction:

Traumatic optic neuropathy (TON) represents a rare but devastating complication of closed head-injuries. No accepted guidelines are available to guide medical and surgical management algorithms. A systematic review of the literature was performed to determine the optimal timing and candidacy for endoscopic surgical intervention.

Methods:

A systematic review of multiple databases was performed including Medline-Ovid, Embase, and Pubmed. Data was extracted and patients stratified based on surgical delay from trauma (<3 days, 3-7 days, or >7 days) as well as pre- and post-operative vision testing (no light perception [NLP], light perception [LP], hand motion [HM], finger counting [FC] or better).

Results:

The literature review identified 26 studies meeting inclusion criteria. In the group of patients receiving surgery <3 days after the antecedent event, 64% (110/172) had visual improvement, while in the group >7 days, 49% (119/241) of patients improved. In those with NLP pre-operatively, 49% (237/486) saw improvement, while those with LP (89%), HM (100%), or FC (75%) fared better.

Conclusions:

Surgical intervention for TON may still be indicated despite delayed presentation. Patients with complete blindness (NLP) tend to have a poorer surgical outcome.

4:19pm

A systematic review of the evidence base for vidian neurectomy in managing rhinitis

Tal Marshak, MD
Richard Harvey, MD
Nahariya, Israel
Israel

Background:

Vidian neurectomy (vn) is an option for medical refractory rhinitis. however, the evidence base for its benefit remains unclear. The studies providing outcomes for vn in managing rhinitis patients is assessed.

Methods:

A systematic review of medline (1946 -) and embase (1974 -) databases to December 16th 2013 was performed. Studies reporting original data on patients with rhinitis treated by vn, were included. Primary outcome were patient reported outcome measures (proms). Secondary outcomes were specific peri-operative morbidity and objective findings.

Results:

853 articles fulfilled the search, producing 30 included studies. Case series accounted for 83.33% (25). The rest were 3 case-control studies, 1 cohort and one randomized controlled trial. Proms were compared before and after surgery in only 20% (n=6). There were n=473 patients represented in these studies. Significant improvement in rhinorrhea or nasal obstruction was reported in all 6 studies. Dry eyes were reported in 24.63% (272/1104) and were temporary in 96.31% (210/218) with the majority resolving in 6 months. Temporary paresthesia in the V2 nerve was the next most common adverse event at 9% (99/1100) and resolving in all. Histological changes in the nasal mucosa were examined in 3 studies (n = 165), all reported a decrease in the cellular infiltration and in the number of glands.

Conclusions:

Vidian neurectomy remains an option for medical refractory rhinitis. A well designed cohort study is needed, to support the findings presented. Ocular side-effects are common but temporary for the majority of patients.

4:26pm

Outcomes of revision modified endoscopic**Lothrop procedure**

David K. Morrissey, MBBS

Ahmed Bassiouni, MBBS

Alkis Psaltis, MBBS

Peter-John Wormald, MD

Yuresh Naidoo, MBBS

Woodville South, South Australia

Australia

Introduction:

Endoscopic Modified Lothrop Procedure (MELP) is used in the treatment of patients who have failed conventional sinus surgery. The failure of this procedure is reportedly between 5 and 32%. We present our institutions data pertaining to the outcome of patients requiring revision MELP.

Methods:

Data was collected prospectively. All patients undergoing revision MELP between January 2001 and December 2013 were included in the study with an average follow up of 36 months. Information related to demographics, asthma status, aspirin sensitivity, Snot 22 score, Lund Mackay scores, intra-operative findings and endoscopic ostium assessment was collected. Minimum follow-up was 6 months.

Results:

During the study period 209 primary modified endoscopic lothrop procedures were completed with average follow-up 36 months. 16 patients required revision MELP (7.6%) of which 3 required multiple revisions for a total of 19 revision MELPs. The rate of failure of revision MELP was 18.7%. Risk factors for failure of primary MELP included the presence of intraoperative pus and aspirin exacerbated respiratory disease. Revision of MELP was undertaken primarily due to recurrence of nasal polyps or ostium stenosis. Those patients who underwent revision MELP experienced symptomatic improvement and importantly no major complications following the procedure.

Conclusion:

The failure rate of primary MELP in our series is 7.6% and of those patients requiring revision MELP, 81.3% required no further surgery. Revision Endoscopic Modified Lothrop procedure is a safe and well tolerated procedure in the small group of patients that require further surgery.

4:33pm

Outcomes of modified endoscopic Lothrop in aspirin exacerbated respiratory disease with nasal polyposis

David Morrissey, MBBS

Alkis Psaltis, MBS

Ahmed Bassiouni, MBBS

Peter-John Wormald, MD

Yuresh Naidoo, MBBS

Woodville South, South Australia

Australia

Introduction:

Patients with Aspirin Exacerbated Respiratory Disease (AERD) and

chronic rhinosinusitis with nasal polyps (CRSwNP) are often reported to be recalcitrant to standard medical and surgical intervention. Failure rates of standard endoscopic sinus surgery in these patients are reported to be up to 90%. We review outcomes for our cohort of AERD patients undergoing endoscopic sinus surgery including Modified Endoscopic Lothrop Procedure (MELP).

Methods:

Data was collected prospectively between January 2001 and December 2014.

Information related to demographics, asthma status, aspirin sensitivity, Snot 22, Lund Mackay scores and endoscopic ostium assessment were collected for up to 5 years. Minimum follow-up was 6 months.

Results:

A total of 48 patients with AERD underwent complete sphenoidectomy, maxillary antrostomy and MELP during the study period with an average follow-up of 36 months. Polyp recurrence was seen in a total of 23 of AERD patients (53%). Six patients required revision MELP following initial surgery demonstrating a success rate of 87.5%. Revision was needed due to recurrence of nasal polyps in five cases and frontal ostium stenosis in a single case. No patients have required additional surgery among the 6 revision cases. There were no major complications in our study group.

Conclusion:

Complete sphenoidectomy, maxillary antrostomy and MELP is successful in a significant majority of patients with AERD and CRSwNP. It is well-tolerated with a low complication rate and facilitates successful ongoing medical management of the condition in patients with AERD.

4:40pm

Q&A

4:45pm

PANEL: Complex frontal sinus cases

Moderator: Marc Dubin, MD

Panelists: Rakesh Chandra, MD, Charles Ebert, MD, Stacey Gray, MD, Richard Orlandi, MD

5:25pm

Closing Remarks

5:30pm

Meeting Adjourned

5:45PM

President's Wine & Cheese Poster Reception

Grand Hall

(Supported by Intersect ENT)

PROGRAM ABSTRACTS

Saturday, September 26, 2015 PM Session: Breakout Room B Dallas Ballroom A3

1:00pm

Welcome:

Erin O'Brien, MD, Chairperson

Moderators: *Li-Xing Man, MD & Michael Platt, MD*

1:00pm

Metastatic squamous cell carcinoma of the nasal cavity: A population-based analysis

Aykut A. Unsal, DO

Pariket Dubal, BA

Tapan Patel, MD

Alejandro Vazquez, MD

James Liu, MD

Jean Eloy, MD

Newark, NJ

USA

Background:

Squamous cell carcinoma of the nasal cavity (NCSCC) is an infrequent malignancy that has been historically difficult to characterize. This study provides new insight into NCSCC utilizing a population-based database. We analyze the propensity for cervical and distant metastasis from NCSCC, as well as survival outcomes.

Methods:

The Surveillance, Epidemiology, and End Results (SEER) database (2004-2012) was queried for NCSCC cases. Data were analyzed with respect to various demographic and clinicopathologic factors. The results were further examined for regional and distant metastasis. Survival was analyzed using the Kaplan-Meier model.

Results:

A total of 1,180 cases of NCSCC were identified in the SEER database between 2004 and 2012. The mean age at diagnosis was 65.8 years. There was a strong gender predilection for males with a male to female ratio of 1.83:1. AJCC stage was known in 1050 cases, of which 53.4% were stage I, 13.3% were stage II, 10.2% were stage III, and 23.0% were stage IV. By tumor (T) stage classification, T1 was the most common (56.6%), followed by T4 (19.3%). Most cases had no nodal (N) involvement at diagnosis (90.8%). Cervical nodal involvement was present in 9.1% of cases, while distant metastasis was seen in 1.9%.

Conclusions:

This study represents the only known population-based investigation of NCSCC. Metastasis to cervical nodes or distant sites, especially with T1 tumors, is rare. However, any cervical involvement or distant metastasis discovered on presentation is a poor prognostic indicator.

1:07pm

Incidence of HPV identified in squamous cell carcinoma of the nasal cavity

Naweed Chowdhury, MD

Kyle Kimura, BS

Ossama Tawfik, MD, PHD

David Beahm, MD

Pradip Manna, PHD

Larry Hoover, MD

Kansas City, KS

USA

Background:

Sociological changes in sexual behavior since the 1960's have resulted in an increased incidence of HPV-associated head and neck cancer. HPV's association with oropharyngeal squamous cell carcinoma has changed our understanding of this disease process dramatically as HPV-positive patients show better responses to treatment and improved survival. Similar studies have been attempted with squamous cell carcinoma of the nasal cavity with inconsistent results, with rates of 20-50% positivity depending on patient population and location. The rarity of nasal squamous cell carcinoma has made large studies difficult to perform.

Methods:

We retrospectively reviewed 40 patients who were diagnosed pathologically for nasal squamous cell carcinoma at our large regional tertiary academic referral center. Demographic data, presenting symptoms, risk factors, staging, and long term outcomes were reviewed. Archived biopsy specimens were processed and tested to determine HPV status using a unique, real time, multiplex PCR assay that targets HPV oncogene E6 to detect, type, and quantify 15 high risk HPV types associated with cervical cancer.

Results/Conclusions:

Over 50 % of patients (N=21) with sufficient archived tissue were positive for high risk HPV types. Of these, the vast majority were positive for type 16, with other high risk types also present. Quantitative results showed a wide range of viral levels with unclear significance of viral load. The high incidence of HPV positivity in these patients may be a predictive factor in outcome, although further pooled studies are needed.

1:14pm

Layered closure with simple bony onlay graft: an acceptable alternative to nasoseptal flap for anterior skull base reconstruction

Christopher R. Roxbury, MD

Tiffany Saavedra, MHS

Gary Gallia, MD, PhD

Masaru Ishii, MD, PhD

Douglas Reh, MD

Baltimore, MD

USA

Introduction:

While the nasoseptal flap is the gold standard for skull base reconstruction in patients with intraoperative CSF leak, it may be associated with prolonged nasal healing. Layered graft techniques including allografts and middle turbinate mucosal autograft may provide comparable reconstructive success with decreased nasal morbidity.

Methods:

Retrospective review of expanded endonasal tumor resections from 2008-2014 was performed and cases of low-volume intraoperative CSF leak repair with layered closure and free bony overlay graft (middle turbinate mucosa or allograft) were identified. Patient comorbidities predisposing to reconstruction failure (obstructive sleep apnea, smoking, diabetes, hypertension) were determined. Reconstruction-related nasal complications were also identified. Postoperative CSF leak rate was determined and univariate analysis was performed to identify predictive factors for reconstructive failure.

Results:

73 cases were identified. Layered closure with dural underlay, dural overlay, and bony overlay was performed. There were 5 cases of postoperative CSF leak (6.85%). Of these, 3 underwent revision reconstruction and 2 were managed conservatively. Mean follow-up was 19 months (range 1-76). There were no statistically significant predictors of reconstruction failure on univariate analysis. There were no significant differences in leak rates between type of bony overlay graft. There were 6 patients (9.3%) who experienced persistent crusting postoperatively. There were no significant differences in crusting rates between alloderm and mucosal grafts. There were no postoperative mucocoeles.

Conclusions:

In cases of low-volume intraoperative CSF leak, layered skull base repair with simple bony overlay graft is an acceptable alternative to the nasoseptal flap, which may reduce prolonged sinonasal healing and donor site morbidities.

1:21pm

Mucosal-sparing options for endoscopic endonasal approach to the craniocervical junction

Alejandro Vazquez, MD
 Muhammad Shahid, BS
 R. Nick Hernandez, MD
 Kristen Echanique, BS
 James Liu, MD
 Jean Anderson Eloy, MD
 Newark, NJ
 USA

Introduction:

Recent advances in surgical techniques have rendered the craniocervical junction (CCJ) accessible transnasally. Endoscopic endonasal transclival and transodontoid approaches are routinely performed in leading skull base centers. Usually, these approaches involve a posterior bony and mucosal septectomy, which may compromise the integrity of the posterior septum and damage the vascularized pedicled nasoseptal flap (PNSF), a robust reconstructive option. With the possibility of an intraoperative cerebrospinal fluid (CSF) leak and the reported success of the PNSF for repair of these defects, preserving the integrity of the PNSF is beneficial during the endoscopic endonasal approach to the CCJ. Here, we describe 3 variations (2 new and 1 previously reported) which preserve the mucosal integrity of the posterior nasal septum and PNSF.

Methods:

Photo and video documentation in cadaveric dissections, artistic illustrations, and clinical examples are used to demonstrate the 3 designs.

Results:

The surgical techniques and steps required for the different approaches are demonstrated. These 3 techniques are: 1) bilateral non-opposing PNSFs tucked beneath their respective middle turbinate; 2) non-opposing Killian incisions with elevation of PNSFs laterally under the inferior turbinates. PNSFs are left attached superiorly onto the septum and laterally under the inferior turbinate. PNSFs are retracted laterally and posterior septectomy is performed allowing access posteriorly. 3) option 1 performed in 1 side, and option 2 in the contralateral side. All 3 options provided ample access to the CCJ.

Conclusions:

These variations of the mucosal-sparing approach to the CCJ allowed adequate surgical access with sufficient maneuverability while preserving both PNSFs.

1:28pm

Internal carotid artery injury in endoscopic endonasal surgery: A systematic review

Oliver Y. Chin, BA
 Ritam Ghosh, BA
 Christina Fang, MD
 Soly Baredes, MD
 James Liu, MD
 Jean Anderson Eloy, MD
 Newark, NJ
 USA

Background:

Internal Carotid Artery (ICA) injury during endoscopic endonasal surgery (EES) is a known and feared complication of paranasal sinus and skull base procedures. These ICA injuries can result in stroke, cranial nerve palsies, and death. This review examines the setting of injury along with the treatment approaches, and patient outcomes.

Methods:

The PubMed database was used to identify articles reporting cases of ICA injury during EES. Variables analyzed included patient demographics, operative approach, preoperative diagnosis, setting of injury, repair method, imaging studies, patient outcomes, and follow-up.

Results:

Twenty-nine articles with 53 cases were included in this review. Pituitary adenomas (28.3%) and nasal polyposis (11.3%) were the most common preoperative diagnoses. Injuries occurred more commonly on the left (1.8:1), involving the cavernous portion of the ICA (68.3%). Injury commonly occurred during exposure of the sphenoid sinus with Kerrison Rongeurs (11.4%), suction tips (8.6%), and drills/perforators (5.7%). Initial hemostasis was achieved with nasal packing (51.5%), bipolar coagulation (9.1%), neck compression (9.1%). Intraoperative imaging was performed in 19 cases. After initial hemostasis, 17 cases were grafted, 10 ballooned, 5 stented, and 5 coiled. No neurologic deficits were reported in 30 cases, transient deficits resolved in 7 cases, and permanent deficit developed in 1 case. Five patients died immediately from injury.

Conclusion:

The incidence of reported cases of ICA injury during EES remains

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low. Left sided injuries to the cavernous portions of the ICA occurred most frequently. Endoscopic transsphenoidal procedures remain the most common procedures during which ICA injuries are encountered.

1:35pm

Q&A

Moderators: Jacqueline Corey, MD & Sarah Wise, MD

1:40pm

Inhibition of allergic responses by intranasal topical selective Nf-b inhibitor in murine model of allergic rhinitis

Dong-Young Kim, MD
Seoul
Republic of Korea

Background:

Study of murine asthma model revealed that specific local nuclear factor-kappa B (NF- κ B) inhibition by NF- κ B decoy oligodeoxynucleotides (ODNs) had therapeutic potential in the control of pulmonary allergy. This study aimed to evaluate the therapeutic effect of selective NF- κ B inhibition by NF- κ B decoy ODNs on allergic rhinitis (AR) using AR mouse model.

Methods:

BALB/c mice were systemically sensitized with OVA and alum, and then intranasally challenged with OVA. NF- κ B inhibitor, NF- κ B decoy ODNs was given intranasally to the treatment group, and NF- κ B scrambled ODNs to the sham treatment group. Allergic symptom scores, eosinophil infiltration, cytokine levels in the nasal mucosa, nasal lavage fluid, and spleen cell culture, serum total and OVA-specific immunoglobulins, and the expression of intercellular adhesion molecule-1 (ICAM-1) in the nasal mucosa were analyzed.

Results:

NF- κ B decoy ODNs significantly reduced allergic symptoms and eosinophil infiltration in the nasal mucosa. It also suppressed serum levels of total IgE and OVA-specific IgE and IgG1. IL-5 and TNF- α levels and the expression of ICAM-1 were significantly decreased in the nasal mucosa of the treatment group compared to the positive control and sham treatment groups. In addition, IL-6 was significantly decreased in the nasal lavage fluid of treatment group. Furthermore, NF- κ B decoy ODNs significantly reduced expression of systemic Th2 cytokines, IL-4 and IL-5 in the spleen cell culture.

Conclusion:

This study showed that local NF- κ B inhibition by NF- κ B decoy ODNs suppressed allergic responses in murine AR model, demonstrating a therapeutic potential of local NF- κ B inhibition in the control of AR.

1:47pm

TNF-alpha-mediated inflammation in chronic rhinosinusitis due to differential expression of type 1 and type 2 TNF-alpha receptors

Justin H. Turner, MD, PhD
Ping Li, MD
Nashville, TN
USA

Introduction:

The biological effects of the pro-inflammatory cytokine TNF- α are mediated through two distinct cell surface receptors with varied expression patterns and often opposing downstream signaling cascades. The aim of this study is to determine whether both TNF- α receptors (TNFRs) are expressed in sinonasal tissue and whether changes in TNFR expression may contribute to disease phenotype.

Methods:

Expression of TNF- α , TNF- α converting enzyme (TACE), TNFR1 and TNFR2 were assessed in sinonasal tissue from healthy controls (n=15) and from patients with CRS with nasal polyps (CRS_{NP}, n=16) and CRS without nasal polyps (CRS_{SNP}, n=15) using real-time quantitative PCR and immunohistochemistry.

Results:

A 2.2-fold and 2.4-fold increase in TNF- α mRNA expression was observed in CRS_{SNP} and CRS_{NP} tissue, respectively, when compared to control tissue. A similar increase in expression was noted for TACE. Both TNFR1 and TNFR2 were expressed in normal sinonasal tissue, primarily in the apical surface of the epithelium, endothelium, and glandular tissue. Compared to control tissue, TNFR1 expression was reduced in CRS_{SNP} and CRS_{NP} by 59% and 89%, respectively. Conversely, TNFR2 expression was increased in CRS_{SNP} and CRS_{NP} by 2.4- and 2.2 fold, respectively. Immunohistochemistry demonstrated a dense infiltrate of TNFR2-positive inflammatory cells in the submucosa and a reduction in epithelial TNFR1 expression in CRS tissue.

Conclusion:

CRS with and without nasal polyps is associated with increased TNF- α expression. Significant changes in the ratio of TNFR1 to TNFR2 expression in CRS may result in an imbalance in TNF- α -dependent signaling pathways and a pro-inflammatory phenotype.

1:54pm

T regulatory and Th17 cells in chronic rhinosinusitis with polyps

Dijana Miljkovic, MS
Alkis Psaltis, MD, PhD, FRACS
Peter-John Wormald, MD FRACS
Sarah Vreugde, MD, PhD
Adelaide, SA
Australia

Introduction:

Chronic Rhinosinusitis (CRS) is classified based on the absence (CRS_{SNP}) or presence of nasal polyps (CRS_{NP}). The presence of polypoid mucosal changes in CRS_{SNP} patients may indicate that this classification is simplistic and that CRS indeed may represent a continuous spectrum of disease.

Methods:

Healthy controls and patients with CRS_{NP} and CRS_{SNP} were prospectively recruited for this study. Samples from healthy appearing mucosa, polypoid tissues and polyps were obtained from each patient where possible at the time of endoscopic sinus surgery and quantitatively analysed using Flow Cytometry for various adaptive and innate immune cell subsets.

Results:

Tissue from 15 CRSwNP, 6 CRSsNP and 8 control patients was obtained for analysis. In the polyps from CRSwNP patients there were significantly more Treg cells (12.86 +/- 12.60 vs 2.83 +/- 4.68) and Th17 cells (16.12 +/- 11.75 vs 2.31 +/- 2.13) compared to the polypoid tissue from CRSsNP patients. Cellular infiltrates in the mucosa of the different patient categories showed no difference in CRSwNP, CRSsNP and control groups.

Conclusion:

This study identified an increase in Treg and Th17 cells in CRSwNP patients implying that these cells may be implicated in polyp development. Importantly it also identified a similar inflammatory infiltrate in non-polyp mucosa across control, CRSsNP and CRSwNP groups which infers that polyps should be sampled when studying CRSwNP.

2:01pm

Connexin gap junction channels and chronic rhinosinusitis

Raymond JT Kim, MD
George Chang, PhD
Rebecca Hu, PhD
Anthony Phillips, PhD
Richard Douglas, FRACS
Auckland, AKL
New Zealand

Gap junction channels are formed by connexin proteins (Cx). These channels facilitate communication between adjacent cells, and some of these have been implicated in acute and chronic inflammation. We hypothesized that that altered Cx expression may lead to the hallmark chronic inflammation in the sinonasal mucosa of chronic rhinosinusitis (CRS) patients.

Our aims were two-fold: firstly screen normal sinus mucosa for the family of Cxs; secondly compare the expression of three key Cxs (26, 30, 43) between CRS and normal sinus mucosa. These Cxs have been previously implicated in lower airway epithelial cell repair or chronically inflamed non-healing cutaneous wounds.

Method:

Sinus mucosa biopsies were taken from 11 patients with CRS undergoing sinus surgery and 7 with normal sinuses undergoing transnasal pituitary surgery. PCRs were performed for gene expression across the Cx family in the normal mucosa. Subsequent targeted quantitative analyses were via qPCR and fluorescent immunohistochemistry (IHC).

Results:

16 Cxs were expressed in the normal mucosa including Cxs 26, 30 and 43. qPCR demonstrated elevated abundance of Cx 26 ($p = 0.005$), Cx 30 ($p = 0.07$) and Cx43 ($p = 0.04$) in CRS compared to normal. IHC confirmed significantly higher levels of Cx43 in CRS ($p < 0.001$).

Conclusion:

Increased Cx expression was found in the CRS mucosa. Connexin 43 is currently being evaluated as a new therapeutic target in inflammatory wound healing and should now be evaluated further for its role in inflammation in the CRS mucosa.

2:08pm

Doxycycline inhibits Tgf- β 1-induced extracellular matrix production in nasal polyp-derived fibroblasts

Byungjin Kang, MD
Hwaejoon Jung, MD
Il-Ho Park, MD, PhD
Jae-Min Shin, MD
Heung-Man Lee, MD, PhD
Seoul
South Korea

Introduction:

Doxycycline has been shown to have anti-bacterial and anti-inflammatory effects and suppresses collagen biosynthesis. The purpose of this study was to evaluate the effects of doxycycline on transforming growth factor (TGF)- β 1-induced myofibroblast differentiation and extracellular matrix production in nasal polyp-derived fibroblasts (NPDFs). We also determined the molecular mechanisms of action for doxycycline.

Methods:

NPDFs were isolated from nasal polyps from eight patients. Doxycycline was used to pre-treat TGF- β 1-induced NPDFs. Cytotoxicity was evaluated using a 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-tetrazolium bromide assay. Expression levels of α -smooth muscle actin (SMA) and fibronectin were measured using Western blot, reverse transcription-polymerase chain reaction, and immunofluorescence staining. Total collagen production was analyzed with the Sircol collagen assay, while mitogen-activated protein kinase (MAPK) and NF- κ B activation were determined using Western blot analysis. Luciferase assay was used to evaluate the transcriptional activity of NF- κ B.

Results:

While doxycycline (0 - 40 ng/ml) had no significant cytotoxic effects in TGF- β 1-induced NPDFs, it significantly reduced the expression levels of α -SMA, fibronectin, and collagen in TGF- β 1-induced NPDFs in a dose-dependent manner. Doxycycline also inhibited the TGF- β 1-induced activation of p38, JNK, and NF- κ B, and its inhibitory effects were similar to those of the specific inhibitors for each.

Conclusions:

Doxycycline has an inhibitory effect on TGF- β 1-induced myofibroblast differentiation and extracellular matrix production via the p38 and JNK/NF- κ B signal pathways in NPDFs.

2:15pm

Q&A

2:20pm

PANEL: Building a successful career in research: Pearls from the PI's

Moderator: Sarah Wise, MD
Panelists: Noam Cohen, MD; Tim Smith, MD; Rod Schlosser, MD; Andy Lane, MD

3:00pm

Break with Exhibitors

PROGRAM ABSTRACTS

Moderators: Jeremiah Alt, MD & Sandra Lin, MD

3:25pm

Improvements in sleep-related symptoms after endoscopic sinus surgery in patients with chronic rhinosinusitis

Edward El Rassi, MD

Jess Mace, MPH

Toby Steele, MD

Jeremiah Alt, MD, PhD

Timothy Smith, MD, MPH

Portland, OR

USA

Introduction:

Sleep impairment is highly prevalent in patients with CRS. While endoscopic sinus surgery (ESS) has been shown to improve overall patient-reported sleep quality, the postoperative impact on individual sleep symptoms remains unclear.

Methods:

Patients with medically-recalcitrant CRS who elected to undergo ESS were prospectively enrolled into a multi-institutional, observational cohort study. Sleep-related symptom severity and treatment outcomes were assessed using the 22-item Sino-Nasal Outcome Test (SNOT-22) sleep domain.

Results:

A total of 334 participants met criteria and were followed postoperatively for an average of 14.5[SD=4.9] months. Mean SNOT-22 sleep domain scores improved from 13.7[6.8] to 7.7[6.6];(p<0.001). Significant mean relative improvements were reported in "difficulty falling asleep" (45%; p<0.001), "waking up at night" (40%; p<0.001), "lack of a good night's sleep" (43%; p<0.001), "waking up tired" (40%; p<0.001), and "fatigue" (42%; p<0.001) scores. A total of 66% of study participants reported postoperative improvement in "lack of a good night's sleep", "waking up tired", and "fatigue" compared to 62% who reported improvement in "waking up at night" and 58% who reported improvement in "difficulty falling asleep".

Conclusion:

Patients with CRS report significant and sustained improvements following ESS in common sleep-related symptoms as assessed by the SNOT-22 sleep domain. Despite these significant improvements, some degree of persistent postoperative sleep impairment was reported. Further study is necessary to determine what factors are associated with continued sleep dysfunction after sinus surgery.

3:32pm

Otologic outcomes after endoscopic sinus surgery

Neville W. Teo, MBBS, MRCS

Jess Mace, MPH

Timothy Smith, MD, MPH

Peter Hwang, MD

Singapore

Introduction:

While endoscopic sinus surgery (ESS) has been shown to improve sinus-specific symptoms in patients with chronic rhinosinusitis (CRS), few studies have looked at otologic outcomes, even though ear symptoms are commonly associated with CRS. This study seeks to evaluate improvement in otologic symptoms after ESS and

identify differences between patients with (CRSwNP) and without (CRSsNP) nasal polyposis.

Methods:

Adults with medically recalcitrant CRS who elected ESS were enrolled in a prospective, multicenter, observational cohort study from 2011-2014. Preoperative evaluation of subjects included assessment of clinical characteristics, measures of disease severity, and quality of life evaluation using the 22-item SinoNasal Outcome Test (SNOT-22). Postoperative improvement in otologic subscores of the SNOT-22 (ear fullness, dizziness, otalgia) were evaluated and compared between CRSwNP and CRSsNP.

Results:

395 patients were studied, with a mean follow up of 13.9 months. 87% of patients reported at least one otologic symptom preoperatively, which decreased to 63% postoperatively (p<0.001). A total of 61%, 44%, and 43% of patients reported experiencing improvement in ear fullness, dizziness and otalgia, respectively. Significant postoperative improvement were found across all otologic subscores – ear fullness from 2.3 to 1.2 (p<0.001), dizziness from 1.3 to 0.7 (p<0.001), and otalgia from 1.2 to 0.6 (p<0.001). Patients with CRSwNP reported significantly greater improvement in ear fullness compared to CRSsNP (54% vs. 41%; p=0.039), but improvement in dizziness and otalgia were comparable.

Conclusions:

Sinus surgery significantly improves otologic symptoms associated with CRS. CRSwNP patients reported slightly greater relief of ear fullness than CRSsNP patients following ESS.

3:39pm

Pain and depression in patients with chronic rhinosinusitis: Does the evidence support a relationship?

Daniel R. Cox, MD

Timothy Smith, MD, MPH

Jess Mace, MPH

Shaelene Ashby, PhD

Jeremiah Alt, MD, PhD

Salt Lake City, UT

USA

Introduction:

Pain and depression often coexist as comorbidities in patients with chronic disease and exert a major impact on quality of life (QOL). Little is known about the relationship between pain and depression in chronic rhinosinusitis (CRS). Our objective was to investigate this relationship and to analyze the effect of pain and depression on QOL in CRS.

Methods:

Patients with CRS were prospectively recruited as part of an observational cohort study. A total of 70 participants provided pain scores using both the Brief Pain Inventory Short Form (BPI-SF) and the Short Form McGill Pain Questionnaire (SF-MPQ). Patients at risk for depression were identified using the Patient Health Questionnaire-2 (PHQ-2). CRS-specific QOL was determined using the Sinonasal Outcome Test-22 (SNOT-22).

Results:

Significant positive correlations were found between depression scores and all pain measures ($R = 0.475-0.644$, $p < 0.001$). Patients with a PHQ-2 score =1 had significantly higher scores on all reported pain measures. Significant positive correlations were found between all pain measures, the total SNOT-22 score, and three SNOT-22 subdomains (sleep, psychological dysfunction, and ear/facial symptoms; $R = 0.323-0.608$, $p < 0.05$).

Conclusions:

Adult patients with CRS at risk for depression have more pain and have overall worse disease-specific QOL. Further research investigating the complex interactions between depression and pain and the role it plays in CRS disease-specific QOL is warranted.

3:46pm

Impact of omalizumab therapy on medication requirements for chronic rhinosinusitis

Matthew J. Clavenna, MD
Justin Turner, MD, PhD
James Duncavage, MD
Simpson Tanner, MD, CCD
Rakesh Chandra, MD
Nashville, TN
USA

Introduction:

Omalizumab is indicated for treatment of patients with moderate to severe allergic asthma. Previous studies have shown >90% of these patients also have chronic rhinosinusitis (CRS). The present series examines the impact of omalizumab on medication use for CRS in a cohort of asthmatic CRS patients who received this therapy.

Methods:

The sample included 25 patients with adequate prescription data pre- and post-initiation of therapy. Data was available for a full 12 months both pre- and post- initiation of therapy in the vast majority of patients. Average antibiotic use (# of unique prescriptions per month) and systemic steroid dose (mg/month) were tabulated for each patient and compared before and after initiation of therapy.

Results:

Mean antibiotic prescriptions/month decreased by 37%, and this was statistically significant ($p = 0.011$). Antibiotic use decreased in 15/25 (60%), was the same in 7/25 (28%), and increased in 3/25 (12%) patients. Chronic steroid administration was required in 19/25 patients, and dosing was highly variable. Mean monthly steroid dose decreased significantly in 8/19 (42%) patients, with reduction ranging 40-100% from pretreatment levels. A modest decrease of 17-30% was observed in 4/19 (21%) patients. Steroid use was essentially unchanged in 4/19 (21%), but dramatically increased (71-366% above pretreatment dose) in 3/19 (15%) patients.

Conclusions:

Omalizumab therapy is associated with a decrease in overall antibiotic use for CRS. A subset of patients also experience significant reduction in steroid dependence. Further study is necessary to determine factors predictive of response.

3:53pm

Characterizing human nasal airflow physiologic variables by nasal index

Aniruddha U. Patki, MD
Dennis Frank-Ito, PhD
Durham, NC
USA

Background:

Anthropologists have suggested that variations in human nasal index (NI) represent adaptation to geographic climatic conditions; however, objective assessments of NI with airflow variables such as mucosal cooling and air interaction with nasal mucosa are lacking. This study uses computational methods to examine the relationship between NI and airflow variables.

Methods:

Sinonasal cavities of 16 subjects with anatomically normal radiographic computed tomography images were reconstructed. NI was calculated from facial soft tissue reconstructions. Computational fluid dynamics simulations were conducted under constant inspiratory pressure to assess each subject's airflow profile.

Results:

Wall shear stress (WSS) and heat flux (HF) demonstrated robust linear fit with NI for $NI < 80$; this was strongest for HF from nostrils to choanae ($R^2 = 0.76$). For $NI > 80$, linear correlations between NI and WSS or HF at either nostril to nasal valve or choanae were weak ($R^2: 0.00002-0.13$). A 4th order polynomial fit to the data describing the association between NI (69-99) and airflow parameters showed R^2 for WSS and HF versus NI were 0.38-0.51; nasal resistance weakly correlated with NI ($R^2: 0.12-0.25$). Simulations revealed HF and WSS are directly proportional to NI in narrower noses ($NI < 80$), and inversely proportional to NI in broader noses ($NI > 90$).

Conclusion:

Simulations demonstrated increasing mucosal warming and air interaction with sinonasal mucosa in narrower noses, more commonly in cold dry climates, and a decreasing effect of these same interactions in broader noses, more common in hot humid climates. This pilot study has shown an association between NI and some aspects of nasal physiology

4:00pm

Q&A

PROGRAM ABSTRACTS

Moderators: Waleed Abuzeid, MD & Marc Tewfik, MD, MSc

4:05pm

Comparison of intranasal fluticasone and budesonide in post-operative endoscopic sinus surgery patients with chronic rhinosinusitis with polyposis

Paul D. Neubauer, MD

R. Peter Manes, MD

New Haven, CT

USA

Introduction:

Nasal steroids are a critical part of the management of patients with chronic rhinosinusitis with nasal polyposis(CRSwNP) after endoscopic sinus surgery(ESS). Increasingly, practitioners are utilizing Pulmicort(budesonide) respules delivered to the sinonasal cavities, which is an off-label use, in lieu of traditional nasal steroids. There has been little research comparing budesonide with traditional nasal steroids, and little research evaluating delivery methods of budesonide respules.

Methods:

A randomized controlled trial was performed on patients with CRSwNP in a tertiary care center. Patients underwent ESS, and were randomized into one of three post-operative medication groups: Group 1 received fluticasone 50 mcg, 2 sprays to each nostril two times daily; Group 2 received budesonide respules(0.5 mg/2mL) delivered via mucosal atomization device(MAD) in the upright position two times daily; Group 3 was prescribed budesonide respules(0.5 mg/2mL) delivered via the vertex-to-floor position twice daily. Primary endpoints were SNOT-22 and Lund-Kennedy endoscopic score at six months.

Results:

Thirty patients were enrolled. The change in SNOT-22 score was greatest for Group 2. This difference approached, but did not reach, statistical significance compared to fluticasone(33.2 v. 43.8, p=0.09). Change in Lund-Kennedy score was greatest for Group 3. This difference approached, but did not reach, statistical significance when compared to fluticasone(3.04 v. 4.27, p=0.06).

Conclusions:

Patients treated with budesonide after ESS for CRSwNP had greater improvement in SNOT-22 and Lund-Kennedy scores compared to fluticasone at six months. However, these differences did not reach statistical significance. This study highlights the need for further research regarding different topical steroid treatment post-operatively.

4:12pm

Placement of a steroid-releasing implant in maxillary and frontal sinus ostia: 3-month results of a prospective, multicenter, open label trial

William J. Brown, MD

Boris Karanfilov, MD

Miami, FL

USA

Introduction:

Steroid-releasing implants facilitate local drug delivery, maintain patency and reduce inflammation. While safety and effectiveness

have been established following ethmoid sinus surgery, this technology has potential to improve outcomes in other sinuses. This study evaluated the feasibility, safety and initial efficacy of implant placement in maxillary and frontal sinus ostia following in-office dilation.

Methods:

A prospective, multicenter, open label study enrolled 10 CRS patients with frontal and/or maxillary sinus disease. Follow-up assessment included SNOT-22 and endoscopic grading by clinicians.

Results:

Ten male patients with a mean Lund-Mackay CT stage of 11.9 (SD 6.0) underwent in-office balloon dilation in 28 sinus openings (16 frontal, 12 maxillary), followed by implant deployment. Implants were placed in 27 sinus ostia resulting in 96% implant delivery success. One implant was deployed into the maxillary sinus. Mean SNOT-22 score was reduced to 1.2 (1.0) from 1.9 (0.8), resulting in a treatment effect size of 0.7. Sinus patency was 100% at 4 weeks and 88% at 12 weeks. At 12 weeks, mean inflammation score (100-mm VAS) was reduced to 26.4 (26.3) from 60.4 (25.6) at baseline, polypoid edema score was reduced in 63% (17/27) of sinuses, and adhesion/scarring score was reduced in 86% (12/14) of sinuses. No patient required oral steroids or surgical intervention during 12 weeks. There were no implant-related serious adverse events.

Conclusion:

The study demonstrated the feasibility and safety of steroid-releasing implant placement in maxillary and frontal sinus ostia following in-office sinus dilation and favorable endoscopic and patient-reported outcomes during 12 weeks.

4:19pm

Frontal sinus surgery and access of nasal irrigation

Henry P. Barham, MD

Vijay Ramakrishnan, MD

Anna Knisely, MD

Raymond Sacks, MD

Richard Harvey, MD, PhD

Darlinghurst, NSW

Australia

Introduction:

Effective mucous lavage and delivery of topical pharmaceuticals are central to successful management of chronic rhinosinusitis (CRS). The frontal sinus remains difficult to penetrate with topical therapies. This study evaluates the impact of Draf III frontal dissection to traditional Draf IIa for distribution of topical therapies.

Methods:

Fresh human cadaver heads were dissected sequentially with Draf IIa frontal sinusotomy and then Draf III procedures. Each cavity was irrigated with pediatric (120mL) and adult (240mL) irrigation bottles with 1/1000 10% fluorescein-labelled free water in two fixed positions (Frankfort Horizontal and Vertex). An endoscope at a fixed position within the frontal sinus recorded frontal sinus and frontal recess penetration. The images then underwent blinded evaluation of fluid distribution scored as 0-4 (nasal cavity only, frontal recess, medial ½, lateral ½, lavage). Ordinal distribution score was analyzed with Kendall's tau-b.

Results:

8 specimens (age 76 ± 11.2 years and 50% female) were assessed. Draf III was superior to Draf IIa in reaching a distribution score of ≥ 2 (90.6% vs 50.1%, $p < 0.001$). Vertex head position improved distribution (90.6% vs 50.1%, $p < 0.001$), was synergistic Draf III (100% with 87.5% lavage $p < 0.001$) but was unable to overcome Draf IIa (81.2% with 25% lavage, $p < 0.001$). Irrigation volume trended towards improved distribution with larger volume irrigations.

Conclusion:

Successful treatment of sinonasal disease is often dependent on post-operative delivery of topical therapies. Draf III frontal sinusotomy achieves superior topical access, and access to the frontal sinus with Draf IIa was poor, despite large volumes and positioning.

4:26pm

Cadaveric validation study of computational fluid dynamics model of sinus irrigations before and after sinus surgery

John R. Craig, MD
Kai Zhao, PhD
Nithin Adappa, MD
Sammy Khalili, MD
Ngoc Doan, BS
James Palmer, MD
Detroit, MI
USA

Introduction:

Investigations into the distribution of sinus irrigations have been limited by labor-intensive methodologies that do not capture the full dynamics of irrigation flow. The purpose of this study was to validate the accuracy of a computational fluid dynamics (CFD) model for sinonasal irrigations through a cadaveric experiment.

Methods:

Endoscopic sinus surgery was performed on two fresh cadavers to open all eight sinuses, including a Draf IIb frontal sinusotomy for one head, and a Draf III procedure for the other. CT maxillofacial scans were obtained preoperatively and postoperatively, upon which CFD models were created. Blue-dyed saline in a 240 mL squeeze bottle was used to irrigate cadaver sinuses at 60 mL/s (120 mL per side, over 2 seconds). This process was replicated in CFD simulations. Endoscopes were placed through holes drilled in the anterior tables of the frontal sinuses, and sphenoid roofs. Irrigation flow into the frontal and sphenoid sinuses was recorded during ipsilateral and contralateral nasal irrigations. Preoperative and postoperative endoscopic videos of the cadaveric sinus irrigations were then compared to the preoperative and postoperative CFD models.

Results:

Preoperative and postoperative irrigation flow patterns into the frontal and sphenoid sinuses were equivalent in the cadaver and CFD models. Preoperatively, almost no irrigations reached the frontal or sphenoid sinuses. Postoperatively, irrigations penetrated these sinuses. The CFD model demonstrated the dynamic flow of irrigations as they traversed the entire sinonasal cavity.

Conclusions:

CFD modeling of sinonasal irrigations accurately represents the dynamic flow of sinonasal irrigations before and after cadaveric sinus surgery.

4:33pm

Topical antibiotic therapy after endoscopic sinus surgery: Prospective double-blind placebo controlled study

Mohammad H. Al-Bar, MD
Arjuna Kuperan, MD
John Wood, MD
Seth Lieberman, MD
Jose Ruiz, MD
Roy Casiano, MD
Miami, FL
USA

Objectives:

To evaluate the efficacy of empirical topical antibiotic therapy after endoscopic sinus surgery (ESS).

Study Design:

A prospective, randomized, double-blinded, placebo-controlled trial.

Methods:

68 Chronic rhinosinusitis patients who were to undergo ESS were recruited and randomized to receive 2 weeks of either mupirocin nasal irrigation or placebo nasal irrigation after their surgery. Short-term postoperative assessments (within the first 3 months postoperative period) of quality of life (SNOT20 and VAS for nasal obstruction), postoperative endoscopic evaluation for edema, crusting, granulation secretions and polyposis were done at postoperative periods in one week one month and 3 months.

Results:

Analysis of 47 patients who completed SNOT 20 and VAS assessment shows significant difference in preoperative and postoperative scores in both groups but no significant difference when comparing the 2 groups ($P < 0.006$ and $P = 0.7$ respectively). There was, however, a statistically significant difference at one month post-operative visit in endoscopic evaluation and the need for oral and topical antibiotic ($P = 0.0005$ and $P = 0.013$, respectively). As a secondary finding, Intraoperative culture positive for staph aureus was found in 21 patients, postoperative cultures at one month visit found to be negative in 76% of treatment group and 50% control group. However, this was statistically non-significant.

Conclusions:

Data analysis suggests that there is significant improvement in early postoperative endoscopic examination and the need for cultural directed antibiotic in patients receiving mupirocin nasal irrigation following ESS. However, quality of life and patient symptoms has no significant difference between the 2 groups.

4:40pm

Q&A

PROGRAM ABSTRACTS

4:45pm

PANEL: Topical therapies for rhinosinusitis: A critical appraisal of the evidence

Moderator: Kevin Welch

Panelists: Noam Cohen, MD; Jivianne Lee, MD;
Chris McMains, MD

5:25pm

Closing Remarks

5:30pm

Meeting Adjourned

5:45pm

President's Wine & Cheese Poster Reception

Grand Hall

(Supported by Intersect ENT)

Saturday September 26, 2015

PM Session: Breakout Room C

Dallas Ballroom A2

1:00pm

Welcome: Mark Zacharek, MD, Chairperson

Moderators: *Elina Toskala, MD & Subinoy Das, MD*

1:00pm

Evaluation of the safety of antimicrobial photodynamic therapy (apdt) for refractory chronic rhinosinusitis

Shaun Kilty, MD, FRCSC
Leandra Mfuna Endam, Msc
Andrea Lasso, CCRP
Roger Andersen, MD, MPH
Nicholas Loebel, PhD
Martin Desrosiers, MD
Ottawa, Ontario
Canada

Introduction:

Antimicrobial photodynamic therapy (aPDT) is proposed as a new treatment modality for the management of refractory chronic rhinosinusitis (CRS). Mechanistically, aPDT directly causes the eradication of bacteria in both planktonic and biofilm forms, as well as local mucosal immunomodulation. Operationally, a fiberoptic light diffusing catheter is introduced into a previously operated sinus cavity to activate an applied photosensitizing agent. Given the relationship of the paranasal sinuses to other critical structures and organs, a patient safety evaluation of the therapy is necessary.

Methods:

Specific safety evaluations were performed of patients undergoing aPDT during a multicenter randomised clinical trial. These evaluations included pre and post-treatment endoscopic visualization, CT imaging, ophthalmologic evaluation, olfactory testing using the University of Pennsylvania Smell Identification Test (UPSIT) and any reported adverse events recorded during the twenty-four hours following aPDT therapy.

Results:

Of the 47 trial patients, 31 were randomised to receive aPDT and a total of 43 treatments were delivered to 154 sinuses (52 frontal, 48 maxillary, 54 ethmoid). Thirteen patients underwent two treatment sessions. In no instances did any ocular dysfunction or visual loss occur. There was no trauma at the level of the surrounding sinus mucosa and in several patients there was resolution of disease. The most frequent post-treatment non-ocular symptom was transient mild pressure over the treated sinus(es), which rarely required analgesia.

Conclusions:

This study demonstrates that there is a safe therapeutic window whereby antimicrobial Photodynamic Therapy (aPDT) of the paranasal sinuses can be safely performed in post endoscopic sinus surgery sinus cavities.

1:07pm

Antimicrobial photodynamic therapy for treatment of refractory chronic rhinosinusitis: A case series

Luis Macias-Valle, MD
Andres Finkelstein-Kulka, MD
Christopher Okpaleke, MPH
Jamil Manji, MSc
Amin Javer, MD, FRCSC
Vancouver, British Columbia
Canada

Background:

Inflammation in refractory chronic rhinosinusitis (CRS) is complicated by persistent microbial colonization resistant to medical treatment. Antimicrobial photodynamic therapy (aPDT) has been shown to be effective in eradicating in-vitro biofilms of CRS microbes and reducing mucosal inflammation. It is an emerging tool for treatment of recalcitrant CRS. Our objective was to review the clinical outcomes and adverse events in our patients treated with aPDT.

Methods:

A retrospective case series was conducted at our centre. Post-surgical patients with persistent inflammation and chronic biofilm within the sinuses despite maximal medical treatment were treated with aPDT using a diode laser and methylene blue (as photosensitizer) on an out-patient basis. The patients' outcomes were reviewed at 3 months post-aPDT. Endoscopic sinus scores and adverse events were recorded as outcomes.

Results:

Sixteen patients were treated with 13 patients completing follow-up at 3 months. Forty-three sinuses (5-frontal, 21-ethmoid, 16-maxillary, 1-sphenoid) in the thirteen patients (12-females, 1-male) were treated (Mean: 2.7 sinuses/patient per treatment). The average age of patients was 53.5 years. Ten of the thirteen patients treated showed improved endoscopic sinus scores in the sinuses at 3 months (Baseline Mean: 5.1, SD: 4.2, 3-months Mean: 3.3, SD: 4.9). Three patients expressed minor and transient adverse events (slight bleeding, stinging sensation) immediately after the procedure and none at 3 months. The clinicians' experience with the procedure was satisfactory.

Conclusion:

Patients with refractory CRS can be safely treated with aPDT on out-patient basis. These early results, while promising, will require validation in prospective clinical trials.

PROGRAM ABSTRACTS

1:14pm

Protective properties of nanodisk-amphotericin B (nd-amb) over commercially available photericin B in human nasal epithelia

Do-Yeon Cho, MD
Daniel Skinner, BS
Shaoyan Zhang, PhD
Bradford Woodworth, MD
Birmingham, AL
USA

Background:

Amphotericin B (AMB), a potent antifungal agent, has been employed as topical and systemic therapy for sinonasal fungal infections. A novel formulation of nanodisk (ND) containing super aggregated AMB (ND-AMB) for the treatment of fungal infections has been recently developed to provide greater protection from AMB toxicity than current clinically approved lipid-based formulations. The objective of the current study was to evaluate the safety of ND-AMB for sinonasal delivery.

Methods:

Human sinonasal tissue was harvested during endoscopic sinus surgery and grown at air-liquid interface until fully differentiated. Cultures were exposed to ND-AMB vs AMB and changes in K⁺ permeability and resistance were measured and recorded via Ussing chamber assay. Ciliary beat frequency (CBF) was analyzed in parallel as well as cytotoxic assay.

Results:

Ussing chamber studies revealed K⁺ currents that increased rapidly within 30 seconds of adding AMB (10µg/mL) to the apical side, indicating apical membranes had become permeable to K⁺ ions. In contrast, negligible induction of K⁺ current was obtained following addition of ND-AMB at same concentration [$10.9 \pm 1.5 \mu\text{A}/\text{cm}^2$ AMB (n = 5) vs. $0 \pm 0 \mu\text{A}/\text{cm}^2$ ND-AMB (n = 5); p = 0.01]. ND-AMB also protected nasal epithelial cells from cytotoxicity of AMB (p < 0.05). There was no difference in ciliary beat frequency between the two groups (p = 0.96).

Conclusions:

Data from the present study suggests ND-AMB protects human nasal epithelia membranes from AMB toxicity by protecting against apical cell K⁺ permeability and could provide a novel topical therapy for fungal disease.

1:21pm

Mind “DeGapp”: In vitro efficacy and safety of deferiprone and gallium-protoporphyrin against staphylococcus aureus biofilms

Katharina Richter, MSc
Mahnaz Ramezanpour, PhD
Clive Prestidge, Prof
Peter-John Wormald, Prof, MD
Sarah Vreugde, PhD, MD
Woodville South, SA
Australia

Introduction:

Chronic rhinosinusitis is a persistent sinus inflammation linked to Staphylococcus aureus (S. aureus) biofilms. Bacteria residing in biofilms evade host defences and adapt to adverse conditions, ultimately leading to resistance against antimicrobials and failure of standard medical care. In this study, a novel non-antibiotic treatment approach is proposed using the compounds deferiprone (Def) and gallium-protoporphyrin (GaPP), which interfere with vital pathways of the bacterial iron metabolism at different levels.

mately leading to resistance against antimicrobials and failure of standard medical care. In this study, a novel non-antibiotic treatment approach is proposed using the compounds deferiprone (Def) and gallium-protoporphyrin (GaPP), which interfere with vital pathways of the bacterial iron metabolism at different levels.

Methods:

The AlamarBlue cell viability assay was used to assess in vitro efficacy of Def and GaPP as single and dual treatment for different times of exposure upon established S. aureus biofilms. In vitro toxicity studies were undertaken using the lactate dehydrogenase cytotoxicity assay upon exposure of the different treatments to mouse fibroblast cells (L929) and bronchial epithelial cells (NuLi-1).

Results:

A synergistic anti-biofilm effect was observed in vitro when S. aureus biofilms were treated consecutively with Def followed by GaPP for 2 hours, respectively. This effect was more pronounced when biofilms were exposed to Def for longer times (8.5 hours) followed by GaPP. In contrast, concurrent Def/GaPP treatments did not significantly affect efficacy compared to monotherapy. Cytotoxicity studies confirmed safety of the dual treatment in vitro.

Conclusions:

Targeting the essential iron pathways for bacterial growth and survival, we demonstrated that the treatment combination of Def and GaPP shows higher in vitro efficacy against S. aureus biofilms than the individual compounds. This novel treatment combination is a promising approach to combat S. aureus biofilms while potentially overcoming bacterial resistance.

1:28pm

The efficacy of rifampicin and doxycycline against intramucosal bacteria in chronic rhinosinusitis: Double-blinded randomized controlled trial

Raymond Kim, MD
Joshua Freeman, MD
Sally Roberts, MD
Richard Douglas, MD
Auckland, AKL
New Zealand

Introduction:

The role of bacteria in the pathophysiology of chronic rhinosinusitis (CRS) remains unclear. Also there is limited evidence supporting clinical response following antibiotics. We have described intramucosal bacterial microcolonies, predominantly Staphylococcus aureus, within the mucosa of patients with CRS. We have also demonstrated significantly higher proportion of alternatively activated, more immunotolerant CD163+ “M2” macrophages in CRS and speculated there may be an interaction between microcolonies and host macrophage function. We sought to investigate the effects of rifampicin, with high tissue penetration aimed specifically at intramucosal microcolonies, on bacteria eradication, host macrophage recruitment and patient symptoms. Doxycycline was also given to reduce risk of resistance development to rifampicin.

Method:

21 patients undergoing surgery for CRS were randomized into receiving: (1) rifampicin and doxycycline; (2) doxycycline and placebo; (3) double placebo, for 2 weeks leading up to surgery.

Symptom scores were taken at commencement and completion of therapy, and mucosal biopsies were taken at time of surgery.

Results:

Symptom scores improved significantly ($p < 0.02$) after treatment in the first group only. Prevalence of intramucosal microcolonies was similar across the groups (1/7 in rifampicin and doxycycline group; 2/7 in both other groups). Although the percentage of M2 macrophages did not change significantly with antibiotics, a significantly higher total number of macrophages ($p < 0.0001$) were seen in the first group.

Conclusion:

Although rifampicin did not have a significant impact on the prevalence of intramucosal microcolonies, patient symptoms improved significantly and there was an increased recruitment of macrophages to the tissues.

1:35pm

Q&A

Moderators: Mark Zacharek, MD & Alla Solyar, MD

1:40pm

Impact of postoperative endoscopy upon clinical outcomes after endoscopic sinus surgery

Rodney Schlosser, MD
Arash Shahangian, MD, PhD
Timothy Smith, MD
Jess Mace, MPH
Luke Rudmik, MD
Zachary Soler, MD
Charleston, SC
USA

Background:

After endoscopic sinus surgery (ESS), endoscopy is used to gauge surgical success and clinical outcomes. Prior studies have not examined this topic in a prospective fashion using validated outcome metrics across multiple institutions.

Methods:

A multi-institutional, prospective study of patients with chronic rhinosinusitis (CRS) who underwent ESS completed the SinoNasal Outcome Test (SNOT-22), missed productivity and medication usage questionnaires at 6 months postoperatively. Endoscopy was graded using Lund-Kennedy endoscopy scoring (LKES) with reviewers blinded to patient-reported clinical data. A control cohort of non-CRS patients was also recruited for comparison.

Results:

Complete data was available on 183 CRS patients and 48 non-CRS control patients. Approximately 50% of patients achieve perfect or near perfect endoscopy (LKES of 0-2) after ESS. Postoperative endoscopy correlated with total SNOT-22 scores, with the strongest correlations to rhinologic and extra-nasal subdomains in the nasal polyp cohort. Improved postoperative endoscopy correlated with decreased antibiotic and oral steroid usage, but had little correlation with missed productivity. Among patients who achieved near perfect postoperative endoscopy, those with nasal polyps had SNOT-22 scores that were similar to non-CRS control

patients. However, CRS patients without nasal polyps remained more symptomatic than both non-CRS controls and CRS with nasal polyp patients despite nearly perfect endoscopy.

Conclusions:

Postoperative endoscopy correlates with clinical outcomes, quality of life and medication usage in particular. The impact of specific strategies to improve postoperative endoscopy, such as perioperative medications, postoperative debridements and absorbable packing materials, is an area for further study.

1:47pm

Acute radiology rarely confirms sinus disease in suspected recurrent acute rhinosinusitis

Alexander S. Zhang, MBBS
Henry Barham, MD
Jenna Christensen, PhD
Raymond Sacks, MBChB
Richard Harvey, PhD, MBBS, BSc
Camperdown, NSW
Australia

Introduction:

Episodic or recurrent sinonasal symptoms are often suspected as 'sinus' in origin. With normal sinus radiology between events, the diagnosis of recurrent acute rhinosinusitis (RecARS) is made. However, other conditions can produce episodic symptoms such as rhinitis and migraine. This study analyses acutely performed computed tomography (CT) in a population with suspected or self-diagnosed 'sinus' disease.

Methods:

Patients referred to a tertiary clinic for suspected RecARS were assessed. Sinus changes were defined by CT (initial assessment) and during the acute event, by a semi-urgent CT performed during the symptomatic episode. Mucosal thickening, ostiometal compromise and severe septal deformity were recorded. Symptom profile was assessed during both time points with the sino-nasal outcome test 22 (SNOT22).

Results:

Forty-eight patients (49.5±14.7 years, 70.8% female) were assessed. At presentation, 75% were resolute in a diagnosis of 'sinus'. Baseline Lund-Mackay scores were all less than 6 (median 0 (IQR 1)). Ostiometal compromise was 6.8% left and 4.5% right at baseline. Of the patients that returned for acute CT (n=26), SNOT-22 and subdomains were similar to baseline. Septal deviation was similar (13.6%v15.3%). Acutely, ostiometal compromise was 0% left and 7.4%(n=2) right. Of these two patients with ostiometal compromise, one was diagnosed with RecARS (4%) and the other with triptan-responsive migraine, with incidental sinus changes. Final diagnosis was rhinitis (47%), headache/migraine (37%) and facial pain otherwise undefined (12.5%).

Conclusions:

Most patients with episodic 'sinus' disease have rhinitis or migraine as their diagnosis. RecARS is an uncommon event even in patients steadfast in their beliefs.

PROGRAM ABSTRACTS

1:54pm

Cost effective selection between swab and tissue biopsy for conventional sinus cultures in chronic rhinosinusitis patients

Anastasios Maniakas, MD
Smriti Nayan, MD, FRCSC
Leandra Mfuna Endam, MSc
Michel Poisson, MD, FRCPC
Martin Desrosiers, MD, FRCSC
Montreal, QC
Canada

Objectives:

Given the high costs, availability and questionable clinical applicability of a sinus microbiome assessment by 16S sequencing, conventional culture (swab cultures (SC) or tissue cultures (TC)) continues to remain the diagnostic tool of choice. The objectives of this study are to evaluate the cost-effectiveness of SC compared to TC by analyzing the bacteria identified and their clinical relevance towards disease management.

Methods:

Thirty five patients at high-risk of disease recurrence following endoscopic sinus surgery had both a SC and TC intra-operatively. Data were analyzed using a Student's T-test and a Pearson's Chi-squared test, with $p < 0.05$ deemed statistically significant.

Results:

The cost of TC is higher than SC (TC:\$44, SC:\$23). TC isolated more bacteria/culture (TC:2.8; SC:1.03; $p < 0.001$). Gram-positive species were more frequently identified on TC than on SC ($p < 0.001$), however the number of cultures simply reported as 'oropharyngeal flora' was significantly lower in with TC (TC:3; SC:17; $p < 0.001$). Gram-negative species were identified in both groups: Enterobacter (n=3 each), Escherichia coli (n=2 each) and Pseudomonas aeruginosa (TC:n=3; SC:n=2) and were concordant. The variability of Staphylococcus aureus isolation (5 of 9 cultures were concordant) suggests that different methods of sampling may isolate intracellular versus superficial forms.

Conclusion:

For cultures obtained at time of surgery, both SC and TC reliably identify Gram-negative bacteria, making SC a cost-effective method of detecting their presence. However, TC is superior to SC in terms of number of species identified and in the detection of potentially 'healthy' Gram-positive species such as Staphylococcus coagulase negative and Corynebacterium.

2:01pm

Modeling risk factors associated with recurrence of nasal polyps after sinus surgery

Amber Luong, MD
Claudia Pedroza, PhD
Samer Fakhri, MD
Amber Luong, MD, PhD
Houston, TX
USA

Introduction:

We utilized both a frequentist and Bayesian statistical approach to identify clinical characteristics associated with risk of nasal polyp recurrence after sinus surgery.

Methods:

We used Cox proportional hazards regression and Bayesian analysis to investigate the risk factors that are clinically significant in influencing the recurrence of nasal polyps, while adjusting for demographics (age, sex, ethnicity), and clinical data (smoking, asthma, chronic rhinosinusitis clinical subtype, serum eosinophil and IgE levels, number of prior sinus surgeries, aspirin sensitivity and inhalant allergies) of individuals undergoing sinus surgery between August 1, 2010 and April 26, 2015.

Results:

Three hundred and seventy-four patients comprised the initial cohort. The analytical cohort was reduced to 136 individuals including only those with CRSwNP and follow-up for at least 6 months. The follow-up time period after sinus surgery ranged from 6 months to 6.5 years. Over that time, there were 73 recurrences that were treated with either medical or surgical intervention. After adjusting for demographics and clinical data, the presence of asthma was the only factor that was significantly associated with an increased risk of nasal polyp recurrence after sinus surgery (HR 1.88; 95% CI 1.01-3.49). Although not statistically significant by frequentist analysis, younger age and African American ethnicity trended to an increased risk of nasal polyp recurrence.

Conclusion:

Frequentist analysis suggests that the co-morbid diagnosis of asthma was associated with higher risk of recurrence of nasal polyps after sinus surgery. Bayesian analysis supported younger age and African American ethnicity with higher risk of nasal polyp recurrence.

2:08pm

To pack or not to pack? - A decision analysis model

Sagit Stern-Shavit, MD
Yuval Nachlon, MD
Moshe Leshno, MD, PhD
Ethan Soudry, MD
Petah Tikva
Israel

Background:

Packing of the operated nasal cavities after endoscopic sinus surgery (ESS) aims to reduce post-operative bleeding and synechia. Both absorbable and non-absorbable packing materials have been suggested for this purpose. Nonetheless, recent literature, challenges the need for packing which is also associated with significant patient discomfort.

Objective:

The goal of the present study was to build an up-to-date decision-analysis model to determine the need for packing in endoscopic sinus surgery (ESS).

Methods:

A systematic review was conducted to retrieve all randomized control trials (RCT) comparing packing versus no packing in ESS. Probabilities and utilities were retrieved. The model was evaluated with Monte Carlo simulation. Sensitivity analysis was used to determine which variables most affected the model.

Results:

6 RCTs were included. No-packing arm was associated with better expected utilities than packing (0.958 vs 0.953). Analyzing all variables through their maximum and minimum ranges using a Tornado plot found synechia to affect the model. Bleeding, however did not. Sensitivity analysis demonstrated packing as the preferred option only when the probability for synechia is greater than 35% without packing or lower than 2% with packing. Moreover, for packing to be the preferred option, patients have to estimate the decrease in QOL to be greater without nasal packing. Subtracting the component of packing removal from the overall disutility, simulating absorbable packing, minimized differences between the arms.

Conclusion:

Based on our decision-analysis model, packing was not found to be advantageous. When packing must be applied, absorbable packing is preferred.

**2:15pm
Q&A**

2:20pm

PANEL: Hemostasis in FESS: An evidence –based approach

Moderator: John DelGaudio, MD

Panelists: Amin Javer, MD; David Poetker, MD; Raj Sindwani, MD

3:00pm

Break With Exhibitors**Moderators: Ethan Soudry, MD & Jonathan Liang, MD**

3:25pm

Clinical implications of mucosal remodeling from chronic rhinosinusitis

Timothy Q. Do, Bmed

Henry Barham, MD

Peter Earls, MD

Raymond Sacks, MD

Richard Harvey, MD, PHD

Darlinghurst, NSW

Australia

Background:

Prognostic implications of mucosal remodelling in chronic rhinosinusitis (CRS) remain unclear. Remodelling of respiratory mucosa in asthma is associated with greater medication use and decreased function. This study investigates the implications of mucosal remodelling on long term clinical outcomes in patients with CRS.

Methods:

A case control study of adult patients with CRS undergoing endoscopic sinus surgery (ESS) was performed. Mucosal remodelling was defined by squamous metaplasia, subepithelial fibrosis and/or basement membrane thickening. The presence of remodelling changes were assessed relative to clinical and treatment outcomes at a minimum of 12months postoperatively. Clinical outcomes were assessed at baseline and 12months using a Nasal Symptom Score (NSS) and Sino-Nasal Outcome Test (SNOT-22). Treatment outcomes were assessed by oral corticosteroid usage (burst/continuous), topical corticosteroid irrigation frequency and further surgical intervention.

Results:

112 patients (48.9±14.9years, 49.1% female) were assessed. Significant improvements were seen for the entire population, in both NSS (2.62±1.06 to 1.30±1.08, p<0.001) and SNOT-22 (2.03±0.96 to 1.03±0.78, p<0.001). Patients with remodelling (n=89) were younger (47.±14.7 v 54.7±13.5yrs, p=0.03) but had similar symptom scores. Remodelling was seen in CRSwNP(86.0%) and eCRS(86.9%). Symptom improvement at 12months was similar between remodelled and non-remodelled groups (NSS (?1.28±1.22 v ?1.03±1.34, p=0.403), SNOT-22 (?1.00±0.92 v ?0.66±0.98, p=0.129)) however, patients with remodeling had greater corticosteroid irrigation frequency (52.9% v 5.7% daily use, Kendall's tau-b p=0.004) and trended towards more oral steroid usage and further surgical intervention.

Conclusions:

Established mucosal remodelling predicts a greater reliance on topical therapies to reach similar clinical endpoints as those without remodelling.

3:32pm

Fibroblast proliferation & vitamin D deficiency in chronic sinusitis

William W. Carroll, MD

Rodney Schlosser, MD

Zachary Soler, MD

Jennifer Mulligan, PhD

Charleston, SC

USA

Outcome objectives:

Vitamin D3 (VD3) is a steroid hormone with known anti-proliferative properties. Patients with chronic rhinosinusitis with nasal polyps (CRSwNP) have been shown to be VD3 deficient. Moreover, VD3 deficiency is associated with worse disease in patients with CRSwNP. One cell type thought to play a role in chronic rhinosinusitis (CRS) is the fibroblast. The aim of this study was to investigate the role of VD3 deficiency in human sinonasal fibroblast (HSNF) proliferation in CRSwNP.

Methods:

Blood and sinus tissue explants were collected at the time of surgery from patients with CRSwNP (n=16). Control subjects (n=12) were undergoing surgery for cerebrospinal fluid leak repair or to remove non-hormone-secreting pituitary tumors. Ex-vivo HSNF proliferation was analyzed with flow cytometry using expression of fibroblast specific protein (FSP) and the proliferation marker Ki67. Plasma levels of 25-hydroxyvitaminD3 (25VD3) were measured by enzyme-linked immunosorbent assay.

Setting: Tertiary care academic medical center.

Study Design: Cross sectional study.

Results:

No relationship was found between total Ki67 and 25VD3 in CRSwNP subjects compared to control subjects (p= 0.971). However, 25VD3 and fibroblast specific proliferation (FSP+Ki67+) were inversely correlated in CRSwNP patients when compared to control patients (p=0.013).

PROGRAM ABSTRACTS

Conclusion:

Human sinonasal fibroblast proliferation is inversely correlated with plasma VD3 levels in patients with CRSwNP and warrants further investigation.

3:39pm

Failure pressures of three rhinologic dural repairs in a porcine ex vivo model

Jacob S. Majors, MD

Ryan Lin

Erik Weitzel, MD

Philip Chen, MD

Kevin McMains, MD

Leon Bunegin, BS

JBSA Fort Sam

Houston, TX

USA

Background:

The objective of this work was to determine the failure pressures of 3 commonly performed repair techniques of 5-mm dural defects in a controlled setting.

Methods:

This was a pig dura ex vivo study. A testing apparatus was fabricated to study failure pressures of 3 different repairs in a porcine model. Five-millimeter (5-mm) dural defects were created and plugged with autologous mucosa/Tisseel (MT) (Baxter International Inc.), fat graft (FG), and bath plug (BP) techniques. Saline solution was infused at 30 mL/hour to apply unidirectional pressure to the repair until failure occurred. Five dural repairs were performed for each arm of the trial, for a total of 15 trials.

Results:

The mean failure pressure of the mucosa/Tisseel repair was 4.3 ± 1.9 cmH₂O, of the fat graft repair was 10.9 ± 4.2 cmH₂O, and of the bath plug repair was 20.7 ± 2.2 cmH₂O. Differences among mean failure pressures were statistically significant.

Conclusion:

The bath plug repair showed significantly higher tolerances for pressure than the other 2 repairs. The bath plug repair was the only technique that withstood adult physiologic supine cerebrospinal fluid (CSF) pressure

3:46pm

Outcomes of Outpatient Endoscopic Repair of Cerebrospinal Fluid Rhinorrhea

Austin S. Adams, MD

Paul Russell, MD

Nashville, TN

Objective:

Endoscopic repair of anterior skull base defects has become the gold standard for management of CSF rhinorrhea. Both improved techniques and adjuvant therapies have led to accepted success rates of greater than 90%. As management has evolved, shorter hospitalizations have been required and the goal of this study is to analyze the outcomes of patients repaired on an outpatient basis versus those managed with inpatient admission post-operatively.

Methods:

Patients undergoing endoscopic repair of CSF rhinorrhea between 2004 and 2014 were identified by review of medical records. Demographic and clinical data were collected and compared between patients having surgery with and without post-operative admission. Patients managed with lumbar drains were not included. Statistical analyses were performed to determine if any differences in patient demographics and outcomes existed.

Results:

A total of 86 patients were identified. 39 of 86 patients (45.3%) underwent outpatient surgery. 47 patients were admitted post-operatively with a mean hospital stay of 1.66 days and a median and mode of 1 day. No statistically significant differences were found between etiology or location of leaks, rates of recurrence, or complications. The outpatient group was found to have a greater proportion of small defects <1cm² ($p = 0.0031$).

Conclusions:

Endoscopic management of CSF rhinorrhea is a safe method of treatment with reliable success rates. Our retrospective analysis revealed comparable outcomes in patients treated with and without post-operative hospital admission, and supports the idea that outpatient management may be reasonable in certain patients, especially those with small skull base defects <1cm².

3:53pm

Factors impacting cerebrospinal fluid leak rates in endoscopic sellar surgery

Tom T. Karnezis, MD

Zachary Soler, MD

Andrew Baker, BA

Rodney Schlosser, MD

Charleston, SC

USC

Background:

Risk factors and predictors of intraoperative and postoperative cerebrospinal fluid leak (CSF) in patients undergoing transnasal endoscopic sellar surgery would provide important prognostic information.

Methods:

A retrospective review of patients undergoing endoscopic surgery for pituitary adenoma or craniopharyngioma between 2002 and 2014 at 7 international centers was performed. Demographic, comorbidity and tumor characteristics were evaluated for association with intraoperative and postoperative CSF leak. Reconstructive and CSF diversion techniques were evaluated for impact upon postoperative CSF leak rates. Statistical correlations and odds ratios were identified using a multivariate logistic regression model.

Results:

Data was collected on 1,112 pituitary adenomas and 53 craniopharyngiomas. Overall, 31.5% of patients had an intraoperative leak and 6.2% had a postoperative leak. Preoperative factors associated with increased intraoperative leaks were African American race, recurrent tumor and extension to anterior cranial fossa ($p < 0.036$ for all). Among all patients with intraoperative CSF leaks, postoperative leaks occurred in 10.5%. A higher postoperative leak rate was seen in craniopharyngiomas (23.1% vs 9.5% in pituitary adenomas) and

higher body mass index (BMI) trended towards significance ($p=0.06$). Rigid reconstruction and CSF diversion techniques did not impact postoperative leak rates. Use of septal flaps trended towards lower postoperative leak rates ($p=0.08$).

Conclusions:

Intraoperative CSF leaks occur frequently during endoscopic sellar surgery, especially in larger or recurrent tumors. Once an intraoperative leak occurs, risk factors for postoperative leaks include cranio-pharyngiomas and possibly higher BMI. Use of septal flaps may decrease this risk, but other techniques were not found to be useful.

4:00pm

Q&A

Moderators: Brian Rotenberg, MD & Philip Chen, MD

4:05pm

Sinonasal quality of life following pituitary surgery

Jemma Cho, BA
Mark Winder, MD
Timothy Steel, MD
Benjamin Jonker, MD
Andrew Davidson, MD
Richard Harvey, MD, PhD
Sydney, NSW
Australia

Background:

Surgical approaches to the pituitary have undergone significant changes from sublabial to direct transnasal microscopic and now endoscopic. This study compares sinonasal outcomes from patients from each of these techniques.

Methods:

A cross-sectional study of patients who underwent pituitary surgery in a tertiary setting was conducted. Patients were recruited via phone, mail, email, and in person, following which a survey with questions on nasal function, subsequent nasal treatment, the Nasal Symptom Score (NSS), Sinonasal Outcome Test-22 (SNOT22), Chronis Sinusitis Survey (CSS), and Short Form 36 (SF36v2) was obtained.

Results:

Of 252 surveys sent, 165 were returned (65.48% response rate), and 16 were excluded (3 records destroyed, 13 transcranial approach). In total, 149 patients (age 60.10 ± 13.99 years, and 47.83% female) via sublabial approach ($n=69$), transnasal microscopic ($n=28$), and endoscopic ($n=52$) approaches were assessed. Sublabial and transnasal microscopic, compared to endoscopic, had more sinus treatment (30.43%, 39.29%, 15.38%, $p=0.05$), medication use (28.99%, 32.14%, 11.54%, $p=0.04$) and new allergy symptoms (21.74%, 7.14, 1.92, $p<0.01$). Compared to sublabial and trans-nasal microscopic, endoscopic patients had superior NSS scores (0.40[1.00], 0.60[1.75], 0.20[0.60], $p=0.05$), SNOT-22 total scores (1.02 ± 0.58 , 1.40 ± 0.78 , 1.00 ± 0.59 , $p<0.01$), and CSS medication subscores (100.00[8.33], 100.00[8.33], 100.00[0.00], $p=0.03$). Endoscopic patients also reported superior SF-36v2 physical subscores (44.02 ± 11.14 , 41.13 ± 9.86 , 47.60 ± 10.12 , $p=0.03$).

Conclusion:

Nasal function, further sinus therapy and medication use were lower in patients with endoscopic approaches. Disease specific quality of life was superior and the endoscopic approach results in less long term sinonasal morbidity.

4:12pm

Gender-specific analysis of outcomes from endoscopic sinus surgery for chronic rhinosinusitis

Devyani Lal, MD
Kimberly Golisch, MS
Rohit Divekar, MBBS, PhD
Yu-Hui Chang, PhD
Phoenix, AZ
USA

Background:

We have previously presented gender-specific differences prevalent in CRS patients electing ESS.

Objectives: Study gender differences in outcomes from ESS for CRS using the patient-reported Sinonasal Outcome Tests (SNOT-22).

Methods:

Retrospective review of CRS patients electing ESS (2011-2013) with preoperative and at least one post-operative SNOT-22 test was conducted.

Results:

ESS was performed on 206 qualifying patients (mean age 55.2 years; 48.6% female). Mean Lund-Mackay CT score was 11.2; total SNOT-22 score was 41.7. Compared to men, women had lower CT score (10.3 vs. 12.1; $p=0.01$) but higher total SNOT-22 score (44.7 vs. 38.9; $p=0.05$). Both men and women showed significant improvement in total SNOT-22 scores at 3, 6, 12 and 24 months following ESS ($p<0.001$). The greatest improvement was at 3 months (SNOT-22 decreased by 24.58 points), with stable improvement at 12 and months (SNOT-22 decrease: 21.62 points).

Females reported higher total SNOT-22 scores at all post-operative follow-ups. These were significantly higher at early time points [CRSsNP: 3 months ($p=0.009$), 6 months ($p=0.01$); CRSwNP: 3 months ($p=0.0521$), 6 months ($p=0.0487$); overall CRS: 6 months ($p=0.0054$)]. Women reported significantly worse scores on rhinologic symptoms at three and six months. However, SNOT-22 differences were lost at longer-term follow-ups at 12 and 24 months.

Conclusions:

Both male and female CRS patients show significant early and durable symptom-relief following ESS. Women report higher symptom-burden prior to surgery, and in the early postoperative period. However, after one-year post-ESS, both genders show similar symptom-scores. The time-scale of improvement is also similar in both genders.

PROGRAM ABSTRACTS

4:19pm

Genotype of the bitter taste receptor T2R38 is associated with sinonasal quality of life in cystic fibrosis

Alan D. Workman, BS
Nithin Adappa, MD
Steven Brooks, BS
James Palmer, MD
Danielle Reed, PhD
Noam Cohen, MD, PhD
Philadelphia, PA
USA

Introduction:

Chronic rhinosinusitis (CRS) is very prevalent in the Cystic Fibrosis (CF) patient population, and leads to high morbidity and markedly decreased quality of life. Identification of genetic markers that contribute to CRS symptoms in these patients can allow for risk stratification and tailoring of medical and surgical treatments. T2R38 is a bitter taste receptor expressed in the sinonasal tract, and non-functional alleles of this receptor have been implicated in treatment-refractory CRS in non-CF patients. The purpose of this study is to investigate the significance of T2R38 genotype in the variability of sinonasal quality of life and CRS severity in a sample of CF patients.

Methods:

Delta F508 homozygous CF patients were recruited from the Cystic Fibrosis Center and genotyped for the TAS2R38 locus. To assess symptom severity, a Sinonasal Outcomes Test (SNOT-22) was collected from each patient. Additional demographic and medical history data was obtained at the time of patient enrollment.

Results:

49 Delta F508 homozygous CF patients aged 18-32 were included in the final SNOT-22 score analysis. Individuals with two functional T2R38 alleles (PAV/PAV) had significantly lower SNOT-22 scores (n=49, p<0.05). On further breakdown of SNOT-22 subcategories, rhinologic symptoms specifically were less severe in PAV/PAV patients than patients with other genotypes (n=47, p=0.01). There was a trend towards lower antibiotic use and decreased need for multiple sinus surgeries in PAV/PAV patients as well, but this did not reach significance.

Conclusions:

Our investigation indicates that T2R38 genotype correlates with rhinologic quality of life in Delta F508 homozygous CF patients.

4:26pm

Sino-nasal outcome test 22 in a control population: A cross-sectional study and systematic review

Zachary Farhood, MD
Rodney Schlosser, MD
Madeline Pearse, BS
Kristina Storck, MSPH
Shaun Nguyen, MD, MA, CPI
Zachary Soler, MD, MSc
Charleston, SC
USA

Objectives:

The Sino-Nasal Outcome Test 22 (SNOT 22) is a commonly utilized outcome measure for chronic rhinosinusitis (CRS). However,

what constitutes a normal score remains poorly defined. The goal of this study was to evaluate SNOT 22 scores in a control population without CRS and perform a systematic review and meta-analysis of "normal" values.

Methods:

Ninety-nine subjects without CRS were enrolled, with each completing the SNOT 22 questionnaire. Multivariable linear regression was used to determine whether demographic factors or medical comorbidities influence SNOT 22 scores in a population without CRS. A systematic literature search was performed, identifying studies which evaluated the SNOT 22 in a non-CRS population and estimates for SNOT 22 values were pooled.

Results:

Thirty-six males and 60 females were included in the primary analysis with a mean age of 52.7±17.5 (range 18-88). The mean SNOT 22 score was 16.5±15.1. Asthma ($\beta=0.286$, p=0.003) and depression ($\beta=0.302$, p=0.002) were found to be independent predictors of higher SNOT 22 scores. Eleven articles were identified in the literature search and one was provided via author correspondence, with 8 reporting sufficient data to be included in the meta-analysis. Weighted mean SNOT 22 score was 11.0±8.7 (n=1149). Our data differed significantly from published data (mean difference=5.5, 95% CI 3.56-7.46, p<0.0001) likely owing to difference in comorbidities.

Conclusions:

SNOT 22 scores vary in non-CRS populations depending on the group queried. Asthma and depression are associated with higher SNOT 22 scores and should be considered when determining what constitutes a normal value.

4:33pm

Canonical correlation analysis of nasal endoscopy and snot-22 domain scores at baseline among surgical patients with chronic rhinosinusitis

Adam S. DeConde, MD
Todd Bodner, PhD
Jess Mace, MPH
Jeremiah Alt, MD, PhD
Luke Rudmik, MD, MSc
Timothy Smith, MD, MPH
San Diego, CA
USA

Introduction:

Diagnostic nasal endoscopy is a commonly used measure of sinonasal inflammation in patients with chronic rhinosinusitis (CRS). Although multiple staging systems have been proposed and evaluated, evidence of association between concurrent symptoms and endoscopic findings remains discordant. The goal of this study is to identify the relevant endoscopic attributes associated with symptom burden, and to systematically derive a weighted endoscopic scale that optimizes prediction of concurrent symptoms.

Methods:

Reported baseline symptom (Sinonasal Outcomes Test-22 {SNOT-22}) and endoscopic evaluation (Lund-Kennedy {LK}) scores were prospectively obtained from patients with CRS. Canonical correlation analysis was performed to maximize the correlation between the SNOT-22 subdomains and LK scores.

Results:

A total of 515 patients were included in analysis including 277 with prior endoscopic sinus surgery. Significant canonical correlations outperformed aggregate correlations in explaining variance of the data (33% vs. 3%, respectively). The first canonical correlation was dominated by the Rhinologic symptom domain and the endoscopic polyp score ($r=0.54;p<0.05$) while additional significant canonical correlation was found between the Extra-rhinologic symptoms sub-domain and the edema score in patients without prior ESS ($r=0.21;p<0.05$), and discharge in patients with prior ESS ($r=0.22;p<0.05$). All other domains and endoscopic variables did not significantly contribute to the canonical correlation.

Conclusions:

Although aggregate symptoms and endoscopic scores demonstrate minimal correlation, a weighted combination of symptom domains and endoscopic attributes greatly improves this correlation. A simple approximation of these weights is provided, which could facilitate future research and clinical practice by identifying endoscopic exam findings that better predict patient symptoms.

4:40pm**Q&A**

4:45pm

PANEL: More than just the SNOT-22: An update on objective and subjective outcomes measures

Moderator: Mickey Stewart, MD, MPH

Panelists: Luke Rudmik, MD,MSc.; Zach Soler, MD; MSc; Claire Hopkins, MD

5:25pm

Closing Remarks

5:30pm

Meeting Adjourned

5:45pm

President's Wine & Cheese Poster Reception

Grand Hall

(Supported by Intersect ENT)

POSTERS

Poster #001

A case of lagophthalmos after a corrective rhinoplasty

Hyun Jun Kim, MD, PhD

Suwon, Gyeonggi-do

Republic of Korea

Corrective rhinoplasty, a commonly performed plastic surgery, is occasionally followed by numerous risks and complications. In this report, we present a case of lagophthalmos which occurred after a rhinoplasty with discussion of the causes and proper management. A 35-year-old female visited our outpatient clinic due to continuous nasal obstruction even after septoplasty. After thorough evaluation, corrective rhinoplasty was performed to release the patient's nasal symptoms and to manage the deviated external nose and nasal septum. During the surgery, we encountered excessive nasal bleeding after percutaneous osteotomy. In addition, immediate postoperative findings presented left periorbital edema without limited eye movement or reduced eye vision associated with paralysis of the eyelid localized to the medial side of the left upper palpebra. Surgeons should be aware of rare but possible complications of corrective rhinoplasty such as lagophthalmos, and a rapid and intensive care is recommended for early management and better prognosis of postoperative complications.

Poster #002

A novel method to harvest vomer bone for caudal batten graft: An alternative endoscopic septoplasty approach to repair caudal septal deformity

William Yao, MD

Benjamin Bleier, MD

Boston, MA

USA

Background:

Caudal septal deviation is a challenging area to address because it is a tip supporting structure. Several methods to straighten the caudal septal deviation have been described to date. One commonly described technique is the placement of a septal batten graft. We discuss a novel endoscopic approach to harvest the batten graft and addressing the caudal septal deformity.

Methods:

Description of a novel surgical technique for an endoscopic septoplasty addressing a caudal septal deviation by use of septal bony batten graft harvested in a single-step fashion utilizing an open Jansen-Middleton septum forceps.

Results:

We have successfully utilized this technique in 10 patients with caudal septal deviation with no complications. All patients had symptomatic improvement of nasal obstruction symptoms.

Conclusion:

A novel use of the open Jansen-Middleton septum forceps allow for a single-step vomer batten graft harvest when addressing a caudal septal deformity through an endoscopic septoplasty approach.

Poster #003

A novel quantitative 3-d sinus analysis to evaluate overall total sinus volume and precise sinus opacification in crs and healthy controls

Pradeep Koripella, BS

Jeffrey Rodriguez, PhD

Alex Chiu, MD

Eugene Chang, MD

Tucson, AZ

USA

Introduction:

The Lund-Mckay scoring system is used to assess for radiographic sinus disease, however it does not allow for precise measurements of sinus opacification or overall total sinus volume. Genotype-phenotype studies in CF, suggest that sinus size may play a role in the development of CRS. We hypothesized that people with CRS and without CF, would have decreased total sinus volume independent of mucosal disease compared to healthy controls.

Methods:

Performed 3-dimensional sinus and skull volumetric analysis on high-resolution sinus CT scans of 10 healthy and 10 people with CRS. Inclusion factors: age greater than 18 years, disease present in more than one sinus. Exclusion factors: history of prior surgery, absence of sinuses (frontal/sphenoid), and CF. The sinus cavities were segmented using 3D slicer software and sinus to skull volume ratios were calculated to account for variations in head size. In healthy controls, the sinus volume was calculated as the air space within the skull. In those with CRS, sinus volume was calculated as the combination of air space and sinus opacification. Furthermore, in those with CRS a precise opacification percentage was determined.

Results:

People with CRS on average had 16% total smaller sinus volumes than healthy controls, with the largest difference seen in the maxillary sinus (30% difference). In those with CRS, the maxillary and ethmoid sinuses had the greatest percentage of opacification (max-46%, eth-44%).

Conclusion:

These findings suggest that decreased sinus pneumatization may predispose to CRS. Precise measurements of sinus opacification can further refine the CRS phenotype.

Poster #004

A review of the role of the endoscopic sinus surgery in the management of sinusitis complicated by extradural vs subdural brain abscesses

Nikita Kohli, MD
Krishnamurthi Sundaram, MD
Brooklyn, NY
USA

Objective:

To review the literature comparing management of extradural and subdural complications of acute sinusitis and the role of the rhinologist in managing these complications.

Patient Population:

Patients with acute sinusitis complicated by brain abscesses.

Intervention: Role of sinus surgery in managing patients with sinusitis complicated by brain abscesses.

Methods:

Papers from 1990-2015 discussing subdural and extradural complications of acute sinusitis and the role of sinus surgery.

Discussion:

Neurological sequelae of acute sinusitis can be life threatening. Approximately 0.5 to 24 percent of hospitalized individuals with rhinosinusitis develop intracranial complications. In a 2002 Laryngoscope paper by Jones, 77 percent of patients with intracranial collections underwent sinus surgery, most commonly the frontal and ethmoids. Of the remaining patients, all underwent craniotomy with an additional 33 percent requiring future sinus drainage. A 1991 Laryngoscope study by Clayman illustrated that surgical delay resulted in prolonged hospitalization.

However, conservative management may be an option for extradural collections. A 2002 review by Heran illustrated that small epidural abscesses could be conservatively managed given adequate sinus drainage, intravenous antibiotics, and minimal extradural effect. Of the eight patients, six underwent sinus drainage, most commonly of the frontal, ethmoid, and sphenoid sinuses. But, a 2015 study by Patel studying the pediatric population suggested that delayed surgical procedures increased complication rates and prolonged hospitalization.

Conclusions:

The results suggest an aggressive approach to sinusitis complicated by subdural collections with a select role for conservative management in the treatment of extradural collections. Good coordination is necessary between the rhinologist and neurosurgeon.

Poster #005

Acute invasive fungal rhinosinusitis: Our experience on 16 cases

Masoud Asghari, MD
Mehdi Bakhshae, MD
Abolghasem Allahyari, MD
Amin Bojdi, MD
Mohammad Reza Majidi, MD
Mashhad, Razavi Khorasan
Iran

Introduction:

Acute invasive fungal rhinosinusitis (AIFRS) is a rapidly progressive life threatening infection that is seen most commonly among immunocompromised patients.

Methods and materials:

We present a case series of 16 patients clinically and histopathologically diagnosed with AIFRS who were treated in our department between the years 2014–2015 with mean follow up was 9.44 ± 2.48 months (Range : 6-17). Demographic data, presenting symptoms and signs, underlying disorders, and outcomes are discussed.

Results:

The mean age was 40.44 ± 21.80 year (range 2-75). The most common underlying disease was leukemia (50%) and diabetes mellitus (43.75%). Mucosal biopsy confirmed fungal invasion to the nasal mucosa in all cases and rhizopus oryzae (50%), Absidia mucor (18.8%) and aspergillus fumigatus (31.3%) were the main fungi. Headache, facial and periorbital pain and facial paresthesia were the most common symptoms. Computed tomography and endoscopic findings showed various stages of sinonasal (100%), pterygopalatine fossa (50%), orbital (37.5%) and cerebral (6.25%) involvement. All patients underwent serial surgical debridement (3.5 ± 1.67 times; range: 2-8) simultaneously with systemic antifungal therapy and controlling underlying disease. The most extensive form with brain involvement survived and recovered with no evidence of recurrent disease following treatment. All patients considered cured after two endoscopic negative histopathologic evaluations. Only one patient who had leukemia and diabetes died from underlying disorders.

Conclusions:

AIFRS is a potentially fatal condition however early diagnosis and management of the underlying disease accompany with systemic antifungal and aggressive serial surgical intervention appears to save most of the patients.

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Poster #006

Acute vision loss following endoscopic sinus surgery

Serena Byrd, MD
 Adnan Hussaini, BS
 Justin Antisdell, MD
 St Louis, MO
 USA

Introduction:

Permanent and irreversible vision loss is typically seen ninety minutes following vascular compromise. Therefore, rapid recognition and effective treatment are paramount. The etiology of postoperative vision loss following endoscopic sinus surgery (ESS) is typically orbital hematoma, injury to orbital structures, thromboembolic event, and ophthalmic artery vasospasm. There have been several documented cases of ophthalmic artery vasospasm following ESS secondary to direct injection of epinephrine into the ethmoidal artery. We present the first documented case of acute vision loss following preoperative topical application of oxymetazoline, as well as the first documented case of nitroglycerin sublingual therapy to successfully treat ophthalmic artery vasospasm.

Methods:

Case report

Results:

A 41-year-old female with a history of systemic lupus erythematosus, Raynaud's, and Sjogren's syndrome presented with recurrent inverting papilloma of the left frontal and ethmoid sinuses. She underwent an uncomplicated endoscopic modified Lothrop. Intraoperatively, topical oxymetazoline was used with no injection of local anesthetic. Approximately 18 hours postoperatively, she experienced unilateral visual compromise, an afferent pupillary defect and retinal pallor. This was treated immediately with nitroglycerin sublingual tablet with prompt return of her vision.

Conclusion:

Arterial vasospasm following ESS is rare; however prompt recognition and effective treatment are vital in preserving vision. Patients with autoimmune diseases have perhaps an increased risk for vasospasm secondary to an increased vasoreactive profile. Nitroglycerin sublingual therapy is a promising treatment for ophthalmic vasospasm secondary to its ability to cross the blood-ocular barrier, its rapid onset of action, and its ability to promote relaxation of vascular smooth muscle.

Poster #007

Adipose tissue based mesenchymal stem cell graft for management of chronic refractory maxillary sinusitis

Smriti Nayan, MD, FRCSC
 Saurin Sanghvi, MD
 Saud Alromaih, MD
 Leandra Endam, MSc
 Ludovic De-Gabory, MD
 Martin Desrosiers, MD, FRCSC
 Toronto, Ontario
 Canada

Objective:

Chronic refractory maxillary sinusitis (CRMS) is a true challenge for the tertiary rhinologist and often incapacitating for patients. The current treatment options have been largely unsuccessful in improving the underlying disease process. While the mechanism for disease persistence is unknown, we postulate that there may be a failure in epithelial repair. Thus, an attempt to regenerate new epithelium using epithelial progenitor cells ('stem cells') may allow for successful treatment of CRMS.

Methods:

A stem cell donor autograft of adipose tissue was used in a 59-year-old male with a four-year history of left sided CRMS. He had failed maximal medical and surgical therapy over a period of 24 months. The patient underwent a revision endoscopic medial maxillectomy for complete removal of diseased mucosa. The maxillary sinus cavity was then re-lined at the diseased site with a harvested adipose autograft with a vascularized pedicled nasoseptal flap placed overtop. The patient was treated throughout the peri-operative period with intravenous antibiotics as well.

Results:

Twelve months following the surgical intervention the patient has had complete resolution of all symptoms and is requiring no further additional treatments with antibiotics or analgesia. On endoscopic examination, the CRMS has resolved and the epithelium appears normal and healthy.

Conclusion:

We suggest a potential novel solution for CRMS, a frustrating clinical entity generally resistant to all other treatments. The introduction of adipose tissue in a single stage surgery allows these progenitor stem cells to help develop new epithelium and correct the underlying abnormality in CRMS.

Poster #008

Allergic fungal sinusitis presenting as hyperprolactinemia

Nikita Chapurin, BA
Cynthia Wang, BS
David Jang, MD
Durham, NC
USA

Introduction:

We aim to describe the first case in the literature of allergic fungal sinusitis (AFS) presenting with hyperprolactinemia due to compression of the pituitary gland.

Methods:

This is a case report of a 37-year-old female who presented with bilateral galactorrhea and occipital headaches for several weeks. Workup revealed elevated prolactin of 94.4, negative pregnancy test, and normal thyroid function. Endocrinology initiated cabergoline for prolactin suppression, and consulted neurosurgery for a probable pituitary tumor. However, MRI and CT demonstrated a 5.0 x 2.7 x 2.5 cm heterogeneous expansile mass in the right sphenoid sinus consistent with allergic fungal sinusitis. Nasal endoscopy revealed polyps in the right sphenoid recess.

Results:

The patient underwent right endoscopic sphenoidotomy with complete removal of fungal debris. There was bony erosion of the sella and clivus. Pathology and microbiology were consistent with allergic fungal sinusitis caused by *Curvularia* species. Prolactin levels normalized four weeks after surgery.

Conclusion:

We present the first case of AFS presenting as hyperprolactinemia due to pituitary compression in an adult patient. Functional endoscopic sinus surgery alone was able to reverse the patient's pituitary dysfunction.

Poster #009

An analysis of patients treated for cerebrospinal fluid rhinorrhea in the United States from 2002 – 2010

Emily Marchiano, BA
Eric Carniol, MD, MBA
Daniel Guzman, BS
Milap Raikundalia, BS
Soly Baredes, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Background:

Management of cerebrospinal fluid (CSF) rhinorrhea is directed towards decreasing rates of ascending meningitis which can carry significant risk of morbidity and mortality. The Nationwide Inpatient Sample (NIS) database was used to analyze the demographic features and concomitant diagnoses in patients admitted with CSF rhinorrhea.

Methods:

We analyzed the NIS database for all hospital admissions of CSF rhinorrhea between 2002 and 2010. Patient demographics, length of stay, hospital charges, concomitant diagnoses, hospital level

characteristics, and complications were analyzed between patients undergoing surgical repair (Group I) and those treated without surgical repair (Group II).

Results:

Patients in Group I were significantly older, the majority were female (67.5%), and were more likely to be obese (12.9%), have diabetes mellitus (15.7%), and hypertension (41.6%) when compared to Group II patients. Lengths of stay were similar between the two groups, but Group I patients incurred higher hospital charges ($P < 0.001$). Group I patients were more likely to be classified as an elective admission (59.8% vs. 38.6%), and were more frequently admitted to a teaching hospital (83.6% with a large bed size (79.0%) when compared to Group II patients. Acute medical complications and concomitant diagnosis of meningitis were similar in both groups.

Conclusion:

Rates of meningitis did not differ between the 2 groups. Patients who underwent surgical repair were more likely to be an elective admission to a teaching hospital. Although length of stay was not affected by repair, hospital charges was higher in patients undergoing repair.

Poster #010

An analysis of using endoscopic Draf IIb approach to treat frontal sinus inverted papilloma

Rui Peng, PhD
Qian Huang, MD
Na Liang, MD
Shun Cui, PhD
Zhen Huang, PhD
Bing Zhou, PhD
Beijing
China

Introduction:

The frontal sinus remains the most challenging part in the surgical treatment of sinonasal inverted papilloma (SIP). In the literature, the overall recurrence rate of frontal sinus SIP is 22.4%. In this study, we have evaluated the prognosis of Draf IIb approach in treating frontal sinus SIP and concluded our experiences in modifying this approach. We've also discussed the cause of frontal neo-ostium stenosis/closure after Draf IIb surgery and proposed our ideas of reducing the stenosis/closure rate.

Method:

This was a retrospective study carried out among 15 patients with frontal sinus inverted papilloma, which had underwent endoscopic Draf IIb surgery during March 2007 to January 2014. The tumor resection rate and frontal neo-ostium opening rate were calculated by survival analysis.

Result:

In all of patients, there were 1 recurrence (6.67%, 1/15), 1 stenosis (6.67%, 1/15), 4 complete closure (26.67%, 4/15), and 1 mucocele cyst (6.67%, 1/15). The 3-year tumor resection rate was 93.3%, and the 3-year frontal neo-ostium opening rate was 65.0%.

Conclusion:

Draf IIb surgery is feasible when the frontal sinus inverted papilloma

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is within the area of the pupil center line, and the frontal neo-ostium stenosis or complete closure is a common complication after surgery. Using a mucosa flap to cover the bare bone may be an effective way to reduce the neo-ostium stenosis/closure rate.

Poster #011

An unusual site of CSF rhinorrhea - spontaneous sphenoid CSF leak from the optic canal

Jeb Justice, MD
Kyle Hannabass, B.Sc
Gainesville, FL
USA

Purpose:

To present a case of a rare site for sphenoid CSF leak.

Case Report:

A previously healthy, obese, 48-year-old female presented with a one year history of clear fluid draining from the nose and associated dull headaches. Beta-2 transferrin testing of the fluid was positive, indicating a CSF leak. CT scan of the sinuses showed near complete opacification of the sphenoid sinus with an air fluid level, small amount of fluid in the posterior nasal cavity, and a small focal dehiscence of the optic canal in the superior sphenoid sinus with adjacent pneumocephalus.

She underwent endoscopic repair of the CSF leak. During the case, lumbar drain was placed and fluorescein dye was injected which did confirm the optic canal in the sphenoid roof as the site of the leak. Surrounding mucoperiosteum was removed and bone edges were prepared carefully with a diamond drill. Repair was performed in a multilayer fashion with a small piece of abdominal fat, mucoperiosteal free graft from the middle turbinate, and packing. Patient was noted to have normal vision immediately after surgery. Lumbar drain was removed on post-operative day #2. She remains free of CSF rhinorrhea 15 months after surgery and has normal vision.

Conclusion:

Sphenoid sinus CSF leaks typically arise from the lateral pterygoid recess or the planum sphenoidale. Spontaneous CSF leak from the optic canal has not been previously reported. Recognition and careful repair of this potential site of leak is paramount.

Poster #012

Analysis of local anatomic dimension influence on frontal neo-ostium area after Draf 3 procedure for chronic rhinosinusitis: A computer-assisted study

Xiaoqing Zhang, MM
Ting Ye, MD
Qian Huang, MD
Junfang Xian, MD
Jing Li, MD
Bing Zhou, MD
Beijing
China

Background and Objective:

Draf 3 procedure was demonstrated to be highly effective in the treatment of refractory frontal sinus disease. A variety of inflammatory factors may contribute to the change of frontal neo-

ostium (FNO) area after this procedure. Our objective is to investigate the influence of the local anatomic dimension on FNO area after Draf 3 in patients with chronic rhinosinusitis (CRS) by using image software.

Methods:

24 patients with CRS who underwent Draf 3 procedure with more than 12 months follow-up from 2010 to 2014 were enrolled in this study. Data on patient demographics, medical history and CT scans were collected. Anatomic dimension was measured by OsiriX®. The multivariate linear regression model was used to assess independent factors linked to FNOA at 1 year after surgery in patients with CRS.

Results:

The contour area of the original intraoperative was 3.550 ± 0.187 cm². The contour area of FNO at 1 year was 2.828 ± 0.192 cm². According to the multivariate linear regression, the preoperative frontal ostium minimum anteroposterior diameter (FOAPMIN) and the account of blood eosinophil were correlated with the contour area of FNO at 1 year. Stenotic ostium was defined as a loss of more than 50% of the original intraoperative area. If FOAPMIN equal to or less than 3.592mm, the sensitivity and specificity for the presence of stenosis were 95% and 75%, respectively.

Conclusions:

Both the FOAPMIN and account of blood eosinophil were the independent predictors for the contour area of FNO at 1 year.

Poster #013

Analysis of paranasal sinus volume in adults with cystic fibrosis

Christopher Rose, MD
Adam Folbe, MD
Michael Wiebel, MD
Vibhav Sekhsaria, MD
Detroit, MI
USA

Cystic fibrosis (CF) is a genetic disorder that affects 1 in 2,500 newborns, with calculated carrier frequency of 1 in 25. This disease was not formally described until 1938 and further research then led to a molecular understanding of the CF transmembrane conductance regulator (CFTR) gene located on chromosome 7.

CF has multiple systemic ramifications in child and adulthood including those of sinus disease. Indeed, a majority of CF patients deal with significant chronic sinus pathophysiology requiring medical and surgical intervention at some point in their lives. Unlike previous studies, the focus of ours is the adult population as an increasing number of CF patients are surviving into their 40s and 50s with modern medicine. Our hypothesis was that CF patients have a statistically significantly different sinus volumes compared to patients without CF.

A retrospective chart review was performed at our institution comparing patients with chronic sinusitis (CRS) and CF to those with sinusitis that do not suffer from CF. These two groups were then compared to a control group of "normal" patients who received CT imaging of sinuses with results that did not reveal evidence of sinus disease.

The results showed CF population to have an average maxillary (7.9cc +/- 1.9, p<0.01), sphenoid (0.7cc +/- 0.8cc, p<0.01), and frontal (0.6cc +/-0.7cc, p<0.01) sinus volumes. These were statistically significantly smaller than those of chronic sinusitis patients without CF and normal controls.

Poster #014

Analysis of two endoscopic sinus surgery approaches for recurrent chronic rhinosinusitis

Mingjie Wang, MD, PhD

Bing Zhou, MD

Shunjiu Cui, MD

Yunchuan Li, MD

Beijing

China

Introduction:

Recurrent Chronic Rhinosinusitis (RCRS) is a world widespread clinical problem. This study was to analysis the efficiency of two different approaches of endoscopic sinus surgery in curing RCRS.

Methods:

The prospective analysis was enrolled in 47 cases from January 2011 to April 2013. All patients were diagnosed as RCRS. According to different surgical methods, patients were classified into functional endoscopic surgery group (FESS group, n=22) and radical sinus surgery group (RSS group, n=25). Symptom Visual Analog Scale (VAS), peripheral blood eosinophil percentage, serum total IgE, skin prick test (SPT), olfactory function, Lund-Kennedy score and Lund- Mackay score were examined and analyzed before and after surgery.

Results:

There was no statistically significant difference between two groups in age, gender, complications with allergic rhinitis and asthma. In RSS group, preoperative VAS symptom score, Lund-Kennedy score and Lund-Mackay score were higher than FESS group. All patients were followed up at least 1 year. In each group, VAS symptom score, Lund-Kennedy score and Lund-Mackay score were compared before and after surgery. VAS symptom score, Lund-Kennedy score, Lund-Mackay score were significantly lower after surgery. Comparison between two groups, Lund-Kennedy score and Lund-Mackay score were lower in RSS group significantly, and there was no significant difference in VAS symptom scores postoperatively, indicating radical sinus surgery approach was more effective in relieving symptoms and reducing inflammation.

Conclusion:

Compared with FESS, radical sinus surgery approach may be more effective in controlling sinusitis symptoms and reducing inflammation of sinus, especially in RCRS, which is a recommended surgical method.

Poster #015

Anatomic variants of the paranasal sinuses in patients with recurrent acute rhinosinusitis

Patricia Loftus, MD

Juan Lin, PhD

Abtin Tabaei, MD

Bronx, NY

USA

Introduction:

The incidence and potential disease impact of anatomic variants in patients with recurrent acute rhinosinusitis(RARS) is unknown. A possible correlation between RARS and the presence of anatomic variants has important implications for management, including surgery.

Methods:

A retrospective review of a cohort of patients with RARS who had undergone computed tomography (CT) was performed. Patient demographics, RARS severity and co-morbidities were reviewed. CT scans were reviewed for the incidence of anatomic variants in all patients. The pattern of inflammatory changes was explored in the sub-set of patients with acute rhinosinusitis at the time of CT. Potential correlation between the presence of anatomic variants and disease severity was investigated.

Results:

In this 26 patient cohort, the most common variants included agger nasi cell (88.5%), concha bullosa (53.8%), infraorbital cell (50%) and deviated nasal septum with middle meatus obstruction (42%). In exploring factors potentially associated with RARS severity, the only statistically significant finding was a greater number of years with RARS (0.0363) in patients with the presence of type 2 frontal cells. In the 23 patients who underwent CT at the time of an acute infection, no statistically significant association was found between the pattern or severity of sinus disease as measured by the Lund-McKay score and the presence of individual anatomic variants.

Conclusions:

Compared to historical descriptions, the frequency of anatomic variants in RARS patients is similar to that of the general population. There is no correlation between the presence of individual anatomic variants and the presence of inflammatory changes in the individual paranasal sinuses.

POSTERS

Poster #016

Anosmia in veterans with traumatic brain injury

Raphael Nwojo, MD
 Chetan Nayak, MD
 Bradley Goldstein, MD, PhD
 Miami, FL
 USA

Introduction:

Although concussion or traumatic brain injury (TBI) is prevalent among war veterans, there is limited information on olfactory dysfunction among this population. Anosmia may be an under-recognized problem, with significant sequelae. Accordingly, we sought to examine the incidence and severity of post-head trauma olfactory loss in veterans carrying a diagnosis of TBI.

Methods:

Subjects were recruited from a VA post-deployment clinic. Inclusion criteria: age = 45, no history of sinonasal disease, and a diagnosis of TBI related to service. A questionnaire determined year and mechanism of injury, length of loss of consciousness, and tobacco history. Subjects underwent exam and nasal endoscopy. Olfactory function was measured with the Smell Identification Test (Sensonics, Haddon Heights, NJ).

Results:

108 patients were identified. 16 patients met criteria and consented. Age range was 26-42, mean 32 years. The most common mechanism was blast injury from improvised explosive device (IED). Average UPSIT score was 22/40 (range 5 – 34). Only 1/16 subjects was normosmic, while 5 had total anosmia. By history, 7/16 patients had mild TBI, 8/16 had moderate TBI, and 1/16 had severe TBI. Interestingly, UPSIT scores of the group with blast induced TBI were poorer than the group reporting non-blast mechanisms (P value 0.045).

Conclusions:

Olfactory dysfunction is common among veterans following TBI. Our results indicate that TBI from blast injuries, such as IED, may be associated with severe olfactory loss. Anosmia in veterans with such injuries may be an unrecognized problem. Larger studies and research testing new therapies appear to be warranted.

Poster #017

Antihistamines for treating rhinosinusitis: a systematic review and meta-analysis

Kachorn Seresirikachorn, MD
 Komkiat Snidvongs, MD, PhD
 Bangkok
 Thailand

Background:

Antihistamines are commonly used for treating rhinosinusitis in spite of controversy. Without the release of histamines, patients with rhinosinusitis may not get benefits from antihistaminic effects. Additionally, anticholinergic effects may bring more harms than benefits. However new generation antihistamines may have a role in allergic subgroup. To date, the overall benefit is not clearly evident.

Methods:

A systematic review of randomized controlled trials studying the use of antihistamines for treating acute and chronic rhinosinusitis was conducted. Data were extracted and pooled for meta-analysis. The outcomes were patients report outcomes, endoscopy, radiography and adverse events.

Results:

Three studies (252 patients) met the inclusion criteria. Antihistamines significantly decreased nasal obstruction in allergic patients with acute rhinosinusitis (mean difference -0.38; 95%confidence interval (CI) -0.72 to -0.05, p = 0.03) but had no benefit on total symptom reduction (mean difference -0.23; 95%confidence interval (CI) -0.56 to 0.11, p = 0.19). They were similar to placebo for pediatric patients with acute rhinosinusitis on symptom reduction (p>0.05) and radiograph (p>0.05). Antihistamines significantly decreased nasal obstruction (p = 0.016) and rhinorrhea (p = 0.001) for patients with chronic rhinosinusitis with polyps but was similar to placebo on endoscopy (p>0.05). When compared to placebo, somnolence and other adverse events were similar.

Conclusion:

Antihistamines may be beneficial to allergic patients with acute rhinosinusitis and chronic rhinosinusitis with polyps. The symptoms improved are allergic rhinitis related including nasal obstruction and rhinorrhea. However, this is not a strong evidence due to limited number of studies and missing data reported.

Poster #018

Application of endoscopic endonasal transeptal approach for fungal sinusitis in the sphenoid sinus

Suguru Furukawa, MD
 Yasuyuki Hinohira, MD, PhD
 So Watanabe, MD, PhD
 Yoshiyuki Kyo, MD, PhD
 Hitome Kobayashi, MD, PhD
 Tokyo
 Japan

Incidence of fungal sinusitis in the sphenoid sinus is 5-10% of overall, and is smaller than that in the maxillary or ethmoid sinus. We performed surgeries for fungal sinusitis in the sphenoid sinus by Endoscopic Endonasal Transeptal Approach (EETA) which has been often employed for endoscopic skull base surgeries. By this EETA, we could obtain better operability and surgical field. In this presentation, we report four surgical cases of fungal sinusitis in the sphenoid sinus in terms of operative procedures and progresses after surgeries.

The patients were all females – one was sixties and others were seventies. First, they underwent submucosal resection of nasal septum endoscopically. Then both sides of the sphenoid sinus were opened through nasal septum, then the sites of disease were resected. In three patients, standard Endoscopic Sinus Surgery was performed because of comorbid chronic inflammation in other sinuses. In all cases, fungus was identified by Grocott's stain and Periodic acid-Schiff stain. No recurrence has been observed for more than one year after their surgeries.

We have employed EETA for diseases in the sphenoid sinus while several transnasal approaches have been developed. By combining this EETA and conventional approaches, we can obtain better visual field and operability.

In conclusion, this EETA was thought to be useful and effective for patients with fungal sinusitis in the sphenoid sinus.

Poster #019

Assessment of pneumatization of the paranasal sinuses: A comprehensive and validated metric

Michael Marino, MD
Jacqueline Weinstein, MD
Charles Riley, MD
Joshua Levy, MD, MPH
Noah Emerson, DO
Edward McCoul, MD, MPH
New Orleans, LA
USA

Objective:

The purpose of this study was to develop and validate a radiographic metric for characterizing the degree of paranasal sinus pneumatization. A validated metric for the extent of sinus pneumatization that comprehensively includes the maxillary, ethmoid, frontal, and sphenoid cavities is not currently available.

Methods:

A validation study was performed where five independent reviewers evaluated 49 sinus computed tomography (CT) scans in coronal, sagittal, and axial orientations. Reviewers evaluated each scan, bilaterally, for 18 proposed dichotomous items as part of the Assessment of Pneumatization of the Paranasal Sinuses (APPS) metric. Evaluation of APPS items was independent of sinus opacification, which was simultaneously evaluated using the standard and previously validated Lund-MacKay scoring system. Inter-rater and intra-rater reliability was then assessed for each proposed APPS parameter and Lund-MacKay item using Fleiss kappa.

Results:

Nine parameters were included in the final APPS metric due to substantial inter-rater reliability (κ (mean)=0.61, κ (range)=0.41-0.81) and intra-rater reliability (κ (mean)=0.66, κ (range)=0.55-0.79), variable radiographic presence, and unique contribution to the characterization of sinus pneumatization. Kappa values were also calculated for Lund-MacKay inter-rater reliability (κ (mean)=0.58, κ (range)=0.45-0.66) and intra-rater reliability (κ (mean)=0.72, κ (range)=0.66-0.75). The final APPS metric has comparable inter-rater and intra-rater reliability to Lund-MacKay scoring. APPS scores were normally distributed within the study group by Anderson-Darling normality test ($p < 0.005$).

Conclusions:

The APPS score is the first comprehensive and validated metric for quantifying the degree of paranasal sinus pneumatization. This has important potential utility in assessing the correlation of various exposures and disease states with paranasal sinus anatomy.

Poster #020

Balloon sinus ostial dilation with microsensor navigation in the operating room setting

Martin Citardi, MD
Amber Luong, MD, PhD
Houston, TX
USA

Introduction:

Balloon sinus ostial dilatation requires precise placement of the balloon device in the outflow tract of the target sinus. The intrinsic anatomic configuration, as well as the inflammatory disease burden, may impede device placement. Recently, a microsensor, which has an outer diameter of only 0.5 mm and a length of 8 mm) has been incorporated into a flexible wire that may be passed through a balloon sinus dilatation system.

Methods:

Charts of 4 male patients (age range 33-68 years) who underwent balloon sinus ostial dilation (Relieva Spin, Acclarent, Menlo Park CA) with microsensor navigation (Guidewire, fiagon, Austin, TX) in the operating room setting, were reviewed.

Results:

The Fiagon navigation system was registered using a contour-based registration protocol, and better than 2 mm accuracy was achieved. The Relieva Spin was used in accordance with the manufacturer's instructions, except that the microsensor guide wire was substituted for the standard guide wire. Balloon dilation was performed on the maxillary (n=4), frontal (n=3) and sphenoid (n=1) sinuses; balloon-assisted dissection (dilatation with tissue removal) was performed for the frontal sinus (n=4). The surgical navigation system displayed the wire tip as it was advanced to the target sinus ostium; this visual feedback for wire position guided balloon placement.

Conclusions:

Microsensor wire navigation technology may be combined with balloon sinus technology. This approach allows the surgeon to follow the trajectory of the wire as it is advanced through the sinus anatomy. Additional optimization of both device and software technology is warranted.

POSTERS

Poster #021

Baseline characteristics predict follow-up in patients undergoing endoscopic sinus surgery (ess) for chronic rhinosinusitis (crs)

Devyani Lal, MD
 Kimberly Golisch, MS
 Yu-Hui Chang, Ph.D
 Matthew Rank, MD
 Phoenix, AZ
 USA

Objectives:

To study associations between baseline patient characteristics and attendance at follow-up visits after ESS.

Methods:

A retrospective review of adult CRS patients electing ESS (2011-2013) at a tertiary-care center was conducted. Patients were studied based on follow-up status at 3, 6, 12, and 24 months to compare baseline characteristics.

Results:

We found 206 qualifying patients (mean age 55.0 years; 48.1% female). Significant interval decline in number of patients following up was noted [3 months: 187 patients (90%); 6 months: 105 (51%), 12 months: 67 (33%); 24 months 65 (32%)]. Those following up were older at 3 month (mean age 55.7 vs. 48.3 years, $p=0.05$) and 6 month (58.3 vs. 51.6 years; $p<0.01$) visits. At 24 months, those following up were more likely to have undergone revision ESS (60% vs. 39.7%; $p<0.01$). When analyzing female patients, those following up at 6 months were more likely to have CRSwNP (41.1% vs. 18.6%; $p=0.02$) and higher preoperative CT score (11.5 vs. 8.5; $p<0.01$). For males, those following up at 12 months were more likely to have CRSwNP (65.5% vs. 44%; $p=0.04$) and higher preoperative CT score (13.8 vs. 11.4; $p=0.01$).

Conclusions:

A significant decline in patient follow-up occurred in the 24-month period after ESS. Compliance and disease severity may affect postoperative follow-up. In the early post-operative period, younger patients were more likely to not follow-up. Patients with CRSwNP, older age, higher preoperative CT scores, and those undergoing revision ESS were more likely to follow-up at various intervals during the 24-month period of this study.

Poster #022

Bevacizumab induced septal perforation

Mathew Geltzeiler, MD
 Timothy Smith, MD
 Toby Steele, MD
 Portland, OR
 USA

Introduction:

Bevacizumab is a vascular endothelial growth factor A (VEGF-A) inhibitor indicated for treatment of several solid organ malignancies including colorectal, lung, and ovarian cancer. Septal perforation secondary to systemic bevacizumab is a rare complication with only one prior description in the Otolaryngology literature. The purpose of this report is to raise awareness and discuss diagnostic and treatment recommendations based on the current state of the literature.

Methods:

Case report

Results:

A 59-year-old female undergoing systemic bevacizumab therapy for ovarian cancer presented with a 0.5cm anterior septal perforation with surrounding crusting. Nasal hygiene measures were initiated and bevacizumab held. No further enlargement of the perforation was noted through subsequent follow up time points. Bevacizumab therapy was restarted without any further sinonasal incidents.

Conclusion:

Bevacizumab is associated with both septal perforation and more widespread sinonasal toxicity. These lesions tend to produce mild symptoms and can frequently be managed conservatively. The decision to hold bevacizumab therapy should be made in conjunction with the patient and medical oncologist. Otolaryngologists should be aware of the toxicity from this increasingly common oncologic therapy.

Poster #023

Bilateral mucopyocele of the torus tubarius presenting as headache: Case report and review of the literature

Aria Jafari, MD
Joseph Acevedo, BS
Marc Lebovits, MD
San Diego, CA
USA

Introduction:

Cystic lesions of the nasopharynx (NP) are rare, typically asymptomatic, and often discovered incidentally. The etiology of these lesions can be either congenital or acquired. Acquired lesions, such as mucoceles and mucopyocles are usually unilateral and occur after local trauma, such as surgery or radiation. We describe the unusual presentation and clinical course of a patient with incidental bilateral NP cysts, appearing to arise from the torus tubarius on brain MRI, later confirmed to be mucopyoceles in a patient with headache refractory to medical management.

Methods:

We present a case report a 49-year-old male veteran with episodic tension-like headaches refractory to medical management and incidental finding of bilateral cysts of the NP on brain MRI for neuropsychiatric evaluation. In the clinic, nasopharyngolaryngoscopy revealed bilateral fullness of the torus tubarii. Patient underwent OR where endoscopic biopsies, which revealed cystic lesions, filled with purulence, consistent with bilateral mucopyoceles.

Results:

At 6-week follow-up, the patient reported improvement of headache symptoms and the operative site was well healed.

Conclusion:

To our knowledge, a case of bilateral mucopyoceles of the torus tubarii has not been described. In cases of headache refractory to medical management, nasopharyngolaryngoscopy should be considered to evaluate for mucosal abnormalities. For mucopyoceles, OR incision and drainage followed by a course of antibiotics and nasal irrigation is an effective treatment method.

Poster #024

Bone involvement: Histopathological evidence for management of sinonasal inverted papilloma in endoscopic surgery

Na Liang, MD
Bing Zhou, PhD
Qian Huang, MD
Honggang Liu, MD
Junfang Xian, MD
Zhenxioa Huang, MD
Beijing
China

Background:

Surgical resection is an appropriate choice for sinonasal inverted papilloma. Thus, a consensus has been reached that the tumor and mucosa around the lesions should be removed, and at the same time the bone under the origin, especially osteogenesis, must be properly disposed. However, potent theoretical evidence in histopathology is unclear.

Material and methods:

30 patients with sinonasal inverted papilloma (diagnosed by pathologist) were included. Each patient had done radiographic examination preoperative, which could indicate where the tumor was located. Samples were composed by tumor and underlying bone during endoscopic surgery. Then the number of inflammatory cells fluctuated among lesions has been recorded to do cursory statistical analysis.

Results:

The bone and periosteum underlying the tumor pedicle were analysed histopathologically. 83.3% (25 patients) of the specimens showed a bony hyperostosis phenomenon. 42.3% patients showed the papilloma broke through the bone lamella, which is coexisted with bony hyperostosis. In one case, still benign, the bone eroded into pieces, and nearly completely swallowed in certain field. The number of inflammatory cells showed a tendency to growing in 53%, compared with the normal.

Conclusion:

Bone involvement, including bone erosion and osteogenesis, provided a histopathologic evidence for the removal of the bone underlying the site of the tumor. For any microscopic lesion remained in the bony crevices probably mean recurrence. According to CT and MRI, different approaches are performed according to different origin. Inflammation may facilitate the process of the tumor erosion, cause recurrence and predicts malignant transformation.

POSTERS

Poster #025

Can symptoms of perennial rhinitis predict indoor and outdoor allergy?

Supinda Chusakul, MD
Naphorn Suksangpanya, MD
Songklot Aejmaturapat, MD
Bangkok
Thailand

Objective:

To investigate the differences of the main nasal symptom and the severity of nasal and eye symptoms between indoor and outdoor allergy in allergic rhinitis (AR).

Methods:

1776 questionnaires were collected from perennial rhinitis patients of the Rhino-Allergy clinic, chosen only whose information on nasal symptoms and skin prick test (SPT) results were available. The main symptom and visual analogue scale (VAS) 0-10 of nasal and eye symptoms were recorded. SPT results were divided into indoor, outdoor and mixed indoor-outdoor allergy. Mixed indoor-outdoor allergy was excluded. The main symptom and VAS of symptoms between indoor and outdoor allergy were compared.

Results:

Data were available for 640 patients in the study. There were 427 indoor AR patients, 22 outdoor AR and 191 mixed indoor-outdoor AR patients. The most common symptom of was nasal obstruction (35.1% of indoor AR VS 36.4% of outdoor AR), P-value= 0.49) The VAS of nasal and eye symptoms in indoor AR was 5.33±2.81 for nasal obstruction: 4.11±2.87 for sneezing; 4.92±2.94 for rhinorrhea; 3.93±3.08 for nasal pruritus and 3.38±3.08 for eye symptom. The VAS of outdoor AR was 4.86±3.56 for nasal obstruction; 3.23±2.82 for sneezing; 4.73±3.18 for rhinorrhea; 3.36±2.45 for nasal pruritus, and 2.55±3.17 for eye symptom. The VAS of symptoms between indoor and outdoor AR were not significantly statistical different.

Conclusions:

We cannot predict the outdoor or indoor allergy from the symptoms in perennial rhinitis. Therefore, SPT is a valuable tool for identifying allergens and helping patients to avoid them as the first line of treatment.

Poster #026

Centrifugal frontal sinus dissection technique: Addressing anterior and posterior frontoethmoidal air cells

William Yao, MD
Benjamin Bleier, MD
Boston, MA
USA

Background:

Successful dissection of the frontal recess remains one of the most challenging techniques in conventional endoscopic sinus surgery. Classic surgical technique requires the frontal sinus to be identified and entered through its natural drainage pathway while preserving the lining of the frontal recess to preserve mucociliary clearance. We discuss a novel surgical technique to safely dissect anterior and posterior frontoethmoidal air cells extending into the frontal sinus.

Methods:

Description of a novel surgical technique for addressing an anterior and posterior frontoethmoidal air cell extending into the frontal sinus. The procedure is performed under direct visualization of the frontal recess boundaries providing for enhanced safety and improved mucosal preservation.

Results:

We have successfully used this technique in 78 patients without complication or requiring additional frontal sinus dissection.

Conclusion:

The centrifugal frontal sinus dissection technique displaces the initial identification of the frontal lumen away from the posterior table thereby providing an additional margin of safety while limiting the potential for trauma to the residual mucosa. This non-traditional technique is predicated on the use of image guidance and mandates a comprehensive understanding of the frontal anatomy, complete familiarity with the image guidance system, and strong baseline frontal dissection skills.

Poster #027

Characteristics of patients treated for orbital cellulitis: An analysis of inpatient data in the U.S. from 2002 – 2010

Emily Marchiano, BA
Milap Raikundalia, BS
Eric Carniol, MD, MBA
Kristen Echanique, BS
Soly Baredes, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Background:

Orbital cellulitis represents a spectrum of diseases, some of which may progress to potentially serious complications. The authors used the Nationwide Inpatient Sample (NIS) database to analyze the epidemiologic features of pediatric and adult patients admitted for the treatment of orbital cellulitis, and to examine associations with surgical management.

Methods:

The NIS was queried for patients admitted for treatment of orbital

cellulitis from 2002-2010. Patient demographics, length of stay, hospital charges and concomitant diagnoses were analyzed.

Results:

There were 14,149 cases of orbital cellulitis identified with 1,717 (12.1%) having undergone surgical management. Surgical patients were older (29.6 ± 23.4) and more commonly male (62.0%) ($P=0.004$ and <0.001 respectively). Patients who had surgical intervention had longer length of stay and higher hospital charges than nonsurgical patients ($P<0.001$). Patients under 5 years of age had surgery least often (5.1%), while patients 10-14 and 15-19 years were operated on most commonly, 22.3% and 21.6% respectively ($P<0.001$). Patients with concomitant diagnoses of acute and chronic sinusitis, acute osteomyelitis, exophthalmos, diplopia and conjunctival edema had significantly increased odds of surgical intervention. Frontal sinusitis was the site most commonly associated with surgical intervention among sinusitis patients ($P<0.001$). Acute medical complications were rare in both cohorts.

Conclusion:

This study describes the characteristics of pediatric and adult patients admitted for orbital cellulitis from a national perspective. Patient characteristics associated with surgical management include older age, male sex, and concomitant diagnoses of acute and chronic sinusitis, acute osteomyelitis, exophthalmos, diplopia or conjunctival edema.

Poster #028

Characteristics of upper and lower airways patency in chronic rhinosinusitis with and without asthma

Zhenxiao Huang, MD, PhD
Mingjie Wang, MD, PhD
Rui Peng, MD
Yan Sun, MD
Qian Huang, MD
Bing Zhou, MD
Beijing
China

Introduction:

Airway patency is dependent on the airway dimension, airflow volume and resistance in the airways. There is small evidence about upper and lower airway patency in chronic rhinosinusitis with and without nasal polyps (CRSsNP and CRSwNP). The aim of this study is to investigate the characteristics of upper and lower airway patency in asthmatic and non-asthmatic patients with CRS, and the upper airway patency changes after nasal decongestion.

Methods:

Upper and lower airway patency of 57 non-asthmatic CRSsNP, 74 non-asthmatic CRSwNP, 26 asthmatic CRSwNP patients and 22 controls with rhinitis were measured using rhinometry and spirometry. Rhinometry was performed before and after nasal decongestion using topical pseudoephedrine.

Results:

No difference was found in baseline total nasal resistance at 75 Pa (R75T), between all groups. R75T in all groups was significantly improved after nasal decongestion ($p<0.01$). Asthmatic CRSwNP patients had a significantly higher R75T after nasal decongestion when compared to non-asthmatic CRSsNP, non-asthmatic

CRSwNP patients and controls ($p<0.05$). Asthmatic CRSwNP patients had a significantly lower forced expiratory volume in 1 second (FEV1) and forced expiratory flow between 25% and 75% of forced vital capacity (FEF25-75) compared to non-asthmatic CRSsNP and CRSwNP patients ($p<0.01$), but no difference was seen between non-asthmatic CRSsNP and non-asthmatic CRSwNP.

Conclusion:

The presence of asthma may not influence baseline upper airway patency in CRS patients. Nasal airway patency was improved by nasal decongestion, but less improvement was observed in patients with asthma. Asthmatic CRSwNP had a significantly lower airway patency than non-asthmatic CRSsNP and CRSwNP patients.

Poster #029

Chronic invasive fungal sinusitis: Characterization and management of a rare disease

Brian D'Anza, MD
Janalee Stokken, MD
J. Scott Greene, MD
Thomas Kennedy, MD
Troy Woodard, MD
Raj Sindwani, MD, FRCS(C)
Cleveland, OH
USA

Introduction:

Chronic invasive fungal sinusitis (CIFS) is a rare subtype of mycotic diseases involving the paranasal sinuses. It is characterized by an insidious onset and invasive organisms with non-granulomatous inflammation seen on histopathology. Historically, treatment has involved radical surgical resection. The purpose of this study was to describe the presentation, co-morbidities, and role of more conservative treatment options.

Methods:

This is a multi-institutional retrospective case series of 6 patients with CIFS over 15 years. Patients' medical co-morbidities, imaging results, operative procedures, pathological findings including organisms identified, antimicrobial medications used, and outcomes were reviewed.

Results:

The mean time from onset of symptoms to diagnosis was 6 months. All patients were found to have invasive fungal organisms on final pathology samples. Cultures and fungal PCR identified *Aspergillus* species in every case. Patients were found to have systemic co-morbidities, with many being diabetic. Imaging findings ranged from thickening of sinus mucosa to invasion of the orbit and skull base in advanced cases. Treatment included long-term antifungal therapy and conservative endoscopic surgery in all but one patient, who had a radical open approach. Every patient was free of invasive fungal disease at last follow up, which averaged 10 months.

Conclusions:

CIFS is a fastidious disease with months between symptom onset and diagnosis. It is differentiated from chronic granulomatous invasive fungal sinusitis by a lack of granulomas on histopathology and an association with diabetic patients. Endoscopic debridement combined with voriconazole is an effective and definitive treatment strategy in this series, the largest in the literature.

POSTERS

Poster #030

Chronic rhinosinusitis and obstructive sleep apnea: No association between cpap reservoir bacterial colonization and sinus culture results

Rosa Lipin, MD
 Anita Deshpande, MD
 John Del Gaudio, MD
 Sarah Wise, MD, MSCR
 Zara Patel, MD
 Atlanta, GA
 USA

Introduction:

Chronic rhinosinusitis (CRS) and obstructive sleep apnea (OSA) are both highly prevalent chronic diseases in the United States. To our knowledge, possible association between culture positivity of CPAP machines and sinus samples has not been studied in patients with both disease states. Our objective was to compare the microbes present in the sinus cavities and CPAP machine reservoirs of patients with both CRS and OSA.

Methods:

Patients from an academic tertiary care Rhinology practice were identified with both chronic rhinosinusitis and obstructive sleep apnea and enrolled prospectively. Inclusion criteria included age over 18 years, diagnosis of OSA by sleep study, regular CPAP use, and an active diagnosis of CRS based on well-established criteria. Exclusion criteria included treatment with antibiotics or cleaning of the CPAP reservoir in the month prior. Cultures were taken from participants' sinus cavities and CPAP reservoirs and resulting microbial growth was compared.

Results:

Ten patients with active diagnoses of CRS and OSA with CPAP use were enrolled in the study and nine of those patients had both sets of samples obtained. The most common organisms on CPAP culture were *Enterobacter cloacae* and *Acinetobacter baumannii*, whereas the most common on sinus culture were *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Microbial growth from the sinus cavities and the CPAP reservoirs were not concordant in any of our patients.

Conclusion:

There is no association between bacterial colonization of the CPAP reservoir and the sinus cavities of those with CRS and OSA based on microbiologic cultures.

Poster #031

Clinical features of different prognosis of allergic rhinitis

Mingjie Wang, MD, PhD
 Bing Zhou, MD
 Shunjiu Cui, MD
 Yunchuan Li, MD
 Qian Huang, MD
 Beijing
 China

Introduction:

Allergic rhinitis (AR) can complicate with asthma, sinusitis, nasal polyps and other diseases. This research was to analysis characteristics of different prognosis of AR and to find a biomarker to evaluate the prognosis of AR.

Methods:

There were 71 patients enrolled in this retrospective study. These patients were divided into three groups: group A is AR; group B is AR with chronic sinusitis; group C is AR with asthma. The patients in group B and C were all with a history of AR previously. All patients were tested peripheral blood eosinophils, serum total IgE, SPT, olfactory function, nasal secretions smear eosinophils staining and upper and lower airway concentration of NO. The clinical data of group A, B and C were statistically analyzed. To evaluate the discriminatory power of biomarker, the Receiver Operating Characteristic (ROC) curve was analyzed.

Results:

There were 24 patients in group A, 21 patients in group B, and 26 patients in group C. The ratio of eosinophils and olfactory function scores between group A and B were significantly different. The ratio of eosinophils and lower airway NO concentrations were significantly different between group A and C. The ratio of eosinophils could be a biomarker to evaluate prognosis of AR and lower airway NO concentration is a risk factor for asthma. 3.15% of peripheral blood eosinophil can be a prognostic cutoff value.

Conclusion:

Ratio of eosinophil in peripheral blood could be used as biomarker to evaluate prognosis. Greater than 3.15% of peripheral blood eosinophil should indicate the poor prognosis.

Poster #032

Comparison of transeptal suturing using maniceps septum stitch with internasal septal splinting following septoplasty

Akihito Kuboki, MD
Shun Kikuchi, MD
Tsuguhisa Nakayama, MD
Daiya Asaka, MD
Jiro Imura, MD
Nobuyoshi Otori, MD
Tokyo, Minato-ku
Japan

Septoplasty is a common surgery for otorhinolaryngologist. But some patients can develop complications such as postoperative hematoma and nasal septum perforation so on after septoplasty. An ideal procedure preventing these complications after it should be technically easy, safe and comfortable for patients after the operation. Nasal packing is commonly performed in many institutions to prevent post-operative complications. However, this technique can cause discomfort, pain, mucosal injury, toxic shock syndrome and breathing difficulties. Recently, several reports describe the usefulness of nasal splinting as an alternative method to nasal packing. While, suturing nasal septum is thought to be effective method as with nasal splinting, but it has a problem to be difficult technically and stressful for operators. In 2013, a new endonasal suturing instrument equipped with a straight needle, the Maniceps septum stitch device(MSS)(Mani, Tochigi, Japan), was developed for nasal septal surgery to address these issues. Here, we report on the study to evaluate the usefulness of suturing nasal mucosa using MSS comparing to nasal splinting in patients underwent septoplasty.

This study is a prospective, randomized controlled trial. Patients underwent septoplasty by a single young surgeon was divided into two groups. Group 1 had the suturing nasal septum with MSS and group 2 had nasal splinting following septoplasty. We evaluate a total operative time, an part of total operative time which is spent on the procedures, post-operative symptom using a visual analog scale(VAS) and complications. From this study, we want to examine the utility of using MSS in septoplasty.

Poster #033

Complete surgical resection improves short term survival in acute invasive fungal rhino sinusitis

Christopher Roxbury, MD
David Smith, MD, PhD
Stella Lee, MD
Masaru Ishii, MD, PhD
Andrew Lane, MD
Douglas Reh, MD
Baltimore, MD
USA

Introduction:

Acute invasive fungal rhinosinusitis (AIFR) is a rare, frequently fatal illness. Currently, there are no specific guidelines for management of AIFR. Our goals are to assess treatment modalities impacting short-term survival.

Methods:

53 histopathologically diagnosed cases of AIFR meeting inclusion criteria were identified between 1984-2014. Patient characteristics, extent of disease at diagnosis, treatment modality, and short-term survival data were collected. Univariate logistic regression analysis was performed to assess for factors associated with short-term survival and increased odds of complete surgical resection. Multivariate logistic regression was performed to control for confounding.

Results:

All patients had comorbidities predisposing to AIFR. Survival to inpatient discharge was achieved in 36 patients(67.9%). Univariate and multivariate analysis showed significantly improved short-term survival in patients with successful surgical resection as defined by negative surgical margins or normal postoperative nasal endoscopy(OR 52.5,p=0.003) (OR 58.2,p=0.006). Other factors such as treatment with anti-fungals and G-CSF did not have a significant impact on survival. A surgical staging system was proposed, with disease limited to the nasal cavity(I), extending extranasally without intracranial extension(II), and with intracranial extension(III). Chi-square analyses showed significant trends toward decreased surgical clearance (83.0%vs44.8%vs0%,p=0.014) and short-term survival (100%vs62.9%vs 25%,p=0.006) with increasing disease stage.

Conclusions:

While further studies are needed to define specific AIFR treatment protocols, these data add to a growing body of literature suggesting that complete surgical resection may provide the best survival outcomes, regardless of other factors such as ability to reverse immunocompromise. Our staging system represents the first attempt to predict surgical success and prognosis in patients with AIFR.

POSTERS

Poster #034

Correlation analysis of subjective and objective evaluation of the doctors and patients with chronic sinusitis

Ping Ye, PhD
 Qiang Zhang, MD
 Li Shi, MD
 Zhong Li, MD
 Lan Cai, MD
 Bing Zhou, MD
 Beijing
 China

Abstract Objectives:

The aim of this study is to identify the correlation of subjective and objective evaluation between the doctors and the patients with chronic sinusitis(CRS) after surgery , in order to find out which can predict the severity of CRS.

Study design: Prospective study.

Methods:

82 patients with chronic rhinosinusitis(CRS) were enrolled in the study(61 male and 21 female;16-63 years old). The severity of nasal diseases in these patients was assessed via the Lund-Mackay score(LMS) and Lund-Kennedy score(LKS) objectively and sinonasal-specific questions from the 20-item Sino-Nasal Outcome Test(SNOT-20) and Visual Analogue Scale (VAS) subjectively. Three different surgeons give their own VAS (VAS doctor) according to their own experience. Results were analysed using Spearman's correlation coefficient. In all tests, p value <0.05 was considered as statistically significant.

Results:

There is a significant correlation between the three doctors scores ($r=0.5644$, $p<0.0001$; $r=0.5204$, $p<0.0001$; $r=0.5305$, $p<0.0001$ respectively). Significant positive correlation was established between VASdoctor and the patients' objective scores such as LMS ($r=0.7251$, $p<0.0001$) and LKS ($r=0.6103$, $p<0.0001$). There was no correlation between the VASdoctor and the patients' subjective scores (VAS, $r=0.1528$, $p=0.1109$; SNOT-20, $r=0.0567$, $p=0.5563$ respectively).

Conclusions:

To some extent, VASdoctor can be used to reflect the severity of sinusitis. The patients' subjective health status and the level of discomfort as well as its tolerance threshold for pain can often not be determined by the doctors directly, which should attract more doctor's attention during the entire treatment process.

Keywords

Chronic rhinosinusitis; Sinusitis; Lund Kennedy scale; Lund Mackay scale; Visual Analog Score

Poster #035

Crosslinked hyaluronan inhibits migration and invasion of nasopharyngeal carcinoma cells through down regulation of egf-egfr signaling pathway

Ji Pang, BS
 Min Wu, BS
 Qian Hai, MS
 Yongchang Chen, PhD
 Jizong Gao, PhD
 Yan Wu, PhD
 Zhenjiang, Jiangsu
 China

Introduction:

Multiple disciplinary managements on nasopharyngeal carcinoma (NPC) are developed with promising outcome. However, cancer recurrence and complications including healing deficiency and tissue fibrosis are still common. High molecular mass hyaluronan (HA) was reported to mediate cancer resistance in a rat model. Hereon, we evaluated the impact of crosslinked HA gel (CHAG) on migration and invasion of NPC cells and investigated the influence of CHAH on EGF-EGFR pathway in an in vitro study.

Materials and Methods:

Human NPC cell lines, CNE-1 and CNE-2, were used for this study. Cell migration assays were performed with transwell cell migration chambers and cell invasion test was performed using ECM-gel in the chambers. Cell suspensions of CNE-1 or CNE-2, containing serum-free 1640 culture medium and CHAG at the concentrations of 125 μ g/ml, 250 μ g/ml, 500 μ g/ml, and 1000 μ g/ml, with or without epithelial growth factor (EGF), were prepared and added to the upper chambers while the lower chambers were filled with 1640 culture medium containing 10% fetal bovine serum. After 24 hours incubation, the migrated or invaded NPC cells were stained and counted. For western blot analysis, NPC cells were culture-expanded on monolayer with the same condition above. Cells were lysed and proteins were detected by antibodies against p-EGFR (Y1068), p-ERK(T202/Y204), p-Akt(S473), EGFR, ERK, Akt and β -actin.

Results and Conclusions:

CHAG significantly inhibited EGF-induced migration and invasion of NPC cells. Such inhibition effects might be mediated through down-regulating EGF-EGFR downstream signaling pathway since levels of p-EGFR, p-ERK, and p-Akt were all reduced by CHAG treatments.

Poster #036

Delayed complications after silicone sheet repair for orbital floor fractures – case series and systematic literature review

Lane Squires, MD
Raj Dedhia, MD
Toby Steele, MD
Travis Tollefson, MD, MPH
Sacramento, CA
USA

Introduction:

Orbital floor fractures are observed in 10 to 25% of all cases of facial fracture. Surveys of materials used in reconstruction show a trend towards porous polyethylene and titanium implants due to established safety profiles and low complication rates. Repair with silicone implants has been associated with delayed complications and therefore abandoned by many surgeons.

Methods:

We present two cases of late implant-related complications caused by silicone sheeting recently managed at our institution. Two independent reviewers searched the following databases: Ovid MEDLINE, EBMreviews, the Web of Science with Conference Proceedings, and references from indexed articles for reports of delayed post-operative complications attributable to the use of implants for orbital floor fractures, specifically for silicone implants.

Results

Case reports: Both patients presented >5 years after initial repair, one with rapid formation of periorbital abscess and the other with slow development of orbital floor mucocele. Literature reviewed showed overall complication rates from silicone repair between 10-15%, with delayed complications such as proptosis, enophthalmos, vision changes, migration of implant, mucocele formation, and periorbital infection. Heterogeneity of the reported data precluded a metaanalysis.

Conclusion:

Herein we describe two patients with delayed complications related to silicone orbital floor fracture repair. Our review of the literature shows numerous examples of late complications from this method of repair. We propose that silicone sheeting for orbital floor reconstruction be discontinued from clinical use. In cases of periorbital edema and potential sinusitis-related orbital infections, practitioners should determine if history of prior orbital reconstruction is present.

Poster #037

Dental carries and allergic rhinitis in preschool children

Mehdi Bakhshae, MD
Sara Jafari Ashtiani, DDS
Mana Hossainzadeh, DDS
Samineh Sehatbakhsh, MD
Maryam Salehi, MD, PhD
Mashhad, Razavi Khorasan
Iran

Introduction:

Allergic rhinitis (AR) may result in an increasing trend in dental carries; due to lack of evidence and controversies in the literature; we investigated the potential effect of AR on dental caries in children.

Methods:

Through cross sectional study, 296 preschool children by stratified random cluster sampling method were included into the study. They evaluated from the point of DMF (decay, missing, and filling) score and AR through physical examinations and the standard questionnaire by a physician and dentist. Other related informations including the medical history and related factors were collecting using a questionnaire.

Results:

Seventy-seven of children had allergic Rhinitis (35.1%) while 219 subjects did not show any evidence for AR (64.9%). Mean age and sex ratio between two groups were comparable (P=0.259 and P= 0.289; respectively). Tooth decay and DMF score had no significant difference between two groups (P=0.07) however missing and filling teeth were seen significantly more in AR children (P<0.05). Fluoride therapy and mouth breathing as confounding factors that had a significant difference between two groups (P<0.001) were controlled by using logistic linear analysis. In this model the mean of DMF in AR was 20% more than those without AR (OR= 1.91 CI: 1.05-1.35) and also it was 15% more in children with mouth breathing than they did not have (OR= 1.15 CI: 1.02-1.31).

Conclusion:

Allergic rhinitis and mouth breathing may have some effect on oral health status and dental condition, leading to an increase rate in dental missing and filling.

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Poster #038

Dental implantation - corporation between the rhinosurgeon and the dentist/oral Surgeon

Takanobu Kunihiro, MD
Toshihiko Oba, MD
Tokyo
Japan

Introduction:

Maxillary sinusitis is one of the most serious complications in dental implantation in the maxilla. We will present our 3-year experience in the treatment of maxillary sinusitis associated with dental implantation.

Materials and methods:

During this period, more than 200 patients have been referred to the first author's clinic from local dentists for the examination and treatment of maxillary sinus diseases. The present study will review part of those patients on whom endoscopic sinus surgery was performed to treat maxillary sinusitis which developed in association with dental implantation in the maxilla.

Results:

Endoscopic middle metal antrostomy was performed on all patients. When bone prosthetic material in the maxillary floor had to be removed, an oral surgeon also participated in the operation. An oroantral fistula, when present, was also closed by the oral surgeon. The extent of antrostomy was determined based on the intraoperative findings. In the vast majority of the patients, the inflammation was confined within the maxillary sinus and the anterior ethmoid sinuses. Some cases also required manipulation of the frontal recess. After surgery, all patients were treated with irrigation using a saline solution through the antrostomy. Maxillary sinusitis resolved completely except for a few patients in whom, for various reasons, the implant penetrating into the maxillary sinus was not removed. Some patients underwent dental implantation again.

Discussion:

Our experience has showed that an intimate corporation between the dentist/oral surgeon and the rhinosurgeon is of paramount importance for safe and successful dental implantation in the maxilla.

Poster #039

Development of a novel biliary t-tube stent after Draf III frontal sinus surgery

Brian Rotenberg, MD MPH
Khrystyna Ioanidis, BSc
London, ON
Canada

Introduction:

Re-stenosis after Draf III frontal sinus surgery remains a problem. The bilateral opening created in the Draf III procedure does not fit any currently available stents. Patients find rinsing of the frontal sinus difficult, with the resulting decreasing compliance leading to more crusting. The objective of this paper is to demonstrate the use of a novel frontal sinus stent fashioned from a biliary T-tube, addressing these issues in patients with complicated sinus disease.

Methods:

This is a retrospective chart review of patients who underwent a Draf III procedure and T-tube stent insertion between January and October 2014. Patient charts were analysed for demographic details, surgical and stent details, peri-operative complications, and re-stenosis rates, as well as indications of rinsing ability post-operatively. Patients were followed for a minimum of six-months.

Results:

Thirty patients met study criteria. No patients had signs of re-stenosis, and patients reported ease of rinsing with the T-tube stent. There was one intra-operative bleed and one post-operative bleed requiring packing. Four patients had infections requiring antibiotics post-operatively. Demonstrations of stent construction and irrigation via video format will be shown in the presentation.

Conclusions:

The novel biliary T-tube stent developed by the authors is a promising future direction for frontal sinus surgery. Patients who have received a biliary T-tube stent after a Draf III procedure showed no signs of stenosis to date and reported an ease of rinsing, solving two major problems with the Draf III procedure.

Poster #040

Diffuse sinonasal and orbital involvement of Erdheim-Chester disease: A case report and review of the literature

John Frederick, MD
Karam Badran, MD
Sunita Bhuta, MD
Jeffrey Suh, MD
Los Angeles, CA
USA

Introduction:

Erdheim-Chester disease (ECD) is an extremely rare non-Langerhans histiocytosis characterized by xanthomatous infiltration of tissue by foamy histiocytes. First described in 1930, patients with ECD develop severe uncontrolled systemic inflammation usually involving multiple organ systems. We report a case of a patient with diffuse sinonasal, orbital, and intracranial involvement causing proptosis, vision loss, and progressive unilateral sinus opacification.

Methods:

A systematic review of the published literature on ECD was performed followed by report and discussion of a case of ECD. Relevant CT and MRI images are presented.

Results:

The patient was a 56-year-old male presented with a 2-year history of left orbital inflammation, proptosis, and headaches. Prior orbital biopsy revealed only inflammation. Computed tomography demonstrated complete opacification of the right frontal and sphenoid sinuses with substantial osteoneogenesis. Sinus biopsy confirmed the diagnosis of ECD. The patient is currently on high-dose prednisone with minimal improvement of his orbital symptoms.

Conclusion:

Erdheim-Chester Disease is a histiocytosis that can rarely manifest in the head and neck and paranasal sinuses. There are no definitive treatment options for ECD. Treatment usually includes a combination of high-dose prednisone, cytotoxic chemotherapeutic agents, and interferon alpha. Despite aggressive medical therapy, the prognosis of ECD is poor, with a 5-year overall survival of 43-68%.

Poster #041

Do eosinophilic polyps predict olfactory dysfunction and its postoperative recovery in chronic rhinosinusitis?

Jin Kook Kim, MD
Kyung_Hwa Jeong, MD
Sung Hwan Ahn, MD
Seoul
Korea, Republic of

Olfactory disturbance due to CRS with NP has been known to be the most treatable causes. The recent literature suggests predict factors for olfactory outcomes after ESS. NP preoperatively may have a higher likelihood of olfactory improvement following ESS. The aim of this study was to investigate: to evaluate the olfactory function according to the types of NP and CT findings, to identify prognostic factors, to better predict the surgical outcome of olfactory function. The number of the total participants was 75. They were classified into ECRS and non-ECRS groups, and the two groups

were compared in terms of demographic characters, Lund-Mackey scores and olfactory function test. With 5 months follow-up, Korean Version of the Sniffin' Stick test I, and KVSSII were also conducted in each patient to examine the difference between postoperative and preoperative state in olfaction. The ECRS group(n=34) showed the higher in L-M score, OMU score, Olfactory Cleft(OC) score, especially presented significant difference in OMU score. The ECRS showed the increase in postoperative KVSSI, KVSSII score when compared to the preoperative one with statistical significance while the non-ECRS(n=41) didn't show any statistically significant change. For anosmia category by KVSSII, ECRS group presented the significantly improved olfactory function test scores the entire threshold, discrimination, identification test. ECRS can be distinct from non-ECRS based on the clinical findings in this study. The ECRS group showed improvement in olfactory function after surgery, and whether ECRS is or not may be useful to predict the prognosis of olfactory recovery.

Poster #042

Effect of thymic stromal lymphopoietin on Muc5b expression in human airway epithelial cells

Yong-Dae Kim, MD, PhD
Yoon Seok Choi, MD, PhD
Hyung Gyun Na, MD
Chang Hoon Bae, MD, PhD
Si-Youn Song, MD, PhD
Daegu, Gyeongsangbuk
Republic of Korea

Introduction:

Thymic stromal lymphopoietin (TSLP) is an interleukin 7-like cytokine and a potent factor for B- and T-cell growth and differentiation. Recent studies have demonstrated an association of TSLP with allergic and inflammatory airway diseases. However, no study on the effect of TSLP on expression of mucin genes in airway epithelial cells has been reported. Therefore, the effects and brief signaling pathways of TSLP on expression of mucin genes in human airway epithelial cells were investigated in this study.

Methods:

In mucin-producing human NCI-H292 airway epithelial cells and primary cultures of normal nasal epithelial cells, the effect and signaling pathway of TSLP on expression of mucin genes were investigated using 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:

In human NCI-H292 airway epithelial cells, TSLP increased MUC5B expression. TSLP significantly activated phosphorylation of ERK1/2 and p38 mitogen-activated protein kinase (MAPK). U0126 (ERK1/2 MAPK inhibitor) and SB203580 (p38 MAPK inhibitor) significantly attenuated TSLP-induced MUC5B mRNA expression. Knockdown of ERK1, ERK2, and p38 MAPK by ERK1, ERK2, and p38 MAPK siRNA significantly blocked TSLP-induced MUC5B mRNA expression. In the primary cultures of normal nasal epithelial cells, TSLP significantly increased MUC5B mRNA expression, which was significantly attenuated after pretreatment with U0126 and SB203580.

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Conclusion:

These results suggest that TSLP induces MUC5B expression via the ERK1/2 and p38 MAPK signaling pathway in human airway epithelial cells.

Poster #043

Effects of frontal sinus cells, ethnicity, and gender on frontal sinus disease

Laura House, MD
Scott Stringer, MD
Jackson, MS
USA

Introduction:

Research on frontal sinus cells has been conflicting regarding relationship between frontal sinus cells and frontal sinus disease. There are no published studies regarding gender differences in frontal sinus disease. No comparisons between African Americans and Caucasians and frontal sinus disease have been published. This study attempts to define the above relationships as well as the relationship between number and types of cells and disease.

Methods:

A retrospective chart review was performed on sinus CT scans done from 2003-2011 at an academic medical center. Exclusion criteria included previous frontal sinus surgery, sinus malignancy, obvious trauma, congenital anomalies, and poor quality of scan. Number and type of frontal cells were recorded for 602 scans. Statistical analysis performed demographic comparisons and compared number and types of cells to evidence of disease.

Results:

Males were more likely than females to have frontal sinus disease. Patients with Type 3 and Type 4 cells were more likely to have disease. No significant ethnic related differences in disease were found using a multivariate logistic regression model. Total number of cells did not significantly affect likelihood of disease.

Conclusions:

This is one of the largest collections of data on frontal sinus cells as predictors of frontal sinus disease. These results suggest that gender and certain types of cells affect likelihood of disease. This study is the first demonstrate a lack of difference in disease in African Americans and Caucasians. These results are significant regarding gender, race, number and type of cells as predictors of disease.

Poster #044

Efficacy of calcium alginate for nasal packing after endoscopic sinus surgery

Naruo Shoji, MD, PhD
Yasuyuki Hinohira, MD, PhD
Yosiyuki Kyo, MD, PhD
So Watanabe, MD, PhD
Sei Kobayashi, MD, PhD
Yokohama
Japan

Objective:

Endoscopic sinus surgery (ESS) has been remarkably developed with new surgical techniques and equipment. Postoperative managements as well as ESS are also significant to obtain excellent outcomes. We have used calcium alginate (Sorbsan®) for nasal packing in ESS. Practical use of calcium alginate is shown, and the usefulness in postoperative managements is demonstrated.

Materials & Methods:

40 patients with chronic sinusitis were operated on using ESS techniques. In 20 patients chitin-coated gauze (Beschitin-F®) was used for postoperative nasal packing, and calcium alginate was used in the remaining 20 patients. The packing was extracted 2 days after surgery, and then nasal rinsing with saline water was performed for 4 weeks in all patients. Postoperative endoscopic evaluation including bleeding, crusting, erosion, and adhesion in the middle nasal meatus was done at 4 weeks after surgery.

Results:

Crusting, erosion, and adhesion in the middle nasal meatus of patients with calcium alginate packing were remarkably reduced, compared with those in patients with chitin-coated gauze packing.

Conclusion:

In this study, calcium alginate facilitated mucosal healing in the middle nasal meatus and was easily dissolved without crusting. Nasal packing with calcium alginate shows great usefulness in postoperative managements after ESS.

Poster #045

Endoscopic closure of inferior meatal maxillary antrostomy with intranasal mucosal flaps: Video demonstration

Sharon Gnagi, MD
Devyani Lal, MD
Phoenix, AZ
USA

Introduction:

Inferior meatal maxillary antrostomies (IMMAs) were commonly performed in the past. IMMAs can potentially be a source of poor clearance. Extended middle meatal antrostomies/mega-antrostomies have been described to improve mucociliary clearance. We describe a simple alternative technique to address problematic IMMAs.

Methods:

Case series

Results:

Two patients underwent endoscopic repair of IMMAs. Both complained of thick anterior and posterior nasal drainage and had endoscopic evidence of thick mucus draining out of the IMMA. They also had recurrent acute sinusitis attributed to poor mucociliary clearance. Both patients had previous aggressive resection of inferior turbinates. Both underwent endoscopic closure of the IMMAs and concurrent middle meatal antrostomies. The edges of the IMMA were first freshened. Next, an interposition graft using human cadaveric acellular dermis was placed. A nasal floor mucosal rotation advancement flap was sized and then placed into position. This was then secured in position using fibrin sealant. Long-term follow-up revealed nicely healed areas at the site of the prior IMMA. Patients improved in terms of the recurrence of infections and complaints of thick nasal drainage.

Conclusions:

Endoscopic closure of IMMAs can successfully be done with local intranasal mucosal flaps. While not all patients with IMMAs need closure, this technique is effective in addressing unfavorable maxillary mucus clearance, and can be used as an alternative to the mega-antrostomy technique when the maxillary sinus lining is relatively healthy and gravitational drainage is not required. This inferior turbinate preserving technique also reduces risk of empty nose syndrome.

Poster #046

Endoscopic endonasal approach to management of petroclival lesions: Case series and review of the literature

Erin Cohen, BS
Ralph Abi Hachem, MD
Zoukaa Sargi, MD, MPH
Roy Casiano, MD
Miami, FL
USA

Introduction:

Open skull base approaches have classically been used to target petroclival pathology. However, complete resection of these lesions with minimal surgical complications has posed a challenge. Here we aim to review the demographics, presentation, surgical and reconstruction technique, clinical outcomes, and oncologic safety of the endoscopic endonasal approach, an alternative treatment for benign and malignant lesions of the clivus and petrous apex.

Methods:

Through retrospective analysis, we identified patients undergoing endoscopic approaches to petroclival lesions at a tertiary care center between August 2007 and September 2014. Outcome measures included complication rate, symptom prevalence post-intervention, follow-up time, recurrence rate, and mortality. Those with lesions extending into the cervical spine were excluded.

Results:

Of the 27 patients included, 15 had benign disease, including cholesterol granuloma and pituitary adenoma, and 12 had malignant disease, most commonly clival chordoma. There were two minor and four major complications, with one mortality. No carotid injuries or cranial neuropathies occurred perioperatively. Reconstruction of the skull base defect was performed using acellular dermis as a sole graft or with a nasoseptal flap; success rate was 89% and a cerebrospinal fluid leak occurred in three cases. 75% of patients had resolution or improvement of their symptoms postoperatively. The local control rate was 92.5%, with two patients recurring locally.

Conclusion:

This study offers support for endoscopic endonasal approach as a reliable and safe treatment alternative for petroclival lesions. Further research should examine endoscopic management as compared to standard open approaches.

POSTERS

Poster #047

Endoscopic endonasal approach to pterygopalatine fossa and infratemporal fossa tumors

Yasuyuki Hinohira, MD, PhD
 Takahiro Suzuki, MD
 Yoshiyuki Kyo, MD, PhD
 So Watanabe, MD, PhD
 Tokyo
 Japan

Outcome objectives:

1) Demonstrate our novel endonasal approach for pterygopalatine fossa (PPF) and infratemporal fossa (ITF) tumors, 2) Show the successful outcome in the long-term follow-up study.

Study Design:

Retrospective study.

Methods:

This is a retrospective study in the referral center. 11 patients with benign and malignant tumors (3 pituitary adenomas, 3 inverted papillomas, 2 neurinomas, 1 encephalomeningocele, 1 juvenile angiofibroma, and 1 chordoma) in the PPF and ITF were operated on between 2009 and 2014. They consisted of 5 men and 6 women, and the age ranged 25 to 73 years old. Endoscopic transnasal resection using our novel technique described below was performed in all patients.

Results:

Total tumor resection was completed in all patients without any extranasal methods. Trans-inferior turbinate approach following submucous conchotomy, including removal of the lacrimal bone and the part of the anterior and medial wall of the maxillary sinus, to obtain wide enough surgical view and field was first done. This procedure enabled safe and accurate surgical manipulations to treat the lesion, preserving both the inferior turbinate and the nasolacrimal duct. The inferior turbinate was sacrificed to control much bleed in only one patient with juvenile angiofibroma. Craniotomy was added to another patient with encephalomeningocele because of postoperative cerebral bleeding.

Conclusion:

Our novel endoscopic endonasal approach to PPF and ITF tumors is acceptable, and may be alternative to extranasal approach including craniotomy. However, larger case series and longer follow-up study are required for conclusion.

Poster #048

Endoscopic endonasal skull base surgery; experience at a single institution

Jenna Van Beck, BS
 Holly Boyer, MD
 Emiro Caicedo-Granados, MD
 Ramachandra Tummala, MD
 Stephen Haines, MD
 Minneapolis, MN
 USA

Introduction:

Endoscopic endonasal approach (EEA) to cranial base surgery has evolved over the past two decades, becoming an established approach to skull base pathology. The purpose of this study was to increase understanding of the safety and efficacy of this approach by reporting surgical outcomes at a single institution.

Methods:

A retrospective chart review of 202 patients who underwent level II procedures (CSF leak repair, pituitary pathology treatment) between 3/2/2007 and 3/24/2015 was performed. Demographic information, presenting symptoms, previous related procedures, comorbidities, and procedural data were recorded. Outcomes regarding complications, length of stay, relief of symptoms, and recurrence were assessed.

Results:

Consecutive patients, 108 females and 94 males, ranging in age from 6 to 89 (mean 49.82) were identified. The commonest presenting symptoms were visual changes (89%) and headache (32.7%). Twenty-seven percent of patients had previous procedures related to the diagnosis. Pituitary macroadenomas (63.9%), microadenomas (8.9%), and CSF leaks (11.4%) were the most common pathologies. Average length of ICU stay was 2.1 days, with average length of hospital stay 6.9 days. Comprehensive review of all intraoperative and postoperative vascular, neural, and systemic complications, infections and delayed deficits revealed a rate of 19.8%. One postoperative death related to surgery occurred. Symptom improvement was 73.3%. Eleven percent of patients available for 6-month follow-up had recurrence of disease.

Conclusion:

Knowledge of outcomes of EEAs allows surgeons to have more informative pre-operative discussions with patients. Comprehensive analysis of complications can lead to targeted approaches to improve outcomes.

Poster #049

Endoscopic management of pneumosinus dilatans in a child:

A case report

Peter Papagiannopoulos, MD
Jill Jeffe, MD
Peter Revenaugh, MD
Pete Batra, MD
Chicago, IL
USA

Introduction:

Pneumosinus dilatans is a condition of unknown etiology that is characterized by abnormal expansion of one or more paranasal sinuses. Although a benign entity, it can present with localized symptoms, such as nasal congestion, anosmia, headache, cosmetic deformity and visual changes, and may be associated with concerning concomitant conditions, including meningioma and optic nerve tumors. This is an extremely rare disease in the pediatric population, with only 4 cases previously reported in the medical literature.

Methods:

A Case Report

Results:

We present a case of pneumosinus dilatans in an 8-year-old female who presented for a second opinion after receiving a diagnosis of fibrous dysplasia. She had a long history of amblyopia and astigmatism of her left eye, as well as progressive left frontal bossing. Previously obtained sequential CT and MR imaging over 4 years revealed progressive, unilateral, hyperpneumatization of the left frontal sinus consistent with pneumosinus dilatans. The patient underwent left endoscopic sinus surgery to open the frontal outflow tract. Flattening of the frontal bossing was evident immediately post-operatively, supporting the theory of air trapping as the pathogenesis of this disease.

Conclusion:

Pneumosinus dilatans is extremely rare in the pediatric population, but should be considered in the differential diagnosis of expansile lesions of the sinonasal tract and distinguished from disorders of bone metabolism such as fibrous dysplasia.

Poster #050

Endoscopic resection of maxillary sinus keratocystic odontogenic tumors

Jonnae Barry, MD
Alexander Chiu, MD
Eugene Chang, MD
Tucson, AZ
USA

Purpose:

Investigate outcomes for maxillary keratocystic odontogenic tumors (KCOT) using a novel endoscopic approach with application of Carnoy's solution.

Introduction:

Formerly odontogenic keratocysts, KCOTs were reclassified in 2005 due to their aggressive and locally destructive nature. These tumors arise from the dental lamina or basal cells of oral epithelium,

account for 5-15% of all odontogenic cysts, and present in the maxilla 23-40% of the time. These tumors are locally destructive and can cause significant cosmetic deformity. Recurrence rates can be as high as 60% and are highly associated with the presence of remnant KCOT epithelia. Open approaches with complete removal of tumor epithelia results in low recurrence rates. However, they incur significant morbidity including alterations in dentition, weakness of the maxilla, and significant recovery time. Case reports of total endoscopic resection of KCOTs are rare in the current literature likely due to the limited ability to remove all associated tumor epithelia. We present four patients treated successfully with endoscopic resection and epithelia ablation with topical Carnoy's solution.

Methods:

Retrospective review of four patients who underwent endoscopic resection of maxillary KCOT.

Results:

All patients had complete resolution of disease with regrowth of normal epithelia, no evidence of recurrence or sinusitis at six-month follow-up.

Conclusions:

Total endoscopic approaches allow near-complete excision of KCOT and the addition of topical Carnoy's solution ablates all residual KCOT epithelia. We report equivocal or better outcomes using this novel approach in terms of disease control, post-op surveillance, reduced morbidity and patient satisfaction.

Poster #051

Esthesioneuroblastoma and the N0 neck: Is there a role for elective neck dissection?

James Naples, MD
Belachew Tessema, MD
Seth Brown, MD
Jeffrey Spiro, MD
Farmington, CT
USA

Objective:

The rate of regional metastasis to the neck in esthesioneuroblastoma is around 18-30%. It often occurs late after initial resection. Management of the N0 neck in esthesioneuroblastoma is not established. The rate of neck metastasis is similar to oral cavity squamous cell carcinoma, where elective neck dissection is an accepted approach to the N0 neck. This suggests possible benefit from elective neck dissection in the N0 neck for esthesioneuroblastoma. Here we present a case series of 3 patients diagnosed with esthesioneuroblastoma and late metastases (>35 months) to the neck after completion of all treatment. We review management of esthesioneuroblastoma, and suggest a potential role for supraomohyoid elective neck dissection.

Methods:

A literature search using the terms "esthesioneuroblastoma," "esthesioneuroblastoma, neck metastasis," and "esthesioneuroblastoma, elective neck" was performed using PubMed database. Manuscripts discussing surgical and non-surgical management treatment options of esthesioneuroblastoma and neck metastases were reviewed.

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Results:

There is limited data on this topic, and no reports evaluated elective neck dissection. Most studies had a small sample size (<50 patients). Two studies suggest benefit from elective neck treatment with radiation, while one suggests no benefit. There is no consensus to management of the N0 neck in esthesioneuroblastoma.

Conclusions:

Neck metastasis in esthesioneuroblastoma occurs at a rate of 18-30%. This parallels oral cavity cancer for which elective neck dissection is an accepted therapy. Our case series of patients with neck metastases suggests a potential role for supraomohyoid elective neck dissection in the N0 neck. Studies to evaluate this should be undertaken.

Poster #052

Eustachian tube lipoma: A case report and review of literature

John Frederick, MD
Alex Yoon, BS
Jeffrey Suh, MD
Los Angeles, CA
USA

Introduction:

We report a case of a solitary lipoma originating from within the cartilaginous Eustachian tube (ET) causing recurrent otitis media, aural fullness, and a persistent middle ear effusion.

Methods:

A systematic review of the published literature on ET lipomas was performed followed by report and discussion of a case.

Results:

We report the case of an 82 year-old female who suffered from recurrent right aural fullness and effusions for several years. Magnetic resonance imaging incidentally revealed a 2.5cm mass in the ET and nasopharynx. Nasal endoscopy the mass demonstrated a soft tissue mass emanating from the ET orifice. The patient was taken to the operating room where the mass was found to be pedicled from within the cartilaginous portion of the ET. Pathology demonstrated lipoma. The patient recovered well from the operation and has had resolution of the middle ear effusion without any persistent ET dysfunction or scarring at 6 months.

Conclusion:

Lipomas within the ET are rare entities that can be safely removed with endoscopic techniques. Although rare, ET lipomas should be included in the differential diagnosis of lesions causing ET dysfunction and unilateral effusions. Complete surgical resection results in symptom resolution, without significant long-term morbidity.

Poster #053

Evaluation of sheep sinonasal endoscopic anatomy as a model for rhinologic research

Luis Macias-Valle, MD
Andres Finkelstein-Kulka, MD
Christopher Okpaleke, MPH
Amin Javer, MD, FRCSC
Vancouver, BC
Canada

Background:

There is a constant search for adequate animal models in functional endoscopic sinus surgery (FESS) research. Despite many publications describing sheep models for FESS procedures, accurate endoscopic anatomical studies are lacking. Furthermore, there are no publications correlating computed tomography (CT) and 3D models with endoscopic anatomical descriptions. This study aims to evaluate and accurately describe the endoscopic anatomy of a live sheep model.

Methods:

10 live adult sheep were included in the study for a total of 20 sides. Two Cadaveric specimens for 3D reconstruction correlation were included and imaged using thin slice (1mm) CT. Description and measurement of different anatomical structures was performed using endoscopic visualization. Measurement of the same structures was also carried out using the 3D imaging model.

Results:

Numerous structures were observed and measured during the cadaveric and live model dissection. Three sets of turbinates were identified at 2.3, 5.1 and 8.5 cm (SD 0.4, 0.8, 1.1). Frontal recess and uncinat process were identified at 12.7 cm (SD 1.3). A natural septal perforation was encountered at 10.5cm (SD 1.8). The sphenopalatine foramen was measured at 12.1 cm. All anatomical measurements were correlated with the measurements on the CT scan 3D volume-rendering model, thereby allowing for an accurate description of the sheep sinonasal anatomy.

Conclusions:

This study describes the endoscopic sinonasal anatomical measurements of the adult sheep. It is the first study to evaluate the sheep CT and endoscopic anatomy in order to determine its feasibility as an animal model for research in FESS.

Poster #054

Filaggrin in nose

Masato Miwa, MD, PhD
Mayumi Miwa, MD, PhD
Kimihiro Okubo, MD, PhD
Ko Okumura, MD, PhD
Bunkyo, Tokyo
Japan

Aim:

Filaggrin (FLG) has been known as a natural moisturizing factor and barrier related protein. Mutation in the human FLG gene has been reported to be the most significant risk factor for atopic dermatitis (AD). This finding has brought a breakthrough in the thinking about AD as a barrier disorder disease. In contrast, FLG in nose has not been studied at all. In this study, we attempted to evaluate FLG expression in human nasal mucosa after various stimulations; lipopolysaccharide, poly I: C and TNFa.

Methods:

Human nasal epithelial cells were purchased from PromoCell GmbH (Heidelberg, Germany). The cell suspension of nasal epithelial cells was placed on a concanavalin A (Sigma)-coated cover slip. FLG expression was confirmed by real-time RT-PCR.

Results:

After stimulation of lipopolysaccharide and poly I: C respectively, FLG expression was diminished. On the other hand, TNFa increases FLG expression in primary cultured cells.

Conclusion:

We investigated the effect of TLR-3 and -4 signaling on the expression of FLG. Under Th2 dominated circumstances, FLG expression has been reported to down regulate in vitro. Taken together recent reports and our original results, FLG might be a key molecule connecting innate immunity with acquired immunity in the upper airway. Further study would be expected to fix the epithelial barrier to treat and prevent AR as a barrier disorder.

Poster #055

Histopathological evaluation of nasal polyposis with asthma

Ping Ye, PhD
Qiang Zhang, MD
Li Shi, MD
Zhong Li, MD
Lan Cai, MD
Bing Zhou, MD
Beijing
China

Introduction:

To delineate the histopathological characteristics of nasal mucosa in chronic rhinosinusitis with nasal polyps (CRSwNP) with asthma and without asthma in order to demonstrate subtypes of nasal polyps and their potential relation with lower airway comorbidity.

Study design:

Clinical and pathological-based cross-sectional study.

Methods:

Nasal polyp specimens were prospectively collected from patients

with CRSwNP both with asthma (16, 28.07%) and without asthma (41, 71.93%) referred to our institution for endoscopic sinus surgery. Oral and topical steroids were stopped 1 month before surgery. The pathological analysis was conducted by 2 independent pathologists with light microscopy on Hematoxymin-Eosin-Saffron stained slides. Each observer fulfilled a standardized protocol with cell count and stromal characterization on the most representative field. Mean grading scores were established. Morphological aspects were compared with the cell distribution and the clinical conditions.

Results:

There was no difference between the asthma and nonasthma groups in terms of goblet cell hyperplasia, squamous metaplasia, stromal edema, or interstitial fibrosis, and hyperplasia. But distinctions were found regarding eosinophilic in mucosa and peripheral blood eosinophils.

Conclusions:

CRSwNP with asthma and without asthma exhibit some similar histopathological features. Eosinophils both in mucosa and in peripheral blood may have an important role in CRSwNP histopathology. Further histologic evaluation is warranted to evaluate for possible subtype treatment targets or prognostic marker.

Key Words:

sinonasal polyposis; nasal polyps; nasal polyposis; sinusitis; nasal mucosa; asthma; histology; pathology

Poster #056

Hospital cost and management of pediatric patients with complicated acute sinusitis

Reema Padia, MD
Andrew Thomas, MD
Jeremiah Alt, MD, PhD
Craig Gale, MS
Jeremy Meier, MD
Salt Lake City, UT
USA

Objective:

Review management and costs for pediatric patients with complicated acute sinusitis.

Methods:

A case series was retrospectively reviewed at a pediatric hospital to assess management by chart review and hospital costs (not charges) using a standardized activity-based accounting system for inpatient treatment. Children less than 18 years of age who were admitted for complicated acute sinusitis between November 2010 and December 2014 were included in the study. Demographics, length of stay, type of complication and cost of care were determined for these patients.

Results:

The study included 64 patients with a mean age of 10 years (SD 5). Orbital cellulitis (orbital/preseptal/postseptal cellulitis) accounted for 31% of patients, orbital abscesses (subperiosteal, intraorbital abscesses) accounted for 26%, frontal bone osteomyelitis for 8%, intracranial complications (epidural/subdural abscess and cavernous sinus thrombosis) for 30% and other (including facial

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abscess and dacryocystitis) for 5%. The average length of stay was 5.7 days (SD 5.1). The mean cost per patient was \$20,748 (range \$218-116,925). Inpatient floor costs (31% of total cost) were the greatest expenditures and operating room costs (18%) were the second greatest. The major drivers in variation of cost between patients included pediatric intensive care unit stays (\$2074-47,219) and pharmacy costs (\$180-17,933).

Conclusion:

Although there is a wide variation in costs of pediatric complicated acute sinusitis, this study shows that there is a significant financial impact on the healthcare system. Understanding sources of costs will help identify potential strategies to improve value of care.

Poster #057

Hypoxia-induced ROS increases Hmgb1/il-8 secretion in human nasal epithelia

Chang-Hoon Kim, MD, PhD
Hyun Jin Min, MD, PhD
Joo-Heon Yoon, MD, PhD
Seoul
Korea

Background:

The nuclear high mobility group box 1 (HMGB1) can be secreted into the extracellular space where this protein often mediates proinflammatory signaling.

Objective:

The aim of the present study was to investigate the role of HMGB1 in upper airway epithelial cells under hypoxic conditions.

Methods:

We cultured primary normal human nasal epithelial cells (NHNE) under hypoxic conditions and evaluated the extracellular secretion of HMGB1. We then investigated the proinflammatory role of HMGB1 under hypoxic conditions. Furthermore, we harvested human nasal mucosa samples and nasal lavage fluids from patients conditioned under hypoxic and non-hypoxic conditions and compared the expression of HMGB1 in human nasal mucosa samples by immunohistochemistry and the levels of HMGB1 in lavage fluids using ELISA.

Results:

Hypoxia induced translocation of HMGB1 into the extracellular space in NHNE cells. The secretion of HMGB1 was dependent upon reactive oxygen species (ROS) and secreted HMGB1 was involved in the upregulation of IL-8 in NHNE cells under hypoxic conditions. HMGB1 in nasal lavage fluids was also increased in hypoxia-conditioned patients compared to controls.

Conclusion:

Therefore, we suggest that HMGB1 plays a role in the pathogenesis of hypoxia-mediated inflammation in upper airway epithelium.

Poster #058

Impact of urinary tract infections following pituitary surgery

Eleonora Spinazzi, BS
Christina Fang, MD
Milap Raikundalia, BS
Sam Schild, BS
Soly Baredes, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Introduction:

To define the relationship between urinary tract infection (UTI) and patient demographics, postoperative complications, hospital charges, length of stay and mortality in patients following pituitary surgery.

Methods:

The National Inpatient Sample database was evaluated for patients who underwent pituitary surgery from 2002-2010. Patient demographics, comorbidities, length of stay, hospital charges, and postoperative complications were analyzed.

Results:

A total of 15,317 patients who underwent pituitary surgery were identified. UTI was diagnosed in 316 (2.1%) patients. Patients with a UTI were more likely female and older, with a mean age of 56.0 ± 19.5 (P<0.001). Patients who underwent a transfrontal approach were more likely to have a UTI (P<0.001). Development of a UTI was seen in a significantly higher frequency in patients with preexisting anemia, coagulopathy, congestive heart failure, fluid and electrolyte disorder, renal failure, paralysis, diabetes mellitus, and weight loss. Patients with a UTI diagnosis had higher hospitalization charges and longer length of stay than patients without a UTI (P<0.001).

Conclusion: UTIs are uncommon in patients undergoing pituitary surgery but are associated with older age, female gender, transfrontal approach, and multiple comorbidities. Patients who developed postoperative UTI after pituitary surgery had longer hospital stay and higher total hospital charges.

Poster #059

In-office placement of steroid-releasing bioabsorbable sinus implants: 3-month outcomes from a prospective case series

Keith Matheny, MD
Kenny Carter, Jr, MD
Ewen Tseng, MD
Karen Fong, MD
Frisco, TX
USA

Introduction:

In-office placement of steroid-releasing bioabsorbable implants after achieving hemostasis following endoscopic sinus surgery (ESS) has previously been shown safe, feasible and well-tolerated with a significant reduction in SNOT-20 and inflammation scores at 4 weeks. To assess whether these favorable effects are sustained after implant degradation, patient-reported and endoscopic outcomes were evaluated at 12 weeks after ESS.

Methods:

Twenty patients with chronic rhinosinusitis (CRS) underwent ESS including bilateral total ethmoidectomy followed by in-office placement of implants in each ethmoid cavity within 7 days. Patient-reported outcomes were assessed using SNOT-20 before ESS and again at week 2, 4 and 12 post-ESS. Endoscopic measures were assessed by an independent blinded surgeon based on video-endoscopy review.

Results:

At 12 weeks, mean total SNOT-20 score was significantly ($p < 0.001$) reduced to 4.7 (S.D. 4.8) from 42.8 (17.8) at baseline pre-ESS, resulting in a treatment effect size of 2.13. The mean ethmoid sinus inflammation score was significantly ($p = 0.002$) reduced to 16.5 (7.8) from 25.6 (8.6) at baseline. The mean crusting/coagulum score of 7.8 (11.5) was significantly ($p < 0.001$) reduced compared to 24.6 (17.0) at week 4, 35.5 (16.2) at week 2 and 27.5 (11.8) at baseline. Middle turbinate lateralization and grade 2 polyps occurred in 5% of sinuses. There were no dense or severe adhesions.

Conclusion:

The significant improvement in patient-reported and endoscopic outcomes at 12 weeks suggests sustained therapeutic effect of steroid-releasing implants for a time period long beyond the implant's biodegradation.

Poster #060

Intra-operative and postoperative considerations in endoscopic resection of infratemporal and pterygopalatine fossa lesions

Saba Ghorab, MD
Devyani Lal, MD
Karel DeLeeuw, MD
Phoenix, AZ
USA

Introduction:

Endoscopic approaches are increasingly utilized for infratemporal fossa (ITF) and pterygopalatine fossa (PPF) lesions. Though case reports and small series describe use of endoscopic approaches for specific ITF and PPF lesions, there is no large series encompassing endoscopic resection of multiple pathologies of the ITF and PPF. We therefore reviewed our institutional experience of such surgical cases for complications and post-operative sequelae.

Methods:

A retrospective chart review was performed to identify endoscopic or endoscopic-assisted resection of ITF and/or PPF lesions from 2010 to 2014. Patients' diagnoses, surgical procedures, and postoperative courses were evaluated for results and complications. A PubMed literature review was also performed.

Results:

Twenty patients underwent endoscopic or endoscopic-assisted resection of ITF and/or PPF lesions in the study period. Pre-operative diagnoses included invasive fungal sinusitis (IFS), complicated bacterial sinusitis, and tumors. Successful execution of planned resection was performed in all. No intra-operative major vascular injury or death was noted. Transient bradycardic episodes were noted during a foramen ovale-based schwannoma resection, which likely arose from the lesser petrosal nerve. Postoperative complications/sequelae included infraorbital numbness, transient/partial dental/lip/palatal numbness, ETD, trismus, transient crossbite from inflamed masticator muscles, and long-term pain. No xerophthalmia was reported. Post-operatively, two patients died from strokes due to intracranial IFS.

Conclusion:

As utilization of expanded endoscopic approaches to ITF and PPF lesions increase, it is important to become familiar with complications/sequelae from accidental or intentional resection of neurovascular, muscular and structural contents. We present the first series of 20 patients with long-term follow-up.

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Poster #061

Key anatomical landmarks in endoscopic orbital surgery: A cadaver study

Susan Edionwe, MD
 Marc Tewfik, MD
 Montreal, Quebec
 Canada

Introduction:

Endoscopic orbital surgery (EOS) is a relatively recent development in skull base surgery, enabled by advances in endoscopic technique and instrumentation. To this regard, it is important to characterize safe maneuvers in EOS. This anatomic study describes key landmarks in endoscopic orbital approaches for extraconal and intraconal dissection.

Methods:

This is a descriptive cadaver study. Three, formalin-fixed cadavers (n = 6 orbits) were dissected; EOS maneuvers and orbital landmarks were described. Each orbit was dissected in the following manner: maxillary antrostomy and total sphenoidectomy for skeletonization of the lamina papyracea, complete laminectomy, removal of periorbita, dissection of extraconal fat and exposure of medial rectus muscle (MRM). Medial retraction and careful dissection of intraconal fat between MRM and inferior rectus muscle (IRM) until optic nerve (ON) was exposed.

Results:

No gross anatomical variants were identified. The MRM is the first, easiest identified orbital structure; this separates intraconal and extraconal fat. Once skeletonized, the location of the IRM is easily identified. Inferomedial orbital dissection can be performed between these muscles without encountering significant structures including the ON. Oculomotor nerve branches were not encountered in these cadaveric dissections.

Conclusions:

This study asserts that the MRM should be considered the key landmark to endoscopic orbital dissection as it is the first structure identified and subsequently guides careful intraorbital dissection. Only the inferomedial quadrant of the orbit is amendable to EOS.

Poster #062

Lymphoma of the nasal cavity and paranasal sinuses: A case series and literature review

Toby Steele, MD
 Maria Buniel, MD
 Jess Mace, MPH
 Lane Squires, MD
 Timothy Smith, MD
 Sacramento, CA
 USA

Introduction:

Lymphomas of the sinonasal tract are a rare and heterogeneous subset of solid malignancies of the lymphoreticular system. The purpose of this case series was to characterize presenting symptoms, treatment modalities, and outcomes for patients with sinonasal lymphoma.

Methods:

Retrospective patient data was collected from an academic oncologic center and entered into a repository designed to capture outcomes for sinonasal malignancies. Patient demographics, presenting symptoms, imaging findings, treatment modalities, and health status were extrapolated and retrospectively evaluated for patients with sinonasal lymphoma using Kaplan-Meier estimations.

Results:

Eighteen sinonasal lymphoma patients with a mean follow up of 50 months were identified. Histologic diagnosis included diffuse large B-cell lymphoma (n=9), NK/T-cell lymphoma (n=5), follicular lymphoma (n=1), T-cell lymphoma (n=1), and lymphoma NOS (n=2). The most frequent presenting symptoms were nasal obstruction (78%), facial pain (72%), facial swelling (50%), and nasal discharge (44%). Treatment prior to lymphoma diagnosis included antibiotics (83%), oral steroids (22%), decongestants (22%), and topical steroids (11%). Treatment regimens following diagnosis included both chemotherapy (94%) and chemoradiotherapy (56%). Survival rates by lymphoma subtype were 56% for B-Cell lymphoma and 40% for NK/T-cell lymphoma. Overall 2-year survival was 67% and 5-year survival 50%. The combination of chemotherapy and radiation resulted in significantly higher survival (p<0.001) than chemotherapy alone.

Conclusions:

Sinonasal lymphomas are characterized by meager survival rates that differ by histopathologic subtype. The diagnosis of sinonasal lymphoma is challenging as symptoms frequently parallel those of chronic rhinosinusitis. Increased awareness of these rare malignancies may improve detection and more timely treatment.

Poster #063

Man's best friend, rhinologist's worst enemy: Canine staphylococcus pseudintermedius sinonasal infection in human hosts

Edward Kuan, MD
Karam Badran, MD
Alexander Yoon, BS
Jeffrey Suh, MD
Los Angeles, CA
USA

Introduction:

Staphylococcus pseudintermedius is a gram positive bacterium commonly found as part of the normal skin and nasal flora of healthy dogs. It may act as an opportunistic pathogen in dogs, but has also been shown to colonize the nasal mucosa of humans. We report three cases of chronic rhinosinusitis (CRS) refractory to aggressive medical management with cultures growing back *S. pseudintermedius*, with clinical improvement only after initiating culture-directed therapy.

Methods:

Retrospective review of three patients with CRS treated at a tertiary academic medical center with sinonasal cultures growing *S. pseudintermedius*.

Results:

All three patients are dog owners and had clinical diagnoses of CRS without polyposis. Each patient had a diagnosis related to immune dysfunction (sarcoidosis, Crohn's disease, and history of lymphoma, respectively). After undergoing endoscopic sinus surgery, each patient was treated with aggressive medical therapy but continued to have purulent nasal discharge. Sinonasal cultures repeatedly grew back *S. pseudintermedius* in all cases, with two patients' dogs also having had concurrent *S. pseudintermedius* wound infections of the ear and leg. Treatment with culture-directed therapy resolved the infections in all cases.

Conclusions:

Opportunistic pathogens have a propensity to exacerbate infection in CRS patients with immune dysfunction. We report the first case series of sinonasal *S. pseudintermedius* infection in humans. Though a rare cause of disease, pathogens from non-human hosts such as *S. pseudintermedius* should be considered in the management of CRS patients refractory to medical therapy.

Poster #064

Maximizing the reach of the vascularized pedicled nasoseptal flap: A cadaveric study with clinical correlates

Jean Anderson Eloy, MD
Alejandro Vazquez, MD
Oliver Chin, BA
Stuti Desai, BA
Leila Mady, MD, PHD, MPH
James Liu, MD
Newark, NJ
USA

Introduction:

Over the past few years, the vascularized pedicled nasoseptal flap (PNSF) has emerged as the workhorse for reconstruction of ventral skull base defects after endoscopic skull base surgery. In this cadaveric study, we use photo and video documentation to demonstrate the surgical techniques for harvesting of the PNSF and provide pearls to maximize its reach for site-specific defects of various sizes. Clinical examples of these different variations are discussed.

Methods:

An anatomic study via cadaveric dissection and photo and video documentation is used to demonstrate different variations in PNSF designs and positioning. Six key surgical maneuvers are identified to maximize the PNSF reach.

Results:

Using cadaveric photo and video documentation, the surgical techniques and steps required to harvest the different variations of the PNSF are demonstrated. These surgical maneuvers include: 1) maximally placed anterior incision at the columella; 2) laterally placed incision under the inferior turbinate to include the hard palate mucoperiosteum or over the inferior turbinate to include the inferior turbinate mucoperiosteum; 3) choanal releasing incision for flap rotation; 4) relaxing transverse incision at the level of the pedicle for anterior elongation; 5) resection of the sphenoid rostrum and sinus septi; and 6) initial lateral placement of the flap pedicle in select defects.

Conclusions:

Each of these 6 key maneuvers can be tailored for specific ventral skull base defects to achieve adequate skull base repair. These maneuvers can be included in the endoscopic skull base surgeon armamentarium when faced with difficult skull base defects.

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Poster #065

Metastatic mammary carcinoma to the orbit masquerading as maxillary sinusitis: A case report

Rami Abo-Shasha, MD
 Camilla Stepniak, BSc
 David Yeh, MD
 Brian Rotenberg, MD MPH
 London, ON
 Canada

Introduction:

Metastatic disease to the eye is exceedingly rare. Mammary carcinoma is the leading cause of orbital metastases, targeting orbital fat and muscle. Ocular metastasis has been reported to present with visual signs and symptoms. We describe a unique case of orbital metastases presenting as maxillary sinusitis.

Methods:

Retrospective analysis of clinical visits, imaging studies, serology and pathological reports.

Results:

A 44-year-old female with a history of breast carcinoma of the right breast presented to her family physician with severe right sided maxillary pain. The patient was diagnosed with maxillary sinusitis and was prescribed antibiotics. However, this failed to alleviate her symptoms. The patient developed ocular pain in the right eye associated with progressive non-fluctuating binocular horizontal diplopia and blurred vision. Clinical examination of the right eye revealed extropia and a complete adduction deficit. MRI of the head with contrast showed abnormal thickening and signal changes of the medial rectus muscle. Image guided transnasal endoscopic biopsy through the ethmoid sinus revealed a thickened and abnormal appearing right medial rectus muscle. Intraoperative frozen section consultation revealed skeletal muscle with infiltrative cells favoring malignancy. The final pathology demonstrated metastatic mammary carcinoma.

Conclusion:

This report demonstrates maxillary sinus pain as the initial symptom of orbital metastases, a primary complaint not previously reported in the literature. Metastatic disease to the orbit could be considered in the differential diagnosis of refractory maxillary sinus pain in patients with a known underlying malignancy. An endoscopic transnasal transorbital approach is valuable in assessing the disease.

Poster #066

Nasal chondromesenchymal hamartoma, a case report and review of the literature

Daniel Schaerer, MD
 Adam DeConde, MD
 Javan Nation, MD
 Levy Mike, MD, PhD
 San Diego, CA
 USA

Introduction:

Nasal chondromesenchymal hamartoma is a rare benign neoplasm associated with pediatric patients under the age of 12 months. To date, only case reports and small case series are available to guide diagnosis and management. This study seeks to provide a comprehensive review of the literature on this rare tumor and present an additional case.

Methods:

A literature review of the MEDLINE database (1950 to May 29, 2015) was performed to identify all cases of nasal chondromesenchymal hamartoma. In addition, a novel case is presented.

Results:

A total of 45 prior reported cases were identified in the literature for a total of 46 cases ever described. Mean age of presentation was 124 months (range of 0-828 months) of age. Most common presenting symptoms were nasal obstruction and visible mass however visual impairment, epistaxis, facial swelling, pain and loose teeth were reported. Treatment included surgical resection via both external and endoscopic approaches as well as chemotherapy and radiation. Of the 29 cases that reported patient follow-up, 8 episodes of recurrence were reported (27.6%) at a mean time of 16.4 months postoperatively.

Conclusion:

Nasal chondromesenchymal hamartoma is an extremely rare benign tumor with a high recurrence rate sometimes years after treatment. Careful long-term follow-up is warranted with this rare benign tumor.

Poster #067

New instrumentation in endoscopic medial orbital decompression

Rohit Garg, MD
Rickul Varshney, MD
David Keschner, MD
Jivianne Lee, MD
Kenneth Krantz, MD
Anaheim, CA
USA

Introduction:

Endoscopic medial orbital decompression is a first line surgical procedure in addressing cosmetic and functional deficits of thyroid eye disease and other causes of compressive optic neuropathy. Current instrumentation for periorbital incisions often utilizes bulky instrumentation or makeshift alterations of current endoscopic sinus surgery instruments. These instruments are sometimes unsafe, inadequately sharp, or ineffective in making appropriate periorbital incisions.

Objective:

We introduce new instrumentation that facilitates in endoscopic medial orbital decompression.

Methods:

We retrospectively reviewed the operative technique and surgical outcomes of 21 orbits from 14 patients who underwent endoscopic medial orbital decompression using the instrumentation from the Smith and Nephew ECTRA II Carpal Ligament System.

Results:

All 14 patients (21 orbits) attained satisfactory cosmetic and functional results using this instrumentation in this novel technique. No complications were encountered using the new instrumentation.

Conclusion:

The Smith and Nephew ECTRA II Carpal Ligament System provides instrumentation that is safe, innovative, and effective in endoscopic medial orbital decompression.

Poster #068

NF2 presenting as multiple primary sinus and cranial neoplasms in the absence of vestibular schwannomas

Erynne Faucett, MD
Brandon Larsen, MD, PhD
Michael Lemole, Jr, MD
Alexander Chiu, MD
Eugene Chang, MD
Tucson, AZ
USA

Introduction:

Neurofibromatosis type 2 (NF2) is a multiple neoplasia syndrome predisposing patients to tumors of the central and peripheral nervous systems. The hallmark of NF2 is the development of bilateral vestibular schwannomas (VS). Other NF2 associated tumors include non-vestibular schwannomas, meningiomas, and ependymomas. We recently evaluated a patient with three different tumors including anaplastic astrocytoma, meningioma, and sinonasal schwannoma, but without VS.

Methods:

Case report and review of literature.

Results:

A 49-year-old female presented to the emergency department with seizures. MRI and CT evaluation demonstrated: 1) an infiltrative parietal mass with biopsy proven anaplastic astrocytoma (WHO grade III), 2) soft tissue mass within the right ethmoid sinus with expansion into the orbital cavity, cribriform plate, and anterior cranial fossa, 3) extra-axial lesion consistent with meningioma, and 4) no evidence of VS. The patient underwent complete excision of the sinonasal-cranial mass revealing schwannoma with mosaic loss of IN1 expression, a pattern strongly associated with either NF2 or schwannomatosis. Given the presence of three different primary sinonasal cranial tumors and absence of schwannomas elsewhere, a putative diagnosis of NF2 was made, despite the absence of VS. Genetic pedigree analysis suggested sporadic NF2 and genotype screening was offered to the patient but denied.

Conclusion:

Our patient presented with an unusual sinonasal schwannoma, with only five cases presented in the literature. Moreover, she also presented with two other primary cranial neoplasms suggesting the presence of NF2 or NF2-like syndrome in the absence of VS. The genetic mechanism of tumorigenesis in this case remains unknown.

Poster #069

Obstructive frontal cells unaddressed during sinus surgery causing postoperative refractory frontal symptomatology

Thomas Higgins, MD, MSPH
Louisville, KY
USA

Introduction:

Obstructive frontal cells are known anatomic variants that can contribute to chronic frontal sinusitis. Endoscopic removal of these cells can be technically quite difficult.

Methods:

A retrospective review of patients presenting to a tertiary rhinology practice was conducted of revision frontal sinus surgeries performed for unaddressed Kuhn-type frontal cells seen on CT imaging of the sinuses and refractory chronic sinonasal symptoms. Nasal endoscopy scores were performed utilizing video endoscopy. Symptom score analyses were performed of SNOT-22 scores preoperatively and at 3 weeks and 3 months postoperatively. Lund-Mackay CT scores were evaluated at baseline.

Results:

The review identified 14 subjects and 21 frontal sinuses who met criteria for inclusion. The baseline frontal sinus findings included complete opacification in 3 frontal sinuses, partial opacification in 5 frontal sinuses, and mucosal thickening in 13 frontal sinuses. Type 3 frontal cells were the most common type. Surgical intervention included Draff 2B frontal sinusotomies in 14, modified Lothrop procedures in 3, and other endoscopic frontal sinusotomies in 4. SNOT-22 scores showed statistically significant improvement at 3 weeks and 3 months ($P < 0.001$). Subgroup analysis showed statistically significant improvement in facial pain/pressure ($P < 0.001$).

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Conclusions:

Obstructive frontal cells that are unaddressed in sinus surgery may lead to refractory symptoms, particularly facial pressure/pain of the area of the forehead. Surgically intervention is technically challenging but can successfully be performed endoscopically.

Poster #070

Olfactory outcome after endoscopic hemi-anterior skull base resection

Mohammad Al-Bar, MD
Ralph Abi Hachem, MD
Zoukaa Sargi, MD
Roy Casiano, MD
Miami, FL
USA

Objective:

Review the outcome of patients undergoing hemi-anterior skull resection and reconstruction with preservation of one olfactory apparatus.

Methods:

Retrospective chart review of all patients treated for skull base tumors undergoing endoscopic HASB and reconstruction at University of Miami.

Results:

17 patients were treated (2008-2015), with endoscopic HASB and reconstruction. Follow-up ranged from 4 to 42 months. Smell identification test with University of Pennsylvania Smell Identification Test (UPSIT) was available for 9 patients postoperatively, of which 5 received and completed radiation therapy prior to smell identification test. All nine patients had either severe hyposmia or total anosmia with a UPSIT score ranging from 9 to 21. Two of seventeen patients had recurrent disease, one of which had local recurrence. Reconstruction was performed utilizing a single layer acellular dermis graft in all patients and one patient had a nasoseptal flap in addition to the acellular dermis for the primary reconstruction of the skull base defect. One post-operative CSF leak, requiring revision surgery was noted in our series. Lumbar drain was not systematically used.

Conclusions:

With the limitation of low patient number and lack of long term follow-up on some patients, a hemi-anterior skull base resection appears to be a good option in carefully selected skull base malignancies. Despite preservation of one olfactory apparatus, residual olfaction function as measured by UPSIT seems to be poor in those cases.

Poster #071

Oral flora causes orbital complications of sinusitis

Christopher Brook, MD
Juliette Flam, BS
Rachel Sobel, MD
Michael Platt, MD. MS
Boston, MA
USA

Purpose:

To determine the microbiological profile of orbital complications of sinusitis in children and adults.

Methods:

A retrospective case series of patients admitted to a tertiary care hospital from January 2000 to December 2014 with orbital complications from sinusitis who had surgical cultures obtained.

Results:

Sixteen patients underwent surgical drainage of an orbital infection associated with sinusitis and had cultures obtained. Nine patients (56%) grew organisms that exist in oral flora whereas seven patients (44%) grew common respiratory pathogens. The most common organisms recovered were Viridans group streptococcus (VGS) (50%), Staphylococcus aureus (31%), Eikenella corrodens (25%), and Prevotella spp. (19%). VGS cultures were polymicrobial with a microaerophilic or anaerobic organism in seven of eight patients (88%) as opposed to the respiratory pathogens which were less frequently polymicrobial (44%) ($p = 0.02$).

Conclusions:

There are two main sources for infectious orbital complications from sinusitis: respiratory pathogens and oral flora. The high prevalence of polymicrobial infections involving oral flora supports a suspected synergy between VGS and other oral organisms. It is unknown if poor oral hygiene is a risk factor for these infections.

Poster #072

Otologic complications from large-volume sinonasal irrigation: A case series

Rachel Cain, MD
David Barrs, MD
Alpen Patel, MD
Devyani Lal, MD
Phoenix, AZ
USA

Background:

Large-volume sinonasal irrigation is a commonly employed therapy for rhinosinusitis. Although patients may report ear-related complaints, actual otologic complications from large-volume sinonasal irrigations are not well described. We previously presented a case of infected cochlear implant, and a cadaver-based study on influx of sinonasal irrigation fluid into the middle ear. We now present an updated case series.

Methods:

Case series

Results:

Three patients suffered otologic complications with use of large-

volume sinonasal irrigation. Two patients endorsed using aggressive digital pressure on the irrigant bottle. Case 1: A 29-year-old male with chronic rhinosinusitis developed acute otitis media, noting unilateral otalgia and hearing loss after performing large-volume sinonasal irrigation following endoscopic sinus surgery. Case 2: A 26-year-old male with a history of neuroendocrine carcinoma status post resection complained of unilateral otalgia and hearing loss while performing large-volume sinonasal irrigation. A Type B tympanogram was noted. Case 3: A 71-year-old man presented with fever and induration at his cochlear implant site 2 weeks after starting large volume sinonasal irrigation following endoscopic sinus surgery. He was found to have acute otitis media with mastoiditis and a large abscess near the cochlear implant.

Conclusions:

Though generally well tolerated, large-volume sinonasal irrigation can be associated with otologic complications. These should be documented in the literature for use by otolaryngologists and rhinologists. Furthermore, special consideration should be given prior to use in patients with cochlear or middle ear implants. Patients should also be counseled about potential otologic complications and use of gentle digital pressure with squeeze bottles.

Poster #074

Pediatric Burkitt lymphoma of the sphenoid sinus presenting as orbital cellulitis

Justin McCormick, MD
Jeb Justice, MD
Mobile, AL
USA

Purpose:

To present a case of a rare sinonasal and skull base malignancy.

Case Report:

A previously healthy, full term, 2-year-old male presented with a 3-day history of right eye pain and swelling. His vaccinations were up to date. Exam revealed significant right periorbital edema, eyelid ptosis, ophthalmoplegia with cranial nerve III and VI palsies, and exophthalmos. His pupil was reactive and intraocular pressure was normal. Labs were unremarkable.

CT and MRI showed a central skull base lesion arising from the sphenoid sinus with erosion of the lateral pterygoid plates and extension into the posterior ethmoids, pterygopalatine fossa, orbital apex, and right cavernous sinus.

Biopsy was performed via endoscopic approach from the right ethmoid and sphenoid sinus. Frozen section analysis was consistent with a small round blue cell tumor consisting of medium sized atypical lymphoid cells.

Immunostaining showed positive staining for CD20, PAX5, Ki-67, variable staining for BCL6, and negative staining for BCL2, Tdt, and CD3, all consistent with the diagnosis of Burkitt's lymphoma.

Bone marrow biopsy and CSF analysis were both negative for tumor. The patient recently finished an aggressive regimen of induction chemotherapy and is doing well.

Discussion:

The sporadic form of Burkitt's lymphoma typically presents in the pediatric population as an abdominal mass, and only one other case report exists in the Otolaryngology literature of pediatric sphenoid sinus Burkitt's lymphoma.

Conclusion:

Primary Burkitt's lymphoma of the sphenoid sinus is rare, and prompt recognition and diagnosis are paramount. Case report and full literature review are provided.

Poster #075

Pituitary carcinoma with cervical metastasis: Report of a case

Frederick Yoo, MD
Edward Kuan, MD
Anthony Heaney, MD
Marvin Bergsneider, MD
Marilene Wang, MD
Los Angeles, CA
USA

Introduction:

Pituitary carcinoma is a rare entity and accounts for approximately 0.1% of all pituitary neoplasms. Diagnosis is made when a non-contiguous pituitary tumor is identified at a distant site from the sellar region. Early diagnosis of pituitary carcinoma is difficult, and due to its rarity, no guidelines for management exist. We present a case of pituitary carcinoma with delayed cervical metastases.

Methods:

Retrospective review of the medical records of a patient diagnosed with pituitary carcinoma at a tertiary academic medical center.

Results:

A 43-year-old male with a history of diabetes mellitus and obesity presented with right ophthalmoplegia and ptosis, with Cushingoid features. He was found to have elevated ACTH and cortisol levels; imaging showed a 4.5 cm locally invasive sellar mass. He underwent transnasal, transsphenoidal resection of the sellar mass, with pathology demonstrating invasive Crooke's cell adenoma. After surgery, ACTH and cortisol levels remained elevated, and he was treated with additional radiotherapy to the sella. Four years later, his Cushing's disease worsened despite medical management. MR imaging of the pituitary and neck revealed a 2.8 cm necrotic left level II neck mass. FNA showed metastatic neuroendocrine tumor. He underwent a left neck dissection and 9/27 nodes were positive for metastatic pituitary carcinoma. Postoperatively, ACTH/cortisol remained elevated, and he subsequently underwent bilateral adrenalectomy with exogenous steroid replacement therapy.

Conclusions:

The hallmark of pituitary carcinoma is metastasis from the primary site, often with delayed presentation. Histopathological findings of an invasive Crooke's cell adenoma may indicate potential to develop into pituitary carcinoma.

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Poster #076

Placement of a steroid-releasing implant in maxillary and frontal sinus ostia: 3-month results of a prospective, multicenter, open label trial

William Brown, MD
Boris Karanfilov, MD
Miami, FL
USA

Introduction:

Steroid-releasing implants facilitate local drug delivery, maintain patency and reduce inflammation. While safety and effectiveness have been established following ethmoid sinus surgery, this technology has potential to improve outcomes in other sinuses. This study evaluated the feasibility, safety and initial efficacy of implant placement in maxillary and frontal sinus ostia following in-office dilation.

Methods:

A prospective, multicenter, open label study enrolled 10 CRS patients with frontal and/or maxillary sinus disease. Follow-up assessment included SNOT-22 and endoscopic grading by clinicians.

Results:

Ten male patients with a mean Lund-Mackay CT stage of 11.9 (SD 6.0) underwent in-office balloon dilation in 28 sinus openings (16 frontal, 12 maxillary), followed by implant deployment. Implants were placed in 27 sinus ostia resulting in 96% implant delivery success. One implant was deployed into the maxillary sinus. Mean SNOT-22 score was reduced to 1.2 (1.0) from 1.9 (0.8), resulting in a treatment effect size of 0.7. Sinus patency was 100% at 4 weeks and 88% at 12 weeks. At 12 weeks, mean inflammation score (100-mm VAS) was reduced to 26.4 (26.3) from 60.4 (25.6) at baseline, polypoid edema score was reduced in 63% (17/27) of sinuses, and adhesion/scarring score was reduced in 86% (12/14) of sinuses. No patient required oral steroids or surgical intervention during 12 weeks. There were no implant-related serious adverse events.

Conclusion:

The study demonstrated the feasibility and safety of steroid-releasing implant placement in maxillary and frontal sinus ostia following in-office sinus dilation and favorable endoscopic and patient-reported outcomes during 12 weeks.

Poster #077

Point of care computed tomography scan in patients with recurrent acute rhinosinusitis

Abtin Tabaei, MD
Juan Lin, PhD
Patricia Loftus, MD
New York, NY
USA

Introduction:

The role of imaging studies and an understanding of the radiographic pattern of inflammatory changes in patients with recurrent acute rhinosinusitis (RARS) are poorly defined. Although RARS is primarily diagnosed based on clinical grounds, computed tomography (CT) has important implications for both diagnosis and treatment planning.

Methods:

A retrospective chart review of patient demographics, co-morbid factors, and disease severity in a cohort of patients with RARS was performed. All patients underwent CT scan during an episode of acute rhinosinusitis. CT scans were reviewed for the pattern of inflammatory changes and potential correlation with patient and disease variables.

Results:

Twenty-three patients were included in this cohort. A variable pattern of inflammatory changes were noted with a statistically significant lower proportion of patients with involvement of the frontal ($p=0.002$) and sphenoid ($p=0.005$) sinuses when compared to the ethmoid and maxillary sinuses. An association between a history of allergic rhinitis and a higher Lund-Mackay ($p=0.0568$) and the presence of frontal sinus inflammatory changes ($p=0.0568$) both approached significance. There was no identified correlation between the severity of inflammatory changes on CT and RARS severity or other patient co-morbidities.

Conclusions:

A variable pattern of inflammatory changes were noted on CT in this cohort, with a higher incidence of ethmoid and maxillary sinusitis. Point of care CT scan during an acute episode of rhinosinusitis in patients with RARS provides diagnostic information about the pattern of inflammatory sinusitis in addition to sinonasal anatomy. In patients with medically refractory severe disease, this perspective is useful for treatment planning.

Poster #078

Practice patterns in endoscopic dacryocystorhinostomy: A survey of the American Rhinologic Society

Sonia Chen, MD
Christopher Le, MD
Jonathan Liang, MD
Oakland, CA
USA

Background:

The introduction of advanced endoscopic techniques has facilitated significant growth in endoscopic dacryocystorhinostomy (EnDCR). The purpose of this study is to evaluate clinical practice patterns of otolaryngologists performing EnDCR.

Methods:

A 25-item survey was electronically disseminated to the American Rhinologic Society (ARS) membership from 11-17-2014 to 12-14-14. The target group encompassed 1157 ARS members.

Results:

A total of 85 (7.3%) physicians completed the survey. EnDCR was performed by 87% of respondents. The annual average number of EnDCR cases ranged from 1-10 in 65%, 11-25 in 15%, 26-50 in 6%, and >50 in 1%. 48% of respondents had some to a lot of DCR exposure during training, and 60% had completed a rhinology fellowship. Respondents frequently perform pre-operative nasal endoscopy and CT imaging, but very infrequently perform ophthalmologic workup. Lacrimal stents were used often/always in 80%, with 38% keeping stents in place for 6-8 weeks. The mucosal flap preservation technique was used often/always in 40%. Topical anti-metabolites were used often/always in only 1%. Ophthalmology was present in most cases to perform lacrimal intubation. Post-operative antibiotics, topical ophthalmic steroids, and oral steroids were prescribed often/always in 62%, 47%, and 23%, respectively. Post-operative endoscopic debridement was performed often/always in 69%. 81% of respondents followed DCR patients for >2 months, with 17% following for >1 year.

Conclusion:

There is widespread integration of EnDCR procedures into rhinologic clinical practice among respondents. EnDCR practice patterns demonstrate moderate variation. In conjunction with evidence-based-medicine, these trends can highlight areas of controversy and help advance patient care.

Poster #079

Pre-treatment snot-22 score predicts response to endoscopic polypectomy in clinic (epic)

Shaun Kilty, MD, FRCSC
Lisa Caulley, MD
Andrea Lasso, CCRP
Luke Rudmik, MD
Ottawa, Ontario
Canada

Introduction:

In the appropriately selected patients with nasal polyps, endoscopic polypectomy in clinic (EPIC) has demonstrated substantial short-term improvement in patient self-reported quality of life measures. Preoperative sinonasal outcome test (SNOT)-22 score can be used to predict symptom response after endoscopic sinus surgery (ESS). The purpose of this study was to evaluate if preoperative SNOT-22 score can predict outcomes after EPIC.

Methods:

CRS patients with polyps undergoing EPIC were enrolled into a prospective observational cohort study. SNOT-22 scores were collected immediately prior to undergoing EPIC and a minimum of 3 months after the procedure. Patients were categorized into preoperative SNOT-22 groups based on 10-point increments beginning at 10 and ending at 110. The proportion of patients achieving a SNOT-22 minimal clinically important difference (MCID) and the percentage of relative improvement (%) for each preoperative group were determined.

Results:

26 patients were enrolled in the study. The mean pre-EPIC SNOT-22 score was 41.3 (± 16.3). All patients had pre-treatment SNOT-22 scores greater than 20 (range 20 to 79). Depending on the SNOT-22 group the probability of achieving MCID was 75-100%. The mean relative improvement in SNOT-22 was 61.7%.

Conclusions:

The results of this study have demonstrated that preoperative SNOT-22 can predict outcomes after EPIC for appropriately selected patients with nasal polyposis.

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Poster #080

Prognostic factors for recurrence after endoscopic sinus surgery for chronic rhinosinusitis with nasal polyps

Tsuguhisa Nakayama, MD
 Daiya Asaka, MD
 Nobuyoshi Otori, MD
 Shin-ichi Haruna, MD
 Tokyo
 Japan

Introduction:

Chronic rhinosinusitis (CRS) is a heterogeneous disease and its pathogenesis is still uncertain. In this study, we investigated the prognostic factors of recurrence after ESS in patients with CRS with nasal polyps (CRSwNP) during a long follow-up period.

Methods:

The subjects were 36 patients with CRSwNP who were performed endoscopic sinus surgery from December 2008 to February 2012. All the patients were performed surgery by one surgeon, and followed at least 2 years after the surgery. We investigated the association endoscopic findings after the surgery with clinical parameters and mRNA expressions in nasal polyps.

Results:

Seventeen patients (47.2%) had severe mucosal edema and not confirm the patency of the each sinus during over 2 years follow-up. Five patients (13.9%) had frank polyp formation because oral steroids have less effect for those who had severe mucosal edema. In four groups including control group, mucosal eosinophil count was significantly difference ($p=0.001$), but CCL11 mRNA, IL-5 mRNA, and IFN-gamma mRNA levels were not significantly difference by Kruskal Wallis test ($p=0.097$, 0.059 , and 0.992 , respectively). Although IL-5 mRNA levels did not show significantly difference between the each four groups, the levels of IL-5 mRNA tended to increase when the sinus conditions were getting worse.

Conclusions:

We found that mucosal eosinophil count is a critical factor determining prognosis in CRSwNP during a long follow-up period.

Poster #081

Quantitative sinonasal mucosa eosinophil count in allergic fungal sinusitis/eosinophilic chronic rhinosinusitis: Correlation to disease severity and role as prognostic indicator

Armon Jadidian, MD
 Frederick Kuhn, MD
 Savannah, GA
 USA

Introduction:

Eosinophilic Chronic Rhinosinusitis (ECRS) is a form of Inflammatory Sinus Disease that can be difficult to manage relative to other forms of sinus disease. Patients with fewer criteria for AFS/ECRS appear to have a less severe disease state and be easier to control

post-operatively. We hypothesize patients with 2/5 AFS criteria have lower eosinophil counts (EC) than patients with 4-5/5 criteria.

Methods:

Patients treated between 7/1/2009 and 7/1/2014 with a diagnosis of AFS were identified. Two groups of patients were selected: those with 2/5 AFS criteria (Eosinophils and Polyps) and 4-5/5 AFS criteria (4/5 patients were included if they were only missing a characteristic CT scan). EC were retrospectively done on the patients surgical specimens. The following data points were compared between the two groups: EC, presence or absence of Stage III recurrence, presence of a "too numerous to count" EC ($>250/hpf$), and length of follow up. 30 patients were in the 2/5 group and 21 patients were in the 4-5/5 group.

Results:

Average EC from 2/5 patients was 70.66/hpf and from patients with 4-5/5 was 157.43/hpf ($p < 0.0001$). 34% of 2/5 patients had a Stage III recurrence compared to 74% of 4-5/5 patients ($p = 0.0171$). 2/5 patients average length of follow up was 27 months and 4-5/5 patients was 40 months.

Conclusions:

Patients with 2/5 AFS criteria may have a less severe disease state and better prognosis compared to patients with 4-5/5 criteria.

Poster #082

Radiographic characterization of the retroantral ethmoid cell

Adam Honeybrook, MD
Nikita Chapurin, BA
Cynthia Wang, BA
David Jang, MD
Durham, NC
USA

Introduction:

The retroantral ethmoid cell (RAEC) is defined as a posterior ethmoid cell that pneumatizes inferolaterally behind the posterior wall of the maxillary sinus. The RAEC can present a challenge to otolaryngologists during endoscopic ethmoidectomy due to its hidden location. It is also encountered during the endoscopic transpterygoid approach to the skull base. Because the RAEC is not well-described in the literature, this study aims to better characterize this anatomic variant.

Methods:

A retrospective review was performed of 58 consecutive adult patients who underwent primary or revision functional endoscopic sinus surgery (FESS) with the senior author at a tertiary care referral center. CT scans for this cohort (116 sides) were reviewed independently by two authors to identify the overall prevalence of the RAEC, and to characterize how often it is successfully addressed during FESS.

Results:

Of the 58 patients identified, the average age was 52 years (range 14-77). 47 (81%) were Caucasian and 32 (55%) were male. Of the 116 sides, 22 (19%) RAECs were identified. When analyzing only the 81 sides that had undergone prior posterior ethmoidectomy, 13 RAECs were identified. Of these 13, 4 were not opened, 6 were partially opened, and 3 were completely opened.

Conclusions:

The results of this series demonstrate the relatively high prevalence of the RAEC. Moreover, the majority of RAECs (77%) were not completely opened during posterior ethmoidectomy. Recognition of this anatomic entity may allow for more thorough ethmoid surgery.

Poster #083

Respiratory epithelial adenomatoid hamartomas: A case series and literature review

Wesley Davison, BA
Luke Donatelli, MD
Aaron Pearlman, MD
New York, NY
USA

Introduction:

Respiratory Epithelial Adenomatoid Hamartomas (REAH) are benign tumors found in the nasal cavity and sinuses. These tumors most frequently occur in patients in their 50s with a male predominance of 3:2. Although this entity was initially thought to be quite rare, it appears that it may be more common than previously thought due to underdiagnosis. The aims of this study were 1) to add an additional case series of REAH to the literature and 2) to pool and summarize all available data from existing publications.

Methods:

Retrospective chart review from years 2004 to 2014, Literature review.

Results:

Twenty-two cases were found in our case series, including 13 men (59%) and 9 Women (41%) with a mean age of 55.5 years. No cases were found prior to 2007. Nine cases (41%) were associated with nasal polyposis and 13 patients (59%) had chronic sinusitis. Five patients (23%) had concurrent papillomas removed. Four cases (21%) with location data were bilateral. Forty-three previous publications were found (4 prospective, 39 retrospective cases reports or case series) including 610 patients. Pooled data revealed a mean age of 54 (range 1-84 years) and male to female ratio of 3:2.

Conclusion:

The results of our study further refine the average age at which REAH diagnosis occurs as 54 years old, though it may occur at any age. There is a clear male to female predominance (3:2). The vast majority of published cases occurred during the last 4 years indicating increased recognition of REAH.

Poster #084

Risk factors for failure in the surgical management of frontal sinusitis in cystic fibrosis

Smriti Nayan, MD, FRCSC
Anastasios Maniakas, MD
Leandra Endam, MSc
Martin Desrosiers, MD, FRCSC
Toronto, Ontario
Canada

Objective:

At present, it is unknown which patient-related factors predispose cystic fibrosis (CF) patients to require more invasive sinus surgery interventions for their chronic frontal rhinosinusitis (CFRS).

Methods:

A retrospective chart review of consecutive adult CF patients (age > 18) that presented to single institution's tertiary rhinology center and underwent surgical intervention for their CRS between 7/1994-4/2014.

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Results:

Seventy patients (33=M, 37=F) underwent endoscopic sinus surgery (ESS) with a Draf IIa to manage the CFRS. Average post-operative follow-up was for 81 months (range 0.5-240 months). Refractory disease was managed with a modified Lothrop procedure (MELP, n=6) or an osteoplastic (OP, n=2) flap. Co-morbid conditions secondary to the CF included diabetes (n=41), hepatic or biliary cirrhosis (n=6) and lung transplant (n=14). The relative risk of requiring a MELP or OP flap with a history of cirrhosis is 6 (95% CI = 1.199-30.011), lung transplant is 1.5 (95% CI = 0.418-5.380) and diabetes is 0.973 (95% CI = 0.489-1.909).

Conclusion:

Surgical management of CFRS is a challenging problem in CF patients. Risk factors for failure of traditional ESS have not been previously identified in the CF population. A history of cirrhosis or lung transplant demonstrates an increased risk of failure of traditional management with an ESS and Draf IIa alone. CF patients with these underlying conditions may benefit from more invasive management such as a MELP or OP from the outset to avoid the risks and complications of multiple surgeries and associated anesthetics.

Poster #086

Sinonasal fibrosarcoma: Analysis of the surveillance, epidemiology and end result database

Tapan Patel, MD
Eric Carniol, MD, MBA
Alejandro Vazquez, MD
Soly Baredes, MD
James Liu, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Introduction:

Primary fibrosarcoma of the sinonasal region is an infrequently occurring malignant neoplasm. Fibrosarcomas are most commonly found in the extremities, with only one percent of fibrosarcomas reported in the head and neck region. This study analyzes the demographic, clinicopathologic and survival characteristics of sinonasal fibrosarcoma (SNFS).

Methods:

The Surveillance, Epidemiology, and End Results (SEER) database (1973-2012) was queried for SNFS cases. Data were analyzed with respect to various demographic and clinicopathologic factors. Survival was analyzed using the Kaplan-Meier model.

Results:

Fifty-one cases of fibrosarcoma were identified in the sinonasal region. The mean age at diagnosis was 54.5 years and the mean survival was 119.7 months. There was no gender predilection with a male-to-female ratio of 1.04:1. The maxillary sinus was the most common site of involvement (54.9%), followed by the nasal cavity (23.5%). Five-year survival analysis revealed an overall survival rate of 71.7%, disease-specific survival rate of 77.8% and relative survival RS rate of 78.8%. Disease-specific survival was better among those treated with surgery (with [76.2%] or without [87.5%]

adjuvant radiotherapy) than those treated with primary radiotherapy alone (33.3%) (p = 0.0069).

Conclusion:

Sinonasal fibrosarcoma is a rare entity. This study represents the largest series of sinonasal fibrosarcoma to date. The mainstay of treatment for this tumor is surgical resection with or without radiotherapy.

Poster #087

Sinonasal IgG4-related disease: an updated case series and systematic review of the literature with recommendations

Alpen Patel, MD
Rachel Cain, MD
Thomas Colby, MD
Devyani Lal, MD
Phoenix, AZ
USA

Background:

Sinonasal IgG4-related disease (IgG4RD) is a new and increasingly recognized cause of recalcitrant sinonasal disease. Multisystemic involvement can be life-threatening. Diagnostic criteria for IgG4RD remain controversial but patients respond well to immunosuppressive therapy.

Objectives:

1. Perform a systematic literature review for sinonasal IgG4RD to study diagnosis, management, and outcomes.
2. Present and describe the clinical course of 6 patients.

Methods:

A systematic review of the English literature from PubMed and Ovid was completed to review reports of IgG4-related disease from 2000-2015. An updated case-series from our institution is presented.

Results:

The systematic review identified 1839 published studies. Thirty-six studies were identified for inclusion. There were 3 expert opinions (Level 5), 28 retrospective case-series, reports, or cohort studies (Level 4), and 5 systematic reviews (Level 3). Due to the heterogeneity of study cases and inclusion criteria, a meta-analysis was not feasible. IgG4RD affects multiples systems with the head and neck region being the second most common. We previously reported 4 patients with 1 meeting criteria for definitive diagnosis. The updated series found 2 additional patients meeting definitive diagnostic criteria. All patients responded to corticosteroid therapy through a multidisciplinary approach.

Conclusion:

IgG4RD is a rare multisystemic disease that may cause recalcitrant sinonasal cavity disease. Our series of increasing patients shows that this rare entity may be a cause of recalcitrant disease that rhinologist must be familiar with. Specific diagnostic criteria for such disease have not been well-defined. We provide an evidence-based management algorithm with an illustrative case series highlighting diagnostic challenges.

Poster #088

Sinonasal lymphoma-case presentations and review of the literature

Elie Rebeiz, MD
Mihaela Smith, PA
Boston, MA
USA

Sinonasal lymphoma is a rare rhinologic entity. We present 3 patients with isolated maxillary sinus lymphoma and review the literature regarding the diagnosis and management.

Three patients presented with clinical and radiologic findings of sinus disease. There were 2 men and 1 woman with disease isolated to the maxillary sinus. Review of the literature was also done and will be discussed.

Results:

Maxillary sinuses were affected in all cases. Histologically, the types were diffuse large B-cell lymphoma, killer/T-cell lymphoma. Presenting symptoms included nasal obstruction, rhinorrhea and diplopia. Radiographic imaging demonstrated a mass, sinus opacification without bony erosion. Treatment included chemotherapy with and without radiation, and radiation alone. Literature review revealed 2-year and 5-year overall survival rates of 75% and 53%, respectively, whereas disease-free 2-year and 5-year survival rates were 70% and 49%, respectively.

Conclusion:

Lymphoma of the nasal cavity and paranasal sinuses is extremely rare, may mimic benign processes, and may manifest either in an isolated fashion or in conjunction with systemic disease. B-cell lymphomas, a more favorable diagnosis, account for a majority of cases, whereas ENKL is associated with rapid disease progression and death. Chemotherapy and radiation are the main therapies. Histologic diagnosis is of paramount importance, and clinicians must remain cognizant of this entity to differentiate it from other sinonasal malignancies.

Poster #089

Sinonasal neuroendocrine carcinoma: A systematic review

Tapan Patel, MD
Ritam Ghosh, BA
Emily Marchiano, BA
Christina Fang, MD
Soly Baredes, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Introduction:

Sinonasal neuroendocrine carcinoma (SNEC) is a very rare tumor that represents less than 5% of malignancies in that region. We present the first systematic review of reported cases of SNEC to determine trends in patient demographics, clinical presentation, diagnostic and treatment modalities, and patient outcome.

Methods:

A search of the PubMed/MEDLINE database was done to identify articles reporting cases of SNEC. The variables included in the analysis were patient demographics, presenting symptoms, tumor location, imaging, treatment, follow-up time, recurrence, and outcome.

Results:

A total of 51 articles and 182 cases were included in the review. The most common presenting symptom was nasal obstruction (56.0%), followed by epistaxis (34.2%). The most common site for SNEC was in the ethmoid sinus (30.7%), followed by the nasal cavity (21.4%). The average follow-up time was 37.1 months (n = 98). At follow-up, 22 and 38 cases were reported to have distant metastasis and local recurrence respectively, while 6 cases had both local recurrence and distant metastasis. 54.2% of the patients were alive with no evidence of disease while 30.5% of the patients died of the disease. Surgical resection combined with concurrent or postoperative radiotherapy was the most common treatment modality (52.3%).

Conclusion:

SNEC is a rare malignancy. It frequently presents with nasal obstruction and epistaxis and is often found in the ethmoid sinus. It is commonly associated with extensive local extension and distant metastases. Surgical resection combined with radiotherapy is the treatment of choice for this tumor.

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Poster #090

Sinonasal tract inflammation as a precursor to malignancy: A systematic review and meta-analysis

Charles Riley, MD
 Michael Marino, MD
 Nathan Hawkey, BS
 Claire Lawlor, MD
 Edward McCoul, MD, MPH
 New Orleans, LA
 USA

Background:

Chronic inflammation has been described as a precursor to the development of malignancy in several disease states. However, the relationship of sinonasal tract inflammation to sinonasal malignancy remains poorly defined.

Methods:

Systematic review and meta-analysis were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Guidelines. MEDLINE, EMBASE, and Cochrane databases were queried for English-language studies published between 1980 and 2015. Studies were excluded that did not provide quantitative data on sinonasal tract inflammation and sinonasal tract malignancy. An itemized assessment of the risk of bias was conducted for each included study.

Results:

Of 23 studies identified during systematic review, five studies met the criteria for analysis. The level of evidence of those studies was generally low. There was an increased risk of sinonasal tract malignancy in patients with a previous diagnosis of chronic rhinosinusitis or allergic rhinitis. Meta-analysis demonstrated an odds ratio (95% confidence interval) of 2.82 (2.04 – 3.89) for all included studies. Subgroup analysis of patients with nasopharyngeal carcinoma had an odds ratio of 3.00 (2.08-4.33) while patients with paranasal sinus malignancy had an odds ratio of 6.64 (4.31 – 10.21).

Conclusions:

This systematic review and meta-analysis suggests an association between previous inflammatory disease of the mucosal surfaces of the paranasal sinuses and nasopharynx with subsequent malignancy of the sinonasal tract. Prospective studies are needed to further examine this relationship.

Poster #091

Snot-22 in a placebo-controlled study with a novel breath powered device delivering Fp in recalcitrant chronic rhinosinusitis; A post hoc analysis and literature review

Per Djupesland, MD, PhD
 Mahmoud Ramy, MD, HPH
 Messina John, PharmD
 Fokkens Wytse, MD, PhD
 Oslo
 Norway

Background:

CRS is a common chronic inflammatory disease with no FDA approved medical therapy. If maximal medical therapy fails, endoscopic sinus surgery is advocated. Sino-nasal outcome test-22 (SNOT-22), a validated disease specific quality-of-life measure is increasing being utilized to assist in the diagnosis and choice of therapy.

Methods:

Pre- and post-treatment SNOT-22 were extracted from RSOM-31 data collected in a published 12 weeks randomized placebo-controlled study in 20 patients with recalcitrant CRS and compared to recent publications. CRS-patients were treated with fluticasone propionate (FP 400 µg b.i.d.) delivered with a novel breath powered device more efficiently reaching posterior nasal segments. Non-parametric analysis was applied due to the small sample size.

Results:

The published study showed significant reduction of endoscopic edema score, symptom scores at all time-points. The pre- and post-treatment SNOT-22 were 46 (24.2)/24.1 (22.6) and 44.9 (20)/42.5 (25.4) with a reduction (least square mean) of -18.6 (24.1)/-2.4 (18.8) for FP and placebo respectively (p=0.11 - NS). The nasal subdomain of SNOT-22 was significantly reduced at 4 (p=0.004) and 8 weeks (p=0.014) and with a trend at last visit attended (p=0.077).

Conclusions:

Delivery of FP (400 µg b.i.d.) for 12 weeks with the novel breath powered device reduced SNOT-22 compared to placebo in a small pilot study in patients with recalcitrant CRS. The SNOT-22 reduction is similar to those reported for endoscopic sinus surgery and greater than placebo controlled studies with medical therapy in CRS. A comprehensive phase 3 program including 1700 CRS-patients will clarify the therapeutic role of targeted breath delivery of FP.

Poster #092

Spontaneous regression of squamous cell carcinoma arising from inverted papilloma

Madeleine Samuelson, MD
Lori Lemonnier, MD
Shreveport, LA
USA

Outcome Objectives:

1) Describe a case of spontaneous regression of invasive squamous cell carcinoma arising from inverted papilloma 2) Review the related literature

Methods:

A case study was performed investigating the spontaneous regression of squamous cell carcinoma arising from an inverted papilloma of the frontal sinus in a 93 year-old male. Physical examination, nasal endoscopy, histopathology and radiographic images are presented. A Pubmed search was performed to identify additional cases of spontaneous regression of non-cutaneous squamous cell carcinoma of the head and neck documented in the English language literature.

Conclusion:

Inverted papilloma is a benign, locally aggressive neoplasm that arises in the sinonasal cavity. According to a 2006 meta-analysis, inverted papilloma is associated with carcinoma in 4-7% of cases. Here we present a case of a persistent inverted papilloma with advanced intracranial extension in a 93 year-old male. New onset, rapid growth of the lesion involving the orbit and skin of the medial canthus was biopsy positive for invasive squamous cell carcinoma. The patient presented two months following biopsy, after entering hospice, with no external or endoscopic evidence of the lesion and radiographic imaging consistent with spontaneous regression. Patient has now been followed for five months since regression and imaging confirms no disease recurrence. On review of the literature this is the first described case of spontaneous regression of squamous cell carcinoma of sinonasal origin, with previous cases in the head and neck being limited to the oral cavity and oropharynx.

Poster #093

Squamous cell carcinoma and adenocarcinoma of the paranasal sinuses: A seer database analysis

Sumit Jain, BS
Yan Li, BS
Pete Batra, MD
Orland Park, IL
USA

Background:

Outcomes studies on sinonasal carcinoma are limited to retrospective case series, often with inclusion of diverse histology and short follow-up. The objective of this study was to identify key predictive variables that impact survival for paranasal sinus squamous cell carcinoma (SCC) and adenocarcinoma (AC).

Methods:

An analysis was conducted using the Surveillance, Epidemiology and End Results (SEER) database from 1973 to 2012 to identify key variables that impact survival for SCC and AC.

Results:

6,211 cases were included, with most common histologic subtypes being SCC (2,895, 41%) and AC (819, 13%). The mean age of diagnosis was 64.1 years. Male:female ratio for SCC and AC were 1.85:1 and 1.04:1, respectively. Patients with SCC and AC were most often diagnosed with stage IV disease in 61.8% and 63.4% of the cases, respectively. A majority of patients with either type of cancer received combined surgery and radiation (52% for SCC, 43.1% for AC). For SCC, prognostic factors associated with worse survival include increased age, African American race, stage IV diagnosis, and radiation therapy alone. For AC, prognostic factors associated with worse survival outcome include age between 60-70, African American race, ethmoid sinus location, stage IV disease and grade IV diagnosis.

Conclusion:

This current study is the only known retrospective population-based study that determines prognostic factors for SCC and AC of the paranasal sinus. For both histological subtypes, African American race, stage IV diagnosis, and radiation therapy alone portends worsened survival. This has important implications for patient counseling in the preoperative period.

Poster #094

Steroid-eluting sinus stent for chronic rhinosinusitis patients undergoing functional endoscopic sinus surgery: A systematic review

Zhenxiao Huang, MD, PhD
Peter Hwang, MD
Yan Sun, MD
Bing Zhou, MD
Beijing
China

Introduction:

Previous study showed that steroid-eluting sinus stent offers beneficial effects in mixed population of chronic rhinosinusitis with and without nasal polyps (CRSsNP and CRSwNP) patients undergoing functional endoscopic sinus surgery (FESS). Whether a steroid-eluting stent offers any beneficial effects over a non-steroid-eluting stent in patients with CRSsNP and CRSwNP has not been systematically reviewed. The objective of this study is to assess the effects of steroid-eluting stent in patients with CRSsNP and CRSwNP, including subgroup analysis by polyps grades.

Methods:

The Preferred Reporting of Items for Systematic Reviews and Meta-Analyses guidelines were used for reporting this review of randomized controlled trials evaluating the effectiveness of steroid-eluting stent compared to non-steroid stent in patients undergoing FESS.

Results:

Two trials were included in this review. Main analysis showed steroid-eluting stent offers beneficial effects on the mixed population of CRSsNP and CRSwNP by reducing rate of requiring postoperative interventions (odds ratio (OR) 0.47, 95% confidence interval (CI) 0.28 to 0.78), polyp formation (OR: 0.44, 95% CI: 0.25 to 0.79), middle turbinate lateralization (OR: 0.28, 95% CI: 0.09-0.9) and adhesions (OR: 0.3, 95% CI: 0.12-0.73). Subgroup meta-

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analysis of trials demonstrated that steroid-eluting stent had beneficial effects on patients with CRSwNP (< or =grade 3+ nasal polyps), but not CRSsNP, via intrapatient controlled non-steroid stent.

Conclusions:

Steroid-eluting sinus stents are effective in improving surgical outcomes of patients with CRSwNP, but not CRSsNP, by reducing polyposis, minimizing adhesions, preserving sinus patency and reducing the need for postoperative intervention, and quality of evidence is moderately applicable.

Poster #095

Subepithelial inflammatory load and basement membrane thickening in refractory chronic rhinosinusitis with nasal polyposis: A histopathological study

Ahmed Bassiouni, MD

Judy Ou, MD

Sukanya Rajiv, MD

Daniel Cantero, MD

Sarah Vreugde, MD

Peter-John Wormald, MD

Adelaide, SA

Australia

Background:

A subgroup of chronic rhinosinusitis patients with nasal polyps (CRSwNP) patients is refractory to optimal surgical therapy and requires multiple revision sinus operations. Studies have shown that mucosal eosinophilia correlates with disease severity. We hypothesized that a high-grade tissue inflammatory load is associated with these refractory patients.

Methods:

A single-surgeon, retrospective case-control study comparing 20 CRSwNP patients requiring a second surgery during follow-up (refractory group) versus a matched cohort of 20 CRSwNP patients without needing further revision surgery (control group). H&E stained tissue harvested intra-operatively (x2 for the refractory group) were recalled for histopathological examination of subepithelial inflammation and basement membrane thickness.

Results:

The refractory group had a significantly higher average eosinophil count (49 versus 18), relative eosinophilia (55% versus 32%) as well as total inflammatory cell count (86 versus 49) than the control group (p <0.05). However within the refractory group, the eosinophil-lymphocyte ratio was reduced from their first to their second (revision) surgeries while the total averaged inflammatory cell count remained unchanged. No significant difference in BM thickness was found between the groups.

Conclusion:

These findings suggest that a higher inflammatory and eosinophilic load is associated with refractory disease and thus may be useful in predicting need for future revision surgery in CRSwNP.

Poster #096

Supportive therapy of allergic rhinitis by stinging nettle (urtica Dioica): Randomized,

Maryam Salehi, MD

Mehdi Bakhshae, MD

Morteza Noorollahian Mohajer, MD

Amir Houshang Mohamadpoor, PhD

Farahzad Jabbari Azad, MD

Majid Esmaeili, MD

Mashhad, Khorasan Razavi

Iran

Introduction:

The financial costs and negative impact of allergic rhinitis on the quality of life are of high importance. Nettle (*Urtica dioica*) has long been used worldwide in complementary medicine. We aimed to survey the benefit of this herb in the management of clinical and laboratory signs and symptoms of allergic rhinitis.

Methods:

In a randomized clinical trial, 44 patients with the signs and symptoms of allergic rhinitis and a positive skin prick test from two tertiary referral centers were selected and randomly divided into 2 groups. Their signs and symptoms, eosinophil percentage on nasal smear, serum IgE, and interleukin (IL-4, IL-5, interferon- γ) levels were recorded. The study group was treated with Nettle, the control group received placebo, both for 1 month, along with routine treatment.

Results:

Forty patients completed the trial. Based on the Sino-Nasal Outcome Test 22 (SNOT-22), a significant improvement in clinical symptom severity was observed in both groups (P < .001). There was a significant difference in post treatment changes of mean IFN γ levels between the study and placebo group (P = 0.017).

Conclusion:

This study did show certain positive effects of Nettle in the management of allergic rhinitis on controlling the symptoms, similar effects was demonstrated by placebo as well. The exact efficacy of *Urtica Dioica* in this respect could not be determined in this study. We believe that our limitations underscore the need for larger, longer term studies of Nettle for the treatment of allergic rhinitis

Poster #098

The correlation between eosinophils and subjective and objective evaluation in chronic rhinosinusitis with nasal polyps

Ping Ye, PhD
Bing Zhou, MD
Beijing
China

Objective:

Trying to find the correlation between ratio of eosinophil in peripheral blood and the subjective and objective inspection score in chronic rhinosinusitis with nasal polyps.

Methods:

This is a non-randomized clinical trial study that was done on 24 patients who were diagnosed as chronic rhinosinusitis with nasal polyps(CRSwNP). Sinonasal symptoms were assessed subjectively via sinonasal-specific questions from the 20-item Sino-Nasal Outcome Test(SNOT-20) and VAS and objectively via the Lund-Kennedy Endoscopic Scoring system(LKES). Lund-Mackay score was recorded for the pre-operative CT scan(LMS). The ratio of eosinophil in peripheral blood was also examined and analyzed. Results were analysed using Spearman's correlation coefficient. In all tests, p value <0.05 was considered as statistically significant.

Results:

Significant positive correlation was found between eosinophils in the peripheral blood and LKES and LMS ($r=0.592, p=0.002$; $r=0.597, p=0.002$ respectively). Negative correlation was established between eosinophils in the peripheral blood and SNOT-20 and VAS ($r=-0.237, p=0.266$; $r=-0.017, p=0.939$ respectively) and the correlation is not significant.

Conclusions:

The eosinophils in the peripheral blood was positively correlated with the patients' objective examination scores. And the correlation between the eosinophils and the patients' subjective inspection score is not significant.

Key words: Sinusitis; Nasal polyps; Eosinophils

Poster #099

The direct costs of adult chronic rhinosinusitis using four estimation methods: Results of the US medical expenditure panel survey

Lisa Caulley, MD, MPH(c)
Kednapa Thavorn, PhD
Luke Rudmik, MD, FRCSC
Chris Cameron, PhD(c)
Shaun Kilty, MD, FRCSC
Ottawa, Ontario
Canada

Introduction:

Chronic rhinosinusitis (CRS) is an inflammatory disease that is reported to affect 2-16% of the United States (US) population. Despite its rising prevalence, there is currently limited data in the literature evaluating the economic burden of this disease. The objective of this study was to determine the US direct healthcare

costs for CRS treatment as estimated by the latest medical expenditure panel survey (MEPS).

Methods:

A prevalence-based approach was employed to measure cost of illness for CRS from the latest (2011) MEPS database using 4 recognized estimation methods: 1) an estimated sum of all health care expenditures; 2) an attribution model for disease-specific estimation of expenditures; 3) an estimation based on a propensity score model and 4) estimated disease-specific expenditure using a linear regression-based approach. A disease prevalence of 3.5% was utilized.

Results:

The mean CRS-specific annual expenditure was \$5,955 [95% Confidence Interval (CI): \$5,087-6,823] by method 1, compared to \$5,560 (95% CI: \$4,689-6,431) by method 2 and \$5560 (95% CI: \$4,653-6,467) by method 3. The annual expenditure as estimated by method 4 was \$5,589 (95% CI: \$4,986-6,192). The highest contributor to expenditures for CRS patients was ambulatory expenses.

Conclusions:

This is the first work to establish a range of estimates for the direct medical expenditures associated with CRS. The study demonstrated the economic burden attributable to this disease was an estimated \$60.2-64.5 billion US dollars in 2011 with variation in the absolute direct expenditures tabulated dependent on the type of estimation model utilized and the prevalence assumed.

Poster #100

The efficacy of a thermosensitive poloxamer 407-based topical medication regimen for chronic rhinosinusitis: A retrospective review

Luis Macias-Valle, MD
Andres Finkelstein-Kulka, MD
Christopher Okpaleke, MPH
Amin Javer, MD, FRCSC
Vancouver, British Columbia
Canada

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 two or more medications that can remain stable and act to reduce inflammation/infection in the sinuses. The advantage to treatment of chronic inflammation is that the time the medication stays inside the sinuses is greatly increased. This study aims to examine the safety, efficacy and our early experience with Poloxamer-407.

Methods:

Post-surgical patients with recalcitrant infection and inflammation despite maximal medical management, and who had been treated with medication-impregnated Poloxamer-407 were reviewed retrospectively. Only patients with at least 3 treatments were included. Endoscopic scores before and after treatment was recorded. Patient-reported adverse events were also recorded.

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Paired students' t-tests were used to test the difference in means of endoscopic scores before and after treatment.

Results:

Thirty patients (10 males, 20 females, average age of 58.5 years) were reviewed. There was a 3.3-point (26.2%) decrease in mean endoscopic scores, before (mean=12.6 SD=10.9) and after (mean=9.3 SD=10.0) the three treatments. Two patients reported transient increase in headaches and postnasal drips respectively. There were no major or long term adverse events. The physicians' experience with Poloxamer-407 was very good.

Conclusion:

Patients with CRS can be safely treated with Poloxamer-407 impregnated with medication. Though there was improvement in endoscopic scores in this difficult to treat patient group, further prospective clinical trials to further evaluate the efficacy of Poloxamer-407 are necessary.

Poster #101

The epidemiology of frontal sinus malignancies: A population-based perspective

Pariket Dubal, BA
Tapan Patel, MD
Kristen Echanique, BS
Alejandro Vazquez, MD
James Liu, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Introduction:

Sinonasal malignancies are rare, constituting less than 1% of all malignant tumors. Approximately 1% of sinonasal malignancies are reported to arise in the frontal sinus. The existing literature describing frontal sinus malignancies is limited. As a result, little is known about these entities and their optimal management. The current study seeks to analyze trends in epidemiology, clinicopathology, incidence, and survival for these rare malignancies.

Methods:

The Surveillance, Epidemiology, and End Results (SEER) 18 database (1973-2012) was searched for frontal sinus malignancies. Data were analyzed for demographic and clinicopathologic trends. The Kaplan-Meier model was utilized for survival analysis.

Results:

A total of 171 frontal sinus malignancies were identified. The mean age at diagnosis was 61.1 years. Males constituted 61.4% of cases. By race, 80.1% were white, 8.2% were black, and 9.4% were Asians or Pacific Islanders. The average malignancy size was 3.8 centimeters. The four most common histologies were squamous cell carcinomas (39.8%), followed by B cell lymphomas (17.5%), unspecified epithelial neoplasms (10.5%), and adenocarcinomas (9.9%). Overall incidence was 0.011 per 100,000 individuals. Overall 5-year disease-specific survival (DSS) was 44.2%. By histology, 5-year DSS was highest for B cell lymphomas (72.3%) and lowest for adenocarcinomas (15.4%).

Conclusions:

Frontal sinus malignancies are rare, commonly presenting in white males between the ages of 50 and 80. Squamous cell carcinoma is the most commonly encountered entity. Of the four most common histologies, survival seems best for B cell lymphomas and worst for adenocarcinomas.

Poster #102

The epidemiology of sphenoid sinus malignancies: A population-based perspective

Peter Svider, MD
Pariket Dubal, BA
Alejandro Vazquez, MD
Soly Baredes, MD
Adam Folbe, MD
Jean Anderson Eloy, MD
Detroit, MI
USA

Introduction:

Sinonasal malignancies are rare, representing less than 3% of upper aerodigestive tract malignant lesions. Approximately 3% of these malignancies arise in the sphenoid sinus. Due to the rarity of sphenoid sinus malignancies, there is a paucity of literature describing their histopathologic features, epidemiology, incidence trends, and survival. We seek to elucidate these factors using a national population-based resource.

Methods:

The Surveillance, Epidemiology, and End Results (SEER) database was used to identify malignant sphenoid sinus tumors. The results were analyzed for demographics, incidence, and clinicopathologic trends. Survival was calculated using Kaplan-Meier analysis.

Results:

The search identified 472 cases. The mean and median age at diagnosis was 60.0 years. Males represented 54.9% of cases. By race/ethnicity, 82.4% were white, 8.5% were black, and 7.2% were Asian, Hawaiian, or Pacific Islanders. Malignant sphenoid tumors had a mean size of 3.7 centimeters. The 4 most common histopathologies were squamous cell carcinomas (29.4%), adenocarcinomas (14.4%), B cell lymphomas (13.1%), and unspecified epithelial neoplasms (11.0%). The overall incidence from 2000 to 2012 was 0.030 per 100,000. Kaplan-Meier analysis demonstrated an overall 5-year disease-specific survival (DSS) of 48.1%. Of the most common histopathologic subtypes, 5-year DSS was best for B cell lymphomas (64.0%) and worst for unspecified epithelial neoplasms (25.6%).

Conclusions:

Malignancies of the sphenoid sinus are rare. The most common histopathology is squamous cell carcinoma. Of the common sphenoid sinus malignant subtypes, 5-year DSS is best for B cell lymphomas and worst for unspecified epithelial neoplasms.

Poster #103

The feasibility of using foley catheters to perform closed reduction of anterior table frontal sinus fractures

Vibhav Sekhsraia, MD

Peter Svider, MD

Adam Folbe, MD

Detroit, MI

USA

Frontal sinus injuries can be associated with cosmetic deformity from anterior table fractures, mucocele formation from frontal recess obstruction, and even intracranial injury from posterior table disruption. The traditional method of correcting isolated anterior table frontal sinus fractures involves direct visualization via direct or bi-coronal approach with fixation using plates and/or mesh. These surgeries are often time consuming and carry significant morbidities. Our study aims to prove the feasibility of a minimally invasive method for closed reduction of isolated anterior frontal sinus fractures. 3 cadaveric heads were obtained from the WSU Medical School Department of Anatomy. Blunt force trauma was simulated to fracture the frontal sinuses bilaterally in each of the three heads. CT scans were obtained in order to confirm and characterize the nature of each fracture before each head underwent bilateral FESS with balloon sinuplasty of the frontal recess. Subsequently a Foley catheter was introduced into each of the six frontal sinuses and inflated followed by post-operative CT scans to analyze the feasibility and result of the procedure. In each case the Foley catheter was successfully introduced into the frontal sinus however reduction of anterior table fractures was not achieved in any of the six frontal sinuses. The main issue encountered appeared to be integrity of the catheter balloon which was unable to reduce the fracture without rupturing. In conclusion while introducing a catheter into the frontal sinus is a feasible procedure, its use in the reduction of frontal sinus fractures is futile in its present state.

Poster 104

The incidence of intracranial radiation necrosis and pseudoprogression following adjuvant radiation therapy for sinonasal malignancies

Shah Ahmad, BS

Christopher Le, MD

Rihan Khan, MD

Baldassare Stea, MD, PhD

Eugene Chang, MD, PhD

Alexander Chiu, MD

Tucson, AZ

USA

Intro:

Surgery and post-operative radiation therapy (RT) are used to treat of advanced sinonasal cancer. However, post-RT changes to the brain can mimic radiologic changes suggestive of tumor recurrence leading to potential unnecessary intracranial biopsies.

Objective:

To determine clinical factors that predict signs of tumor recurrence (TR) versus radiation necrosis (RN) in post therapy sinonasal malignancies with intracranial extension.

Materials/methods:

Retrospective study of 29 patients with sinonasal malignancies who underwent surgery and post op RT from 2010 -2014 at the University of Arizona. We analyzed sinonasal cancer type, stage, radiation dosimetry, time until imaging changes, pathology, PET/CT imaging, and patient demographics.

Results:

12 of 29 patients had post-op imaging changes on MRI suspicious for either RN or TR. 5 were deemed to have TR without need for biopsy due to new metastasis seen on PET/CT scan. 3 patients were observed with serial imaging that confirmed pseudoprogression due to regression of lesion with time. 4 patients had sufficient concern due to persistent MRI changes that they underwent surgical biopsy, and 1 had tumor recurrence. Factors that favored TR included advanced stage, and faster onset of imaging changes on MRI (93 vs 209 days, p=0.05).

Conclusions:

Intracranial TR can be difficult to distinguish between RN in sinonasal cancers treated with surgery and radiation. Patients with advanced stage disease and rapid onset of MRI changes in post-surveillance scans are more likely to have TR versus RN. However future imaging techniques or tests that investigate tumor biomarkers are necessary to prevent unnecessary biopsies.

Poster #105

The nasofrontal beak: A consistent landmark for superior septectomy during Draf III

John Craig, MD

Petrov Dmitriy, MD

Sammy Khalili, MD

John Lee, MD

Nithin Adappa, MD

James Palmer, MD

Detroit, MI

USA

Introduction:

Cerebrospinal fluid (CSF) leak occurs in 1-11% of endoscopic Draf III procedures. CSF leak can occur intraoperatively when beginning the superior nasal septectomy. This study investigated whether the posterior edge of the nasofrontal beak (NFB) at the level of the internal frontal ostium is a safe landmark to use when beginning the superior septectomy, to avoid skull base injury.

Methods:

Preoperative CT-maxillofacial scans were reviewed from 100 patients from the home institution's sinus surgery database. Anteroposterior distances between the posterior edge of the NFB and the anterior aspect of the olfactory fossa (OF) at the level of the internal frontal ostium were measured in each patient. Measurements were taken in the midline, and to the left and right of midline. Six fresh cadaver heads were also dissected to evaluate the relationship between the NFB and OF.

Results:

In all six cadaver dissections the posterior edge of the NFB was anterior to the OF in the midline, and to the left and right of midline at the level of the internal frontal ostia. On CT evaluation, the NFB was anterior to the OF on the left and right of midline in 100% of

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patients, with mean anteroposterior distances of 6.04 mm and 6.41 mm, respectively. The NFB was anterior to the OF in the midline in 98% of patients, with a mean distance of 9.02 mm.

Conclusions:

During standard Draf III, the posterior edge of the NFB is a reliable landmark for avoiding skull base injury during the superior septectomy.

Poster #106

The noble trans-septal technic for unblock removal of nasal tumor with cross multiple parallel incision (tacumi incision)

Kazuhiro Omura, MD
Nobuyoshi Otori, MD
Minato, Tokyo
Japan

The basic operational approach for malignant tumor in the nasal cavity is en-block removal combined external incision and endoscope.

On the other hand, benign tumor of the nasal cavity, is not really required en-block resection even with a few possibility of malignancy like an inverted papilloma. It is from the idea to remove the origin of the tumor completely with a free margin lead to the good prognosis of the treatment.

Recently the operational instruments are improving day by day, you can treat more various diseases with draf procedure for the diseases in frontal sinus, Endoscopic Modified Medial Maxillectomy(EMMM) in Maxillary sinus. But it is still difficult when you want en-blocked removal for large size tumor packed in the nasal cavity even with these procedure because of tumor reduce the space for the operational instrument.

We think the ideal way of resection is en-block removal with only endo-nasal approach without external incision. So we made the noble Trans-septal technic for unblock removal of nasal tumor with cross multiple parallel incision (TACUMI incision). With TACUMI incision, you can move the tumor to opposite side and make operational space and detect the origin of the tumor even the tumor came out from the nasal cavity. So you can do en-block removal of the tumor.

We have done this procedure for 4 cases and can do en-block removal without any complications. There is no septal perforation 6months after the operation too.

Poster #107

The role of simulation in teaching sinus surgery in otolaryngology residency: An ARS survey

Philip Chen, MD
Daniel Chang, BS
Rakesh Chandra, MD
Erik Weitzel, MD
Jennifer Peel, PhD
Kevin McMains, MD
San Antonio, TX
USA

Introduction:

The role of simulation in surgical training continues to expand across all surgical specialties. Simulators present potential advantages of training in a safe, controlled, reproducible setting, with validated measures to determine trainees' abilities. The ideal simulator would be affordable and easily accessible. To date, no formalized, progressive, FESS simulation curriculum has been developed. This survey intended to assess the use of and barriers to use of simulation in training otolaryngology residents endoscopic sinus surgery.

Methods:

An electronic, web-based survey was disseminated to members of the American Rhinologic Society affiliated with otolaryngology training programs.

Results:

77 responses were received, representing 31 states, the District of Columbia, and Canada. 45% of respondents (30 of 67) reported using sinus simulation in training. Cadaveric workshops were held in all programs using simulation; however, only 12.5% used a commercially-available product. The faculty observed improvement with endoscope handling and dexterity after simulation completion. A majority of respondents also believed residents had better anatomical understanding with a faster learning curve after simulation. The biggest obstacles to FESS simulation were cost and lack of realistic simulators.

Conclusions:

Fewer than half of respondents noted use of FESS simulation in otolaryngology programs. Cost and lack of validated models are cited as the most common impediments to implementation of FESS simulation in residency training. A sustained national effort should be undertaken to develop a progressive curriculum using validated simulators for skill attainment.

Poster #108

The use of percutaneous sutures in rhinoplasty

Jessica Scordino, MD
Paige Bundrick, MD
Frederick Stucker, MD
Shreveport, LA
USA

Introduction:

Percutaneous suturing is a useful but perhaps underutilized, technique. They are useful for cartilage fixation, obliteration of dead space, cooptation of tissues, securing of tissues and modification of topical anatomy. Whenever possible, sutures are placed in a mattress fashion oriented in relaxed skin tension lines. The placement is through the skin into the nasal cavity and then exiting back out through the skin. The stitch is then secured with a mattress suture while being careful not to over tighten to accommodate for anticipated post operative edema. It is critical to obliterate dead spaces as blood accumulation can have devastating consequences for cartilage grafts. When using percutaneous sutures there is no need for a bolster dressing.

Methods:

Chart Review

Results:

A review of 500 consecutive nasal procedures indicated a use of percutaneous sutures in 23%. The number of sutures ranged from one to over thirty. The common indications were for cartilage fixation, obliteration of dead space, cooptation of tissue, replacement and securing of tissue following trauma, and modification of topographical anatomy. Most patients had more than one of these indications.

Conclusions:

Percutaneous suture placement is a simple technique that allows management of topographical anatomy with precise graft placement and fixation in both open and closed techniques. The percutaneous sutures also coopt the skin and soft tissues to grafted or normal nasal cartilage. They prevent fluid accumulation, hematoma formation and graft migration. This technique decreases tissue edema and excessive scarring and aids in healing.

Poster #109

Tlr4-mediated expression of Il-32 via the jnk/akt/creb pathway in nasal polyp

Il-Ho Park, MD, PhD
Jung-Sun Cho, PhD
Byungjin Kang, MD
Jae-Min Shin, MD
Heung-Man Lee, MD, PhD
Seoul
South Korea

Background:

Nasal polyp is prolonged inflammation of the sinonasal mucosa. IL-32 is involved in the pathogenesis of chronic lung inflammatory diseases. The aim of study is to compare the expression level of IL-32 in normal nasal mucosa and nasal polyp and to investigate

the mechanism underlying IL-32 expression in nasal polyp.

Methods:

IL-32 expression in nasal tissues, normal nasal mucosa -derived fibroblasts (NorDFs) and nasal polyp-derived fibroblasts (NPDFs), organ cultures of nasal tissues was measured by RT-PCR, western blotting and ELISA. NorDFs and NPDFs were exposed to lipopolysaccharide (LPS) and the expression level of IL-32 was measured. LPS from *Rhodobactersphaeroides* (RS) and siTLR4 were used to inhibit signaling by TLR4. Activation of MAPKs (ERK, p38, and JNK), AKT, and CREB was examined using western blot analysis.

Results:

Expression of IL-32 was increased in nasal polyp compared to normal nasal mucosa. LPS induced expression of IL-32 in a time-dependent manner. The induction level of IL-32 was higher in NPDFs than in NorDFs. Treatment with RS and siTLR4 inhibited the mRNA expression of TLR4, MyD88, and IL-32 in LPS-stimulated NPDFs. IL-32 expression was specifically activated by JNK, AKT, and CREB in LPS-stimulated NPDFs and nasal polyp organ cultures.

Conclusions:

The sensitivity for IL-32 expression by LPS was increased in nasal polyp compared to normal nasal mucosa. These results suggest that LPS stimulates the expression of IL-32 in nasal polyp through the TLR4-JNK-AKT-CREB signaling pathway. Therefore, IL-32 may be involved in the pathogenesis of nasal polyp.

Poster #110

Transient blepharoptosis as a complication of endoscopic sinus surgery

Seung Hoon Lee, MD, PhD
Ji Ho Choi, MD, PhD
Tae Hoon Kim, MD, PhD
Hyun Jun Kim, MD, PhD
Heung Man Lee, MD, PhD
Ansan, Gyeonggido
Korea

Reported cases of major and minor complications associated with endoscopic sinus surgery (ESS) are diverse. Intra-orbital neuropathy is a rare complication, which is caused by the complex nerve course and close anatomical vicinity. Oculomotor nerve palsy generally causes mydriasis, blepharoptosis, impairment of eye adduction, and upward and downward gaze palsy in the affected eye. It can be caused by ischemia, trauma, or compressive lesions such as aneurysms, meningiomas, or other primary tumors. Lesions involving the intra-orbital portion of the nerve can cause incomplete superior branch nerve palsy. Although rare, incomplete superior branch nerve palsy can develop as a complication of endoscopic sinus surgery. We present a case of isolated transient blepharoptosis after endoscopic sinus surgery.

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Poster #111

Treatment of “sinus headache” in patients with concomitant chronic rhinosinusitis (crs)

Pedram Daraei, MD
 Jennifer Gross, MD
 John DelGaudio, MD
 Atlanta, GA
 USA

Background:

Multiple studies have shown that “sinus headache” without evidence of sinusitis is frequently migraine. There have been no studies to evaluate treatment of “sinus headache” as migraine in patients with CRS. We sought to determine if patients with concomitant “sinus headaches” and CRS responded to migraine-targeted therapy as well as “sinus headache” patients without CRS.

Methods:

Retrospective chart review was performed from 1998 to 2014 of patients with ICD-9 codes for headache or atypical facial pain at an academic medical center. Targeted treatment of migraine headaches in patients with CRS was evaluated and compared to a matched cohort of patients without CRS.

Results:

Of 923 patients reviewed, 67 patients were identified with CRS. Of these 67 patients, 29 had appropriate follow-up after Rhinologist-initiated migraine-targeted therapy (mean follow-up 10.0 months). Of these patients, 20 had active symptoms of CRS and 9 were stable. Forty-five patients with migraines without CRS were identified as controls (mean follow-up 6.6 months). No difference was found in treatment success of Rhinologist-initiated migraine-targeted therapy between groups: 82.8% in CRS patients and 82.2% in controls ($p=.95$).

Conclusions:

“Sinus headache” (migraine) is commonly encountered in patients with and without CRS, and can be treated with targeted therapy in both groups in an equally efficacious manner. Regardless of whether the patient has active or stable CRS, recognizing the signs and symptoms of migraine headaches followed by appropriate treatment can improve patient quality of life, eliminate a symptom that can cloud further CRS-directed treatment, and avoid unnecessary revision sinus surgery.

Poster #112

Trends in otolaryngology subspecialties in academia

Jiahui Lin, MD
 Ashutosh Kacker, MD
 Oscar Trujillo, MD
 Michael Stewart, MD, MPH
 New York, NY
 USA

Introduction:

Subspecialization has been increasing, particularly in academia. This study aims to characterize the role and hiring trends of subspecialties within academic Otolaryngology Departments.

Methods:

A cross-sectional survey study was created to evaluate past, present, and projected issues in the academic otolaryngology workforce. Data included faculty appointments, work hours, clinical and research roles, academic productivity, patient load, promotions, and criteria for future hires. Surveys were sent via e-mail from January to June 2014 to all academic chairpersons of accredited otolaryngology residency programs within the United States.

Results:

The response rate was 34.3%. On average, subspecialists made up 83% of otolaryngology faculty in academic Departments, and 13% of otolaryngologists practiced in an area of subspecialization without formal fellowship training. Head and Neck, Otolaryngology/Neurotology, and Facial Plastics and Reconstructive Surgery were the most frequently represented fellowship-trained subspecialties. Most otolaryngologists (42%) were employed as Assistant Professors, and 27% were appointed as Professors. Between 2009 and 2014, there was an average of six new hires per academic otolaryngology practice (range, 1 – 13), and of these new hires, 79% were subspecialists. Chairpersons estimated that in the next five years, they would hire an average of three new otolaryngologists per practice (range, 0 – 7). Sixty-one percent of new hires were predicted to be subspecialists, the most common of which were in Head and Neck, Pediatric Otolaryngology, and Otolaryngology/Neurotology.

Conclusions:

Subspecialists play a large role in academic Otolaryngology Departments. Head and Neck, Pediatric Otolaryngology, and Otolaryngology/Neurotology appear to be areas of growth within academic otolaryngology.

Poster #113

Two cases of nasal amyloidosis secondary to lymphoma

Ian Humphreys, DO
Peter Hwang, MD
Jayakar Nayak, MD, PhD
Stanford, CA
USA

Introduction:

Nasal manifestations of Amyloidosis are extremely rare with less than 20 cases reported. Amyloid deposition within the nose can result from a primary or secondary process. We present two cases of secondary nasal amyloidosis in the setting of Lymphoma. The diagnostic and management options are discussed as well as a brief review of the existing literature.

Methods:

Two separate cases of nasal amyloidosis were identified. Charts were reviewed for demographic, historical, laboratory, diagnostic, and management details. An English language literature search of PubMed and Medline with the terms "nasal, nose, sinus, or sinonasal" and "amyloid or amyloidosis" was performed on 1/3/15.

Results:

There were one female and one male patient, presenting in the 5th and 6th decades respectively. Both patients had previously been diagnosed with Lymphoma. Both patients presented with profound nasal obstruction. Workup included imaging and biopsy. Topical steroid irrigations provided marginal relief, however no other medical therapies were of benefit. One patient underwent surgery for nasal obstruction with improvement in symptoms at 6 months.

Conclusions:

Nasal amyloidosis is a rarely described clinical and pathologic entity. Nasal symptoms are non-specific. Management typically consists of a search for autoimmune disease, imaging, and biopsy. Medical treatments are typically delivered and offer marginal relief, if at all. Systemic therapies have no proven benefit. Surgery has a limited role to re-establish nasal patency, however recurrence of obstruction is almost certain. Currently, the literature is devoid of effective treatment options.

Poster #114

Uninsured patients present to emergency departments for acute rhinosinusitis with greater pain and nonspecific symptoms

Regan Bergmark, MD
Ahmad Sedaghat, MD, PhD
Boston, MA
USA

Introduction:

Our prior work has shown differential emergency department (ED) utilization for uncomplicated acute rhinosinusitis (ARS) by insurance status, with Medicaid and self-pay/uninsured patients disproportionately using the ED more often. This study investigates the association between patient-reported symptomatology and insurance status for patients presenting to EDs with ARS.

Methods:

1,632,826 adults from the 2006-2010 National Hospital Ambulatory Medical Care Surveys diagnosed with uncomplicated ARS at a hospital ED were included. Patient-reported reasons for presentation included in this study were constitutional symptoms, facial pain/headache, sinonasal symptoms, head cold/flu-like symptoms, cough/sputum production, and sore throat symptoms. Patient-reported pain level was also included. Symptoms were assessed for associations with insurance status after controlling for clinical, demographic and socioeconomic characteristics.

Results:

Compared to privately insured patients, self-pay/uninsured patients reported higher pain levels (beta_adjusted=0.37, 95%CI: 0.04 – 0.71, P=0.033) and were less likely to report sinonasal symptoms (adjusted odds ratio [OR_adjusted]=0.40, 95%CI: 0.19 – 0.83, P=0.017) or head cold/viral infection symptoms (OR_adjusted=0.19, 95%CI: 0.05 – 0.67, P=0.011). Insured patients were equally likely to report any of the studied reasons for ED presentation regardless of insurance type.

Conclusions and Relevance:

ED presentation for ARS in the self-pay/uninsured population may be related to more severe pain and symptoms that are not specific for ARS. Reducing unnecessary ED utilization for uncomplicated ARS, a condition appropriately treated in a primary care office, will require improving access to outpatient care and counseling. The insured population—presenting to EDs with more typical ARS symptoms and less severe pain—may be more readily targeted.

Poster #115

Utility of an intraoperative flexible endoscope as a diagnostic tool during far lateral supraorbital frontal sinus surgery

Eric Carniol, MD, MBA
Saurin Sanghvi, MD
Peter Svider, MD
Tapan Patel, MD
James Liu, MD
Jean Eloy, MD
Newark, NJ
USA

Introduction:

Frontal sinus (FS) disease management represents a challenging aspect of ESS. FS mucocele drainage may be an exception. Visualization of the extreme lateral aspect of the sinus is restricted in cases of supraorbital extension. Hardened material such as a mycetoma or bony fragments in the lateral recess of the supraorbital FS makes complete evacuation difficult. Often, a wider unilateral frontal sinusotomy (Draf IIB) or contralateral access via a modified Lothrop procedure (MLP) or modified hemi-Lothrop procedure (MHLP) is necessary to adequately visualize the lateral aspect of the sinus. We describe the utility of the flexible endoscope in a challenging case prior to a more aggressive technique.

Methods:

Case report.

Results:

An 82-year-old man, admitted for pneumonia, was noted to have left-sided ptosis for three weeks. CT scan demonstrated an expansile left FS mass causing expansion of the sinus with erosion of the posterior FS table and superior orbital wall. The patient underwent a Draf IIA procedure. Mycetoma-appearing material was removed. A 70-degree endoscope could not provide adequate visualization of the supraorbital FS recess. A flexible endoscope was then successfully used for visualization and remnant mycetoma was successfully removed. Bony dehiscence of the posterior table and orbital roof were evident, with fully intact mucosa. The patient had an uneventful postoperative course.

Conclusion:

In cases where visualization of the extreme lateral aspect of the FS is inadequate with rigid endoscopes, a flexible endoscope can be used as a simple diagnostic tool before a more aggressive and potentially unnecessary frontal sinusotomy.

Poster #116

Utility of early postoperative imaging after combined endoscopic and open ventral skull base surgery

Zachary Mendelson, BS
Lucia Diaz, MD
Kristen Echanique, BS
Alejandro Vazquez, MD
James Liu, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Introduction:

Following skull base surgery (SBS) with combined endoscopic endonasal and external approaches, immediate postoperative imaging is often obtained. The role of postoperative CT and MRI scans in these patients remains unclear. This study aims to determine the clinical utility of early postoperative CT and MRI scans after combined SBS.

Methods:

A retrospective chart analysis of 14 cases of combined SBS between 2009 and 2014 was performed. Data were collected regarding postoperative CT and MR imaging as well as hospital course. Interpretations of postoperative imaging were separated into two groups: 1) using radiologist's interpretation alone and 2) surgeon knowledge of the case in conjunction with imaging.

Results:

Twenty-eight postoperative scans were obtained (14 CT, 14 MRI) within 48 hours of surgery. There was no significant difference between imaging interpretation by surgeons and radiologists. For CT interpretation the true positive (TP), false positive (FP), true negative (TN) and false negative (FN) rates for radiologists (TP=0/14, FP=3/14, TN=7/14, FN=4/14) were similar for surgeons (TP=1/14, P= 1.000; FP=0/14; P=0.222; TN=10/14, P=0.439; FN=3/14, P=1.000). Rates for MRI interpretation by both groups were exactly the same (TP=0/14, FP=0/14, TN=10/14, FN=4/14). The rate of postoperative complications was 28.5% (4/14). Patients exhibited clinical symptoms in all instances of postoperative complications requiring intervention.

Conclusion:

The benefit of early postoperative imaging to detect complications after combined SBS may be limited. When positive imaging findings were noted in our cohort of patients, their effect on patient management was dictated by the presence of supporting clinical symptoms.

Poster #117

Utility of surgery and/or radiotherapy in metastatic sinonasal squamous cell carcinoma

Tapan Patel, MD
Milap Raikundalia, BS
Kevin Shaigany, BS
Alejandro Vázquez, MD
Soly Barades, MD
Jean Anderson Eloy, MD
Newark, NJ
USA

Introduction:

The aim of this study is to analyze the survival benefits of surgery and/or radiotherapy over no therapy in patients with distal metastatic (M1) squamous cell carcinoma of the sinonasal region (SNSCC).

Methods:

The Surveillance, Epidemiology, and End Results (SEER) database was queried for M1 SNSCC cases from 1973 to 2012. Patient demographics, initial treatment and survival outcomes were analyzed. Survival was analyzed using the Kaplan-Meier model.

Results:

Of the 125 patients identified with M1 SNSCC in the SEER database, 21 patients received no therapy, 53 patients received radiotherapy, 8 patients received surgery and 43 patients underwent surgery with adjuvant radiotherapy. The 5-year disease-specific survival rates were 16.64% for the no therapy group, 15.03% for the radiotherapy alone group, 37.50% for the surgery alone group and 22.72% for the surgery with radiotherapy group (p = 0.0002). Site-specific analysis revealed that surgery alone provides disease-specific survival benefit compared to no therapy at all sub-sites within the sinonasal region.

Conclusions:

Our results show that surgery, which has been shown to improve quality of life in patients with advanced head and neck cancer, may also provide some survival benefit in patient with metastatic squamous cell carcinoma of the sinonasal region.

Poster #118

Variation of hospital and surgeon cost for adult septoplasty and turbinate reduction

Andrew Thomas, MD
Reema Padia, MD
Jeremiah Alt, MD, PhD
Sathya Vijayakumar, MS
Trevor Champagne, BA
Jeremy Meier, MD
Salt Lake City, UT
USA

Objectives:

Review differences in hospital and surgeon costs associated with septoplasty and turbinate reduction in adult patients.

Methods:

An observational cohort study was performed in a multi-hospital network using a standardized activity-based accounting system to determine costs associated with septoplasty and bilateral inferior turbinate reduction from 1/2012 to 5/2015. Adults (> 18) were included. Hospital cost categories analyzed included: Anesthesia, Operating Room (OR), Pharmacy, Post-anesthesia Care Unit (PACU), Same-Day-Surgery (SDS). There were 88 surgeons included in the study.

Results:

The study cohort initially included 3,874 patients. There were 1,342 patients with no OR Cost (the greatest cost component) which were excluded from total cost calculation. The mean total cost for the remaining 2,532 patients was \$3011.84 (S.D. \$1575.1, Range \$545.6 to \$21,201.12). Related hospital stays were included in total cost. OR was the greatest average cost per case (\$1465.8), followed by SDS (\$459.12), and pharmacy (\$139.7). There was wide variation of average cost per case per surgeon ranging from \$171.71 to \$8524.97.

Conclusion:

This study demonstrates that there is a wide variation in cost associated with the common general Otolaryngology procedure of septoplasty and inferior turbinate reduction. OR, SDS, and pharmacy costs represent the largest contribution to overall cost and potential areas for further investigation on cost reduction associated with these procedures. There also is wide variation among the average cost per case for surgeons performing these procedures. Further research is needed to identify factors contributing to large variation in operative cost for these procedures.

Poster #119

Vidian nerve schwannoma: A rare cause of skull base neoplasm presenting with ocular manifestations

Farzad Masroor, MD
Jonathan Liang, MD
Oakland, CA
USA

Introduction:

Vidian nerve schwannomas are an exceedingly rare entity, with only six cases reported since 2006. Presenting ocular symptoms have only been reported in one case.

Methods:

Case report and review of literature. A 54 year-old female presented with three months of right periorbital pressure, third cranial nerve palsy, and visual field defect.

Results:

CT and MRI showed a large right-sided expansile sphenoid/parasellar skull base mass with obliteration of the vidian canal. The neoplasm extended into the pterygopalatine fossa (PPF), but did not violate the cavernous sinus or middle cranial fossa. Nasal endoscopy showed a fibrous mass extending from the sphenoidal recess. The patient underwent an extended endoscopic resection including bilateral sphenoidotomy, posterior septectomy, and PPF dissection. Intraoperatively, there were multiple islands of bony dehiscence along the skull base, optic nerve, and cavernous carotid artery; the dura remained intact without CSF leak. Microscopic margins were positive at the PPF. Pathology demonstrated uniform S-100-positive spindle cells arranged in intersecting fascicles, consistent with a schwannoma. Postoperatively, the patient had improvement of ocular symptoms, with no gross disease on six-month follow-up.

Conclusion:

We present the first case of a vidian nerve schwannoma presenting predominantly with ocular symptoms, including vision loss. This is a rare subset of facial nerve schwannomas that can present as a skull base mass. Ocular symptoms can be secondary to mass effect. Consideration should be given to this entity in the setting of typical radiographic and histopathologic characteristics. Endoscopic approaches to resection are safe and with low morbidity.

Poster #120

**Zones of endoscopic pedicled nasoseptal flap reconstruction:
A paradigm for site-directed flap design**

Jean Anderson Eloy, MD
Alejandro Vazquez, MD
Mike Pfisterer, MD
Leila Mady, MD
Belachew Tessema, MD
James Liu, MD
Newark, NJ
USA

Introduction:

The vascularized pedicled nasoseptal flap (PNSF) represents the technique of choice for repair of large ventral skull base (SB) defects after endoscopic SB surgery. This flap is designed in many fashions based on defect site/size. Through a cadaveric model, we describe these various PNSF designs using photo and video documentation. Clinical examples are discussed.

Methods:

Photo and video documentation in cadaveric dissections are used to illustrate the designs of optimal PNSFs for 5 ventral SB regions.

Results:

We divide the ventral SB into 5 general regions: 1) cribriform, 2) planum/tuberculum sellae, 3) sella, 4) clival/odontoid, and 5) lateral corridors. In contrast to other regions, the cribriform area necessitates maximization of the PNSF length, and often width, based on the size of the defect. The planum/tuberculum sellae relies significantly on a longer PNSF due to the need to cover the posterior wall of the sphenoid sinus and to reach the anterior edge of the defect. The sella region is anatomically less challenging, permitting safe repair with an average PNSF length and width. Considering sphenoid rostrum resection and subsequent shortening of the PNSF rotational arc, the clival/odontoid region typically necessitates relatively shorter flaps. The lateral corridors can be successfully repaired with shorter length PNSFs, but flap widths are guided by the defect size.

Conclusions:

The anatomical diversity of the ventral SB requires various PNSF designs to achieve optimal endoscopic SB reconstruction. Each of the previously mentioned regions can benefit from a unique overall design for endoscopic SB repair using the PNSF.

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