



COSM 2022

April 28-29, 2022

**Hyatt Regency Dallas,
Dallas, TX**



PROGRAM GUIDE



Rodney Schlosser, MD, FARS

Presidential Welcome to the ARS at COSM 2022



As the President of your society, I have had the privilege of seeing the “30,000-foot view” for the last several years and I can assure you that our society is energetic, vibrant and engaged! I’m excited to continue our in-person meetings that have been some of the most successful in the history of the ARS. We will meet in Dallas this spring and Sarah Wise, the Program Chair and President-Elect, has put together an outstanding program. I look forward to more intimate, small group interactions between some of our junior members and Past Presidents as part of her “Targeted Conversations on Important Topics”. Based upon some of our Past Presidents, I’m confident this will be enlightening as well as entertaining!

In addition to the latest clinical topics, we will also have a number of presentations on Humanitarian Efforts, Social Media, Resilience and the Medical Family, as we endeavor to comprehensively address medical and non-medical topics of interest to you, our members. I look forward to seeing everyone in person as we continue to conduct our meetings in the safest manner possible, while maintaining our high standards for educational quality.

Rodney J. Schlosser, MD, FARS
President, American Rhinologic Society



Welcome from the Program Chair



Sarah K. Wise, MD, FARS

As we learn to live with the ups and downs of COVID, we are excited to welcome you to a fantastic American Rhinologic Society Spring Meeting at COSM! Building upon the success of two fantastic in-person meetings in the latter half of 2021 – the Summer Sinus Symposium in Austin, and the Annual Meeting in Los

Angeles – the ARS 2022 Spring Meeting promises to be interactive, thought-provoking, and fun. Appropriate safety precautions are in place, and we look forward to sharing this time with you at the Hyatt Regency in Dallas, TX on April 28-29.

Known for excellent scientific presentations, the 2022 ARS Spring Meeting will not disappoint! We have over 55 scientific oral presentations and over 100 posters planned for the meeting. The abstract review committee worked diligently to grade numerous submitted abstracts in a timely fashion, ensuring a high quality scientific program for our attendees. Scientific oral presentations will cover COVID-19 Olfactory Disturbance, Rhinologic Procedures and Sinus Surgery, Skull Base, Systemic Conditions with Rhinologic Manifestations, CRS Pathophysiology, Symptom Burden and Social Determinants of Health, as well as the Top Clinical and Top Basic Science Abstract presentations. We look forward to hearing about the extraordinary research that continues to advance scientific knowledge in rhinology!

Together with the ALA and AHNS, we will sponsor a Thursday afternoon lecture by Dr. Wayne Sotile on the topic of “Resilience”. This topic is very timely and we are eager to present this session with other subspecialty societies. We will also learn from expert panels on Cystic Fibrosis, Ergonomics in Sinus and Skull Base Surgery, Allergic Fungal Rhinosinusitis, and Skull Base Surgery Considerations Across the Lifespan. Short, high-yield sessions titled “Targeted Conversations on Important Topics” will also be presented. These sessions will feature discussions between early-mid career rhinologists and several ARS Past Presidents on pertinent areas of rhinology – Biologics for Nasal Polyposis, Social Media, Humanitarian Efforts, Managing the Orbit in Invasive Fungal Sinusitis, Frontal Sinus Osteoplastic Flap vs Draf III, and more.

Thursday’s scientific session will be capped off with the ARS Welcome Reception. Friday morning will get started with a breakfast session on “The Medical Family” presented by guest speaker Wayne Sotile, PhD – co-sponsored by the Women in Rhinology and the Diversity and Inclusion Committee. Many thanks in advance to our speakers, planners, and attendees. We sincerely appreciate your continued support and engagement with the American Rhinologic Society.

ARS at COSM 2022 Program Committee

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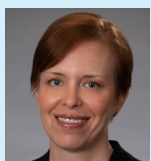
American Rhinologic Society Executives - 2022



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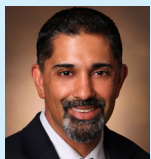
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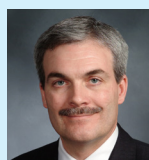
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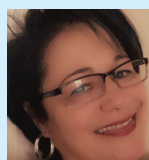
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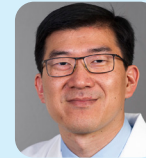
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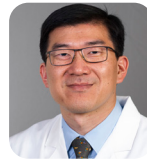
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ARS Mission Statement

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

ARS designates this live activity for a maximum of 11.25 AMA PRA Category 1 Credit(s)[™]. 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:

- Understand new developments in rhinosinusitis pathophysiology and mechanisms.
- Evaluate new evidence related to olfactory/rhinologic disturbance in COVID-19.
- Assess disease-specific and quality of life outcomes in sinonasal and skull base conditions.
- Evaluate evolving therapeutic options for the treatment of rhinologic conditions.

How to obtain your CME certificate:

1. Go to <http://ars.cmecertificateonline.com>
2. Click on the "ARS at COSM 2022" link.
3. Evaluate the meeting and click the hyperlink provided on the last page to claim your credit certificate.
4. Save/Download/Print all pages of your certificate for your records.

Questions?

Email Certificate@AmedcoEmail.com



ARS PRESENTS

The Thriving Medical Family

Guest Speaker

Wayne M. Sotile, PhD

Sponsored by Women in Rhinology and the Diversity & Inclusion Committee

April 29, 2022

7 AM CST



**Landmark Ballroom C | Hyatt Regency
Dallas, Texas**

ARS at COSM 2022 Scientific Abstract Reviewers

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Christopher Low, MD

Sonya Marcus, MD

As of 4/19/22

Visit our patient-facing website!



PRESENTATIONS - PROGRAM AT-A-GLANCE

Thursday, April 28, 2022 Morning Session 8:00 am – 12:00 pm CST Landmark Ballroom C

8:00 am – 8:05 am

Welcome & Introduction

Rodney Schlosser, MD, FARS; Sarah Wise, MD, FARS

Scientific Oral Presentations: Top Rated Abstracts - Session I

Moderators: Kara Detwiller, MD, FARS; Charles Ebert, MD, FARS; Jose Mattos, MD

8:05 am - 8:13 am

Non-allergic rhinitis and air pollution exposure

Zechariah Franks, MD

8:14 am – 8:22 am

A comparative analysis of endoscopic sinus surgery versus biologics

Amar Miglani, MD

8:23 am – 8:31 am

Association of cytokine profile with treatment failure and revision sinus surgery in CRS

Elizabeth Longino, MD

8:32 am – 8:40 am

Impact of long-acting implantable corticosteroid matrices on SNOT-22 subdomains in CRS patients

Anders Cervin, MD, PhD

8:41 am – 8:49 am

Effect of bevacizumab injection on epistaxis in HHT patients undergoing surgical cauterization

Ashoke Khanwalkar, MD

8:50 am - 8:55 am

Q&A

8:55 am - 9:04 am

Awards Ceremony

Jean Kim, MD, FARS

9:05 am - 9:45 am

PANEL: Revisiting the Controversial Role of Fungi in CRS: Examination of Allergic Fungal Rhinosinusitis

Moderator: Amber Luong, MD, PhD, FARS

Panelists: Amin Javer, MD, FARS; Joshua Levy, MD, FARS; Matthew Ryan, MD, FARS

Sponsored by Allergy & Immunology in Rhinology Section

9:45 am - 10:15 am

Break with Exhibitors - Marsalis Hall

Scientific Oral Presentations: Top Rated Abstracts - Session II

Moderators: Naweed Chowdhury, MD; Ashleigh Halderman, MD, FARS; David Jang, MD, FARS

10:15 am – 10:23 am

Chronic IL-13 expression in mouse olfactory mucosa results in progressively aneuronal epithelium

Ani Saraswathula, MD

10:24 am – 10:32 am

Unsupervised clustering of olfactory phenotypes

Rodney Schlosser, MD, FARS

10:33 am – 10:41 am

Olfactory epithelium tropism of SARS-CoV-2 and age-dependent intracranial spread via olfactory axons

Andrew Lane, MD, FARS

10:42 am – 10:50 am

Determinants of SARS-CoV-2 entry and replication in airway mucosa and susceptibility in smokers

Jayakar Nayak, MD, PhD

10:51 am – 10:59 am

Non-invasive biomarker and artificial intelligence model for differentiation of CRSwNP and CRSsNP

Sarina Mueller, MD

11:00 am - 11:05 am

Q&A

11:05 am - 11:20 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Humanitarian Efforts in Rhinology

Moderator: Danielle Warner, MD, FARS

Anthony Del Signore, MD; Rodney Schlosser, MD, FARS

11:20 am – 12:00 pm

PANEL: Cystic Fibrosis CRS: A New Era

Moderator: Ashleigh Halderman, MD, FARS

Panelists: Daniel Beswick, MD, FARS; Do-Yeon Cho, MD; David Gudis, MD, FARS; Stella Lee, MD

Sponsored by the Pediatric Rhinology Committee

12:00 pm - 1:00 pm

Lunch with Exhibitors - Marsalis Hall

Thursday, April 28, 2022
Afternoon Session
1:00 pm – 5:00 pm CST
Landmark Ballroom C

Scientific Oral Presentations: COVID-19 and Olfaction

Moderators: Angela Donaldson, MD, FARS; Nicholas Rowan, MD; Ahmad Sedaghat, MD

1:00 pm - 1:06 pm

Nasal inflammation in COVID-19

Katherine Chang, MD

1:07 pm - 1:13 pm

COVID-19 versus CRS/rhinitis associated olfactory dysfunction on health utility and quality of life

Thanh Luong, BS

1:14 pm – 1:20 pm

A longitudinal study of olfactory dysfunction and parosmia in mild COVID-19 cases

Aurelia Monk, BA

1:21pm – 1:27 pm

Long term olfactory dysfunction in COVID-19

Andy Chua, MBBS

1:28 pm - 1:34 pm

Impact of saline irrigations in non-hospitalized patients with COVID-19

Kyle Kimura, MD

1:35 pm - 1:40 pm

Q&A

1:40 pm - 1:55 pm

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Current Treatment for COVID-induced Olfactory Loss

Moderator: Dana Crosby, MD, FARS
 Carol Yan, MD; Peter Hwang, MD, FARS

1:55 pm - 2:45 pm

KEYNOTE SPEAKER: Wayne Sotile, PhD

Title: "Resilience"

Combined ARS, ALA, AHNS Session
 Presented Virtually

2:45 pm - 3:15 pm

Break with Exhibitors - Marsalis Hall

Scientific Oral Presentations: Sinus Surgery

Moderators: Elisabeth Ference, MD, FARS; Marilene Wang, MD, FARS; Zachary Soler, MD, FARS

3:15 pm – 3:21 pm

Development of an endoscopic sinus surgery preoperative checklist with the Delphi method

Stephen Leong, BA

3:22 pm – 3:28 pm

Long-duration pain block for postoperative analgesia after sinus surgery

Jessica Bishop, MD

3:29 pm - 3:35 pm

3D models to accelerate resident surgical learning curve for endoscopic sinus surgery techniques

Jumah Ahmad, MD

3:36 pm – 3:42 pm

Image-guided surgical device failures in functional endoscopic sinus surgery: a MAUDE analysis

Samir Hassanin, BA

3:43 pm - 3:49 pm

Ergonomic analysis of hand fatigue in endoscopic sinus surgery

Mason Krysinski, MD

3:50pm – 3:56 pm

Measurements of foot-pedal reaction time and hand accuracy in seated vs. standing position

Bennett Ahearn

3:57 pm - 4:05 pm

Q&A

4:05 pm - 4:20 pm

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Biologics vs Sinus Surgery: Is it either/or?

Moderator: Jivianne Lee, MD, FARS
 Kevin Welch, MD, FARS; David Kennedy, MD, FARS

4:20 pm - 5:00 pm

PANEL: Ergonomics, Longevity, and Wellness in Sinus and Skull Base Surgery

Moderator: Vijay Ramakrishnan, MD, FARS
 Panelists: Raewyn Campbell, MD, FARS; Sanjeet Rangarajan, MD, FARS; Renee Witherspoon, Occupational Hygiene and Safety Manager, Research, Campus, and Environmental Safety

5:00 pm - 5:10 pm

Business Meeting

5:30 pm - 7:00 pm

ARS President's Welcome Reception - Reunion C

Friday, April 29, 2022
Morning Session
7:00 am – 12:00 pm CST
Landmark Ballroom C

7:00 am – 8:00 am

BREAKFAST SESSION

Guest Speaker: Wayne Sotile, PhD

Title: "The Medical Family"

Presented Virtually

Sponsored by the Women in Rhinology Section and Diversity & Inclusion Committee

Scientific Oral Presentations: Rhinologic Procedures & Skull Base

Moderators: Mathew Geltzeiler, MD, FARS; Abtin Tabaei, MD, FARS; Elina Toskala, MD, FARS

8:00 am - 8:06 am

Randomized controlled trial for nasal packing post HHT laser treatment

Justin Pyne, MD

8:07 am – 8:13 am

Middle turbinate attachment's relationship with in-office procedure response for vasomotor rhinitis

Omar G. Ahmed, MD

8:14 am – 8:20 am

Does septoplasty and inferior turbinate reduction impact exercise capacity? A prospective study

Sei Chung, MD

8:21 am - 8:27 am

The incidence of new-onset postoperative diplopia after medial & inferior orbital wall decompression

Tory McKnight, BS

8:28 am – 8:34 am

SNOT-22 scores after repair of CSF rhinorrhea

Matthew Liu, BS

8:35am - 8:41 am

Transverse venous sinus stenting in idiopathic intracranial hypertension

Peter Filip, MD

8:42 am - 8:50 am

Q&A

8:50 am - 9:30 am

PANEL: Endoscopic Skull Base Surgery: Considerations Across the Lifespan

Moderator: Stacey Gray, MD, FARS

Panelists: Nithin Adappa, MD, FARS;

Roy Casiano, MD, FARS; Uma Ramaswamy, MD;

Meghan Wilson, MD

Sponsored by Skull Base and Orbital Surgery & Women in Rhinology Sections

9:30 am - 9:45 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Managing the Orbit in Invasive Fungal Sinusitis

Moderator: Corinna Levine, MD, FARS

Justin Turner, MD, FARS; John DelGaudio, MD, FARS

9:45 am - 10:15 am

Break with Exhibitors - Marsalis Hall

Scientific Oral Presentations: Systemic Diseases Associated with Rhinologic Conditions

Moderators: Cecelia Damask, DO; Sonya Marcus, MD; Jeffrey Suh, MD, FARS

10:15 am – 10:21 am

Radiologic improvement in chronic rhinosinusitis in patients with CF treated with CFTR modulators

Tyler Merrill, MD

10:22 am - 10:28 am

Correlations between sinus CT and quality of life improvement with CFTR modulator therapy

Jessa Miller, Resident Physician

10:29 am - 10:35 am

Cystic fibrosis responders to endoscopic sinus surgery

Ashleigh Halderman, MD, FARS

10:36 am - 10:42 am

Cystic fibrosis chronic rhinosinusitis: An evidenced-based review with recommendations

Daniel Spielman, MD

10:43 am – 10:49 am

Genetics and olfactory dysfunction in primary ciliary dyskinesia

Zainab Farzal, MD, MPH

10:50 am – 10:56 am

Olfactory decline predicts frailty in older US adults with chronic lung disease

Esther Wang, BS

10:57 am - 11:05 am

Q&A

11:05 am - 11:20 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Social Media in Rhinology

Moderator: Greg Davis, MD, FARS
Zara Patel, MD, FARS; Michael Setzen, MD, FARS

**Scientific Oral Presentations:
Pathophysiology and Mechanisms**

Moderators: Esther Kim, MD; Edward Kuan, MD, FARS; Nyall London, MD, FARS

11:20 am – 11:26 am

Nitric oxide generating microparticles: anti-biofilm efficacy and sinonasal epithelial cell toxicity

Kevin Li, MD

11:27 am – 11:33 am

Denatonium-responsive bitter receptors and AERD

Jennifer Douglas, MD

11:34 am – 11:40 am

Succinate activates solitary chemosensory cells (SCCs) in the nose

Elizabeth Sell, Medical Student

11:41 am – 11:47 am

Pseudomonas biofilms in patients with chronic rhinosinusitis

Sarah Khalife, MD

11:48 am – 11:54 am

In-vitro release of triamcinolone acetonide from saturated sinus dressings

Do-Yeon Cho, MD

11:55 am - 12:00 pm

Q&A

12:00

Meeting Adjourns

**Friday, April 29, 2022
Morning Concurrent Session
8:00 am – 12:00 pm CST
Reunion Ballroom C**

Scientific Oral Presentations: Patient Perceptions and Social Determinants

Moderators: Edward McCoul, MD, FARS; Theodore Schuman, MD, FARS; Zara Patel, MD, FARS

8:00 am – 8:06 am

Sinonasal outcomes in patients treated for AERD

Glen D'Souza, MD

8:07 am - 8:13 am

Quality of life in CRS patients treated with long-acting implantable corticosteroid matrices

Anders Cervin, MD, PhD

8:14 am - 8:20 am

I got sinus - what do we mean when we have a 'sinus infection'?

Edward McCoul, MD, FARS

8:21 am – 8:27 am

The rising cost of rhinological medications: a NADAC analysis

Milind Vasudev, BS

8:28 am – 8:34 am

Health literacy in rhinology patients

Abdullah Zeatoun, MD

8:35 am – 8:41 am

Impact of social determinants of health on access to rhinology care and patient outcomes

Esther Wang, BS

8:42 am - 8:50 am

Q&A

8:50 am - 9:10 am

A CONVERSATION WITH THE EDITOR-IN-CHIEF: Preparing a Publishable Paper

Lauren Roland, MD; Timothy Smith, MD, FARS

9:10 am - 9:30 am

TIPS FROM THE EXPERTS: Starting a Career as a Surgeon-Scientist

Moderator: Victoria Lee, MD

Panelists: Noam Cohen, MD, FARS; Andrew Lane, MD, FARS

9:30 am - 9:45 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Odontogenic Sinusitis

Moderator: Angela Donaldson, MD, FARS
Panelists: John Craig, MD, FARS; Todd Kingdom, MD, FARS

9:45 am - 10:15 am

Break with Exhibitors - Marsalis Hall

**Scientific Oral Presentations:
Pathophysiology and Mechanisms**

Moderators: Mark Arnold, MD; Philip Chen, MD, FARS; Mindy Rabinowitz, MD, FARS

10:15 am – 10:21 am

Is there a correlation between radiographic and histologic findings in rhinosinusitis?

Do-Yeon Cho, MD

10:22 am – 10:28 am

Site-specific detection and differential expression of inflammatory markers in the sinonasal mucosa

Wesley Stepp, MD, PhD

10:29 am – 10:35 am

Association between specific endotypes and the presence of discharge or edema after ESS for CRS

Eli Stein, Medical Student

10:36 am – 10:42 am

Histopathologic differences in adult and pediatric patients with chronic rhinosinusitis

Sarah Khalife, MD

10:43 am - 10:49 am

Tissue eosinophilia is a superior metric compared to polyp status for RNA sequencing in CRS tissue

Tripti Kaur Brar, MBBS, MD

10:50 am – 10:56 am

HIF1-alpha regulates human nasal epithelial cell growth in nasal polyposis

Austin Mattox, Medical Student

10:57 am – 11:05 am

Q&A

11:05 am – 11:19 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Standard of Care in Extended Frontal Sinus Surgery: Does Anyone Learn Osteoplastic Flaps Anymore?

Moderator: Raj Sindwani, MD, FARS
Panelists: Stacey Gray, MD, FARS; James Palmer, MD, FARS

Scientific Oral Presentations: Symptom and QOL Measures in Rhinologic Conditions

Moderators: Naveen Bhandarkar, MD, FARS; Garret Choby, MD, FARS; Stephanie Joe, MD, FARS

11:20 am – 11:26 am

Sham-controlled trial of a novel device for the treatment of viral upper respiratory tract infection

Thomas Edwards, MD

11:27 am - 11:33 am

Eustachian tube dysfunction (ETD) in chronic rhinosinusitis with comparison to primary ETD

Tiffany Chen, Clinical Research Fellow

11:34 am – 11:40 am

CRS in asthma is not associated with worse Asthma Control Test responses

Amarbir Gill, MD

11:41 am – 11:47 am

Correlations between three validated olfactory tests

Michael Shih, BS

11:48 am – 11:54 am

Drug-induced olfactory and gustatory dysfunction

Peter Debbaneh, MD

11:55 am - 12:00 pm

Q&A

12:00 pm

Meeting Adjourns

Posters**1st Combined Group****ARS, AAFPRS, AHNS, ALA (Marsalis Hall)****Wednesday, April 27****Poster Viewing: 1:00 pm – 7:00 pm****Meet the Authors: 5:30 pm – 6:00 pm****Thursday, April 28****Poster Viewing: 9:00 am – 7:00 pm****Meet the Authors: 5:30 pm – 6:00 pm**

Poster C001

A population-based analysis of nodal and distant metastases in sinonasal adenoid cystic carcinoma

Jack Birkenbeuel, BS

University of California, Irvine

Poster C002

Advances in 3D printing for patient specific sinus and skull base surgery

Ricardo Pulido, MD

Poster C003

An objective evaluation of popular nasal irrigation systems

Garret Berk, BS

Poster C004

Antibiotic irrigations for acute on chronic rhinosinusitis in patients with identical drug allergies

Jessa Miller, MD

UCLA

Poster C005

AROMA: Real-world global registry to assess long-term outcomes of Dupilumab treatment in CRSwNP

Adam Chaker

Technical University of Munich

Poster C006

Assessing the efficacy of sclerotherapy in patients with hereditary hemorrhagic telangiectasia

Anna Jenkins, Medical Student

Mayo Clinic School Alix of Medicine

Poster C007

Association between hypoalbuminemia and postoperative outcomes of pituitary tumor resection

Sree Chinta

Poster C008

Association of frailty with surgical outcomes with transoral approach to the cervical spine

Mehdi Lemdani, BA

Rutgers New Jersey Medical School

Poster C009

Chronic rhinosinusitis and sickness behavior: Cytokine profile systematic review

Wasiq Nadeem, BS

UT Health San Antonio

Poster C010

Chronic rhinosinusitis and statins

Mustafa Bulbul, MD, MPH

Poster C011

Combined endoscopic sinus surgery and septal perforation repair: SNOT-22 outcomes and closure rates

Tripti Kaur Brar, MBBS, MD

Mayo Clinic, Arizona

Poster C012

Comorbid psychological and pain diagnoses in the pauci-inflammatory endotype of CRS

Alex Labby, MD

Vanderbilt University Medical Center

Poster C013

Comparison of endoscopic polyp grading scales

Seth Jeong, BA

Poster C014

Complicated sinusitis secondary to streptococcus intermedius: A pediatric case series

Alexander Duffy, MD

Thomas Jefferson University Hospital

Poster C015

Composite reverse septal flap for nasal tip support after subtotal septectomy

Kody Bolk, MD

LSUHSC

Poster C016

WITHDRAWN

Poster C017

CRS cognitive impairment review

Hannan Qureshi, MD

University of Washington

Poster C018

Diabetes mellitus and clinical outcomes following epistaxis treatment

Avneet Randhawa, BS

Rutgers University New Jersey Medical School

Poster C019

Diets in asthma and AERD

Marie Lundberg, MD, PhD

Poster C020

Does lumbar drain affect outcomes for endonasal resection of pituitary neoplasms?

Benjamin Bitner, MD

University of California Irvine Medical Center

Poster C021

Does understanding expectations improve patient satisfaction and communication in rhinology

Eric Du, BS

UC San Diego

Poster C022

Dopamine reward and olfaction

Eve Champaloux, MD, PhD

University of Washington

Poster C023

Effect of chronic obstructive pulmonary disease on endoscopic sinus surgery

Christopher Pettit

Poster C024

Effect of hypertension in transsphenoidal surgery outcomes

Avneet Randhawa, BS

Rutgers University New Jersey Medical School

Poster C025

Effect of obesity following inpatient epistaxis treatment

Avneet Randhawa, BS

Rutgers University New Jersey Medical School

Poster C026

Effect of weight loss on chronic rhinosinusitis

Vraj P. Shah, BS

Rutgers New Jersey Medical School

Poster C027

Effects of midvault repair techniques on nasal drug delivery

Raluca Gosman, BS

Poster C028

Endoscopic endonasal approach to intraconal malignant tumor of the orbit

Dhruv Sharma, MD

Indiana University

Poster C029

Endoscopic repair of iatrogenic carotid artery injury using a lateral tongue muscle patch

Nikita Chapurin, MD, MHS

Vanderbilt University Medical Center

Poster C030

Evaluating distance bias in chronic rhinosinusitis outcomes

Amarbir Gill, MD

University of Utah

Poster C031

Evaluating opioid prescriptions after functional endoscopic sinus surgery (FESS) and/or septoplasty

Landon Larabee, BS

Poster C032

Extra-nasopharyngeal angiofibromas: Case report and literature review

Elizabeth Jee, MD

Louisiana State University

Poster C033

WITHDRAWN

Poster C034

Frailty predicts worse survival in sinonasal squamous cell carcinoma

Rijul Kshirsagar, MD

University of Pennsylvania

Poster C035

Frailty status and dietary patterns in adults with olfactory dysfunction

Nicholas Rowan, MD

Johns Hopkins University Medical Center

Poster C036

Frailty status and perioperative outcomes in sinonasal tumors

Nicholas Rowan, MD

Johns Hopkins University Medical Center

Poster C037

Free mucosal grafting and bioabsorbable steroid-eluding stents in skull base surgery

Ashutosh Kacker, MD

WCMC

Poster C038

Granulomatosis with polyangiitis and invasive fungal sinusitis

Isabelle Gengler, MD

University of Cincinnati

Poster C039

Head position for drug delivery to OMC and MS in patients with CRS

Carson Popper, Medical Student

Poster C040

Histopathologic characterization of pediatric chronic rhinosinusitis

Hannah Brown, BS
Rush Medical College, Rush University Medical Center

Poster C041

Hypoalbuminemia and open anterior skull base surgery

Rushi Patel, BA
Rutgers New Jersey Medical School

Poster C042

IIH related CSF rhinorrhea leaking through an ecchordosis physaliphora

Mackenzie Noonan

Poster C043

Image guided obturator design and fabrication for maxillectomy defect in the case of IFS

John Lally, MD
US ARMY

Poster C044

Impact of a combination CFTR modulator on mucosal inflammation in CF patients

Neil Patel, MD, MSc
University of California San Francisco

Poster C045

Impact of combination surgery and radiation therapy on survival in esthesioneuroblastoma

Ryan Jin, BS
Rutgers New Jersey Medical School, Newark, NJ

Poster C046

Impact of delay in treatment on survival in sinonasal undifferentiated carcinoma

Anas Qatanani, BS

Poster C047

Impact of Dupilumab on sleep/function scores in patients with CRSwNP

William Busse
University of Wisconsin

Poster C048

WITHDRAWN

Poster C049

Improvement in 'taste', and association with smell with Dupilumab-treated patients in CRSwNP

Anju T. Peters, Professor
Northwestern University

Poster C050

Improvement in rhinologic symptoms and quality of life in CF patients undergoing combination therapy

Jeremy Tervo, Medical Student
Columbia University Vagelos College of Physicians & Surgeons

Poster C051

Incidence of invasive fungal sinusitis prior to and during the COVID-19 pandemic

Maggie Donovan, Medical Student
University of Arizona College of Medicine – Phoenix

Poster C052

Income disparities in chronic rhinosinusitis management

Vraj P. Shah, BS
Rutgers New Jersey Medical School

Poster C053

Infratemporal fossa mature teratoma in a pediatric patient: A case report

Keonho Kong, MD
University of North Carolina

Poster C054

Internet search for balloon sinuplasty

Vivek Pandrangi, MD
Oregon Health & Science University

Poster C055

Inverted papilloma during pregnancy: A case report

Antonella Loperfido, MD
San Camillo Forlanini Hospital
Rome, Italy

Poster C056

Management of acute sinusitis with orbital complications: A systematic review

Anusha Sherwani
Long School of Medicine

Poster C057

Management of intracranial complications of acute sinusitis: A systematic review

Leslie Kim
Long School of Medicine

Poster C058

WITHDRAWN

Poster C059

Metabolic syndrome and skull base surgery

Khodayar Goshtasbi, MS, MD
University of California Irvine School of Medicine

Poster C060

Monoclonal antibodies and chronic rhinosinusitis with nasal polyps: our multidisciplinary experienceAntonella Loperfido, MD
San Camillo Forlanini Hospital, Rome, Italy

Poster C061

Multi-institutional review of sinonasal and skull base chondrosarcoma: A 20-year experienceJacob G. Eide, MD
University of Pennsylvania

Poster C062

Nasal septal perforations of unknown etiologyTravis Haller, MD
Mayo Clinic

Poster C063

Nasal swell body characteristics in patients with septal perforationsDaniela Brake, MD
Mayo Clinic Arizona

Poster C064

Nasopharyngeal depth and facial anthropometry: A normative analysisAlexander Dickie, MD
University of Western Ontario

Poster C065

ODS management durationAbdulkader Yassin-Kassab, MD
University of Pittsburgh Medical Center

Poster C066

Orbital pseudotumor associated with CRS and fungus ball responsive to antifungalsEmma West, MD
VCU Health System

Poster C067

Pain control with sphenopalatine ganglion block after endoscopic sinus surgery

Neelam Phalke, MD

Poster C068

Parosmia and COVID-19: An evidence-based review with recommendations for the clinicianJoseph Gary
Vagelos College of Physicians & Surgeons at
Columbia University

Poster C069

Patient risk factor analysis for procedural intervention in management of epistaxisRachel Kearn, DO
SUNY Upstate Medical University

Poster C070

Patient safety indicator events vs. insurance type in transsphenoidal pituitary surgery patients

Keshav Kumar, MPH

Poster C071

Patient volume and online ratings for academic rhinologists in the United StatesKelsey Roman, BS
University of California, Irvine

Poster C072

Patterns of care for elderly patients with sinonasal undifferentiated carcinomaChristopher Didzbalis, BA
Rutgers New Jersey Medical School, Newark, NJ

Poster C073

WITHDRAWN

Poster C074

Postoperative impact of delay in surgery in patients undergoing ventral skull base surgeryMehdi Lemdani, BA
Rutgers New Jersey Medical School

Poster C075

Postoperative impact of transfer status for patients undergoing ventral skull base surgeryMehdi Lemdani, BA
Rutgers New Jersey Medical School

Poster C076

Postoperative sinonasal infection following endoscopic skull base surgery

Dean Chung, BA

Poster C077

Pott's puffy tumor: A review of the literature

Rebecca Rohde, MD, MPH

Poster C078

Prevalence of type 2 inflammatory signatures in patients with CRSwNP from 2 phase 3 clinical trialsClaus Bachert, MD
Ghent University

Poster C079

Primary ciliary dyskinesia: a case of misdiagnosis and an update on diagnostic toolsAdam Kimple, MD, PhD, FARS
University of North Carolina

Poster C080

Prophylactic antibiotics and septoplasty

Marie Lundberg, MD, PhD

Poster C081

Quantifying ethmoid sinus dimensions with relevance to skull base injury in endoscopic sinus surgeryMichael Chang, MD
Stanford University

Poster C082

Rates of antidepressant, anxiolytic, and ADHD medication use among patients undergoing ESS

Alan Workman, MD, MTR

Poster C083

Rationale and design for EDS-FLU trials in CRS without and with nasal polypsJames N. Palmer, MD, FARS
University of Pennsylvania

Poster C084

Real world use of Dupilumab for nasal polyposisIsaac Schmale, MD
University of Rochester Medical Center

Poster C085

Real-world persistence and adherence in subcutaneous allergen immunotherapy: A systematic reviewMichelle Park, MD Candidate
Johns Hopkins University School of Medicine

Poster C086

Reconstruction of oroantral fistulasNrusheel Kattar, MD
LSU-Health Sciences Center

Poster C087

Resilience and symptom severity in patients with sinonasal complaintsJames Kim, MD
Keck School of Medicine University of Southern California

Poster C088

Retrobulbar amphotericin B in the treatment of invasive fungal sinusitis with orbital involvementAshley Kraft, MD
LSUHSC NO

Poster C089

Review of the association between olfactory dysfunction and idiopathic intracranial hypertension

Sriram Navuluri, MD

Poster C090

Rhinosinusitis-related complications in transplant recipientEstephania Candelo, MD, MSc
Mayo Clinic

Poster C091

WITHDRAWN

Poster C092

SNOT-22 scores in CSF rhinorrheaMatthew Liu, BS
UT Austin - Dell Medical School

Poster C093

Spontaneous nasal septal abscess of odontogenic originAlexis Lakatta, BSA
University of Texas Medical Branch

Poster C094

WITHDRAWN

Poster C095

Symptom severity in primary English and non-English-speaking patients with sinonasal complaintsFrancis Reyes Orozco, BA
Keck School of Medicine University of Southern California

Poster C096

Systematic review of preoperative embolization in juvenile nasopharyngeal angiofibroma removal

Ashley Diaz, BS

Poster C097

Temporality and the relationship between radiographic and patient reported outcome severity in CRSEli Stein, Medical Student
Northwestern University Feinberg School of Medicine

Poster C098

The anatomy of revision sinus surgeryAshleigh Halderman, MD
University of Texas Southwestern

Poster C099

The predictive utility of SNOT-22Matthew Liu, BS
UT Austin - Dell Medical School

Poster C100

The weekend effect in transsphenoidal pituitary surgery: A national analysisVraj P. Shah, BS
Rutgers New Jersey Medical School

Poster C101

Transorbital management of incidental intracranial mass in a patient with AERD and nasal polyposisShaunak Amin, MD
University of Washington

Poster C102

Transsphenoidal pituitary surgery patients in the ICU

Rushi Patel, BA
Rutgers New Jersey Medical School

Poster C103

Treatment of skull base osteomyelitis

Ashleigh Halderman, MD, FARS
University of Texas Southwestern

Poster C104

Understanding the pathophysiology of olfactory dysfunction in cleft lip nasal deformity

Sarah Russel, MD
University of North Carolina - Chapel Hill

Poster C105

WITHDRAWN

Poster C106

Variation in computed tomography opacification in sinus disease: A snapshot in time

Sean Parsel, DO
Thomas Jefferson University

Poster C107

Virtual care versus in-person assessment: patient satisfaction at the otolaryngology clinic

Boipelo Tselapedi-Sekeitto, MD
University of Western Ontario, London, ON, Canada

Poster C108

YouTube rhinosinusitis video characteristics vary based on the search term used

Christopher Hornung, BS
University of Minnesota Medical School

ORAL PRESENTATIONS

Thursday, April 28, 2022

Morning Session

8:00 am – 12:00 pm CST

Landmark Ballroom C

8:00 am – 8:05 am

Welcome & Introduction

Rodney Schlosser, MD, FARS; Sarah Wise, MD, FARS

Scientific Oral Presentations: Top Rated Abstracts – Session I

Moderators: Kara Detwiller, MD, FARS; Charles Ebert, MD, FARS; Jose Mattos, MD

8:05 am - 8:13 am

Non-allergic rhinitis and air pollution exposure

Zechariah Franks, MD
Murugappan Ramanathan, MD, FARS
Nyall London, MD, FARS
Shyam Biswal
Zhenyu Zhang
Stella Lee, MD
Johns Hopkins

Background:

Non-allergic rhinitis (NAR) is one of the most prevalent sinonasal inflammatory processes, yet its etiology remains unclear. The fine particulate matter (PM2.5) component of air pollution may contribute to the development of NAR, but has not been well studied. Our objective was to investigate the association between NAR and PM2.5 exposure.

Methods:

Under IRB approval, adult patients with newly diagnosed NAR by rhinologists across a single health system were identified. Data from 191 patients with NAR, without comorbid allergy testing or chronic rhinosinusitis (CRS), were compared to 764 age and gender-matched, healthy controls without rhinitis or CRS (1:4 Ratio of Cases to Controls). Cumulative PM2.5 exposure was estimated by a novel technique incorporating patients' residential zip codes into a deep learning neural networks model and conditional logistic regression was performed.

Results:

Exposure levels to PM2.5 were significantly higher in patients with NAR as compared to healthy controls at all measured time points at 1, 2, 3, and 5 years preceding diagnosis. An increased odds of developing NAR was associated with a 5 µg/m³ increase of PM2.5 concentrations over all measured time points prior to diagnosis: one year (aOR=1.99,95% CI:1.12-3.54), two years (aOR=2.16,95% CI:1.23-3.80), three years

(aOR=2.18, 95% CI:1.27-3.76), and five years (aOR=2.47, 95% CI:1.42-4.29).

Conclusions:

This powered case-control study is one of the first to demonstrate that long-term exposure to PM2.5 is associated with increased odds of developing NAR. Ambient PM2.5 represents a potentially ubiquitous and modifiable risk factor for NAR and warrants further prospective studies to determine potential mechanisms.

8:14 am – 8:22 am

A comparative analysis of endoscopic sinus surgery versus biologics

Amar Miglani, MD
Zachary M. Soler, MD, FARS
Timothy Smith, MD, FARS
Jess Mace, Senior Research Associate
Rodney Schlosser, MD, FARS
Mayo Clinic, Arizona

Objective:

To compare treatment outcomes between endoscopic sinus surgery(ESS) and biologics for severe chronic rhinosinusitis with nasal polyposis(CRSwNP). Study design: Outcomes from a prospective, multicenter cohort of CRSwNP patients undergoing ESS between 2011-2019 were compared to Phase-3 biologic trial data.

Methods:

Patients meeting inclusion criteria modified from recent dupilumab-LIBERTY-NP, omalizumab-POLYP, and mepolizumab-SYNAPSE trials were included in this study. Baseline patient characteristics and outcomes were compared between the ESS cohort and the aforementioned biologic trials at 24-weeks and 52-weeks.

Results:

One-hundred eleven CRSwNP patients met modified inclusion criteria. Baseline characteristics of ESS and biologic groups were statistically similar. At 24-weeks, ESS demonstrated significantly greater improvements in SNOT-22 scores compared to one(of two) dupilumab trials(p<0.05) and both omalizumab trials (p<0.01). ESS resulted in significantly lower nasal polyp scores(NPS) compared to dupilumab(p<0.01) and omalizumab(p<0.001), despite comparable improvements in psychophysical olfaction(p>0.05). At 52-weeks, ESS resulted in comparable improvements in SNOT-22 scores compared to dupilumab(p=0.21), but NPS remained significantly lower in the ESS group compared to dupilumab(p<0.01) and mepolizumab(p<0.01).

Conclusions:

At 24 weeks, ESS offers equivalent-to-superior SNOT-22 improvements compared to dupilumab, but these differences diminish at 52 weeks. ESS and

dupilumab offer comparable improvements in psychophysical olfaction. Compared to omalizumab, ESS offers superior SNOT-22 improvements. ESS offers significantly greater reductions in polyp size compared to omalizumab, dupilumab, and mepolizumab.

8:23 am – 8:31 am

Association of cytokine profile with treatment failure and revision sinus surgery in CRS

Elizabeth Longino, MD

Alex Labby, MD

Jeffanie Wu, Medical Student

Nikita Chapurin, MD

Li Ping

Rakesh Chandra, MD, FARS

Justin Turner, MD, FARS

Naweed Chowdhury, MD

Vanderbilt University Medical Center

Introduction:

Inflammatory endotypes in chronic rhinosinusitis (CRS) may predict severity of disease, need for multiple sinus surgeries, and treatment response. The goal of this study was to analyze nasal mucous inflammatory cytokine patterns in CRS patients with (CRSwNP) and without (CRSsNP) nasal polyposis and their association with treatment failure and revision sinus surgery.

Methods:

198 patients with CRS who underwent sinus surgery were included. Cytokines were quantified in intraoperative mucus specimens using a multiplex flow cytometric bead assay. Patterns of cytokine expression in patients with 0, 1 and at least 2 prior sinus surgeries were analyzed using Kruskal-Wallis analysis of variance and principal component regression.

Results:

There were 122 CRSwNP and 76 CRSsNP patients. The CRSwNP cohort included 70, 31, and 21 patients with 0, 1 and at least 2 prior surgeries, respectively. The CRSsNP cohort included 55, 16, and 5 patients with 0, 1 and at least 2 prior surgeries. There was a statistically significant increase in the following cytokines with increasing number of surgeries in the CRSwNP cohort: IL-2, IL-4, IL-6, IL-9, IL-17A. Revision surgery was not associated with the prototypical type 2 cytokines IL-5 and IL-13. In CRSsNP only IL-1B was significantly higher in patients with prior surgery.

Conclusion:

This analysis suggests that CRSwNP patients who require revision sinus surgery have higher type 2 and 3 inflammatory cytokines. A significantly elevated type 2/3 cytokine profile may be associated with more severe disease and/or topical treatment resistance. Patients with CRSsNP requiring revision surgery do not appear to exhibit this pattern.

8:32 am – 8:40 am

Impact of long-acting implantable corticosteroid matrices on SNOT-22 subdomains in CRS patients

Anders Cervin, MD, PhD

Allison Gartung, PhD

Joanne Rimmer, A/Prof

Agnieszka Wrobel

Lindsay Brayton, Clinical Project Manager

Background:

LYR-210 is an implantable matrix designed to release mometasone furoate for 24 weeks onto inflamed sinonasal mucosa in chronic rhinosinusitis (CRS) patients. LYR-210 demonstrated dose-dependent and significant improvement in the SNOT-22 total score compared to control, with all LYR-210 (7500µg)-treated patients achieving the 8.9-point minimal clinically important difference (MCID) at week 24. To further assess the impact of LYR-210 on SNOT-22 in the LANTERN study, the change from baseline (CFBL) and proportion of responders for each subdomain were evaluated.

Methods:

Surgically naïve adults with moderate-to-severe CRS who failed previous medical management enrolled in a multicenter, randomized, controlled (LANTERN) study. 23 patients underwent sham-procedure (control); 21 and 23 patients received bilateral administration of LYR-210 (7500µg) and LYR-210 (2500µg), respectively. MCID values for the rhinologic, extranasal rhinologic, ear/facial, psychological, and sleep domain scores are 3.8, 2.4, 3.2, 3.9, and 2.9, respectively (Chowdhury, 2017). CFBL and MCID response in each SNOT-22 subdomain were analyzed using ANCOVA and logistic regression models, respectively.

Results:

LYR-210 demonstrated dose-dependent symptom improvement with LYR-210 (7500µg) achieving statistical significance ($p < 0.05$) in each SNOT-22 subdomain compared to control at week 24. More LYR-210 (7500µg)-treated patients achieved the MCID vs. control in the rhinologic (90% vs 65%), extranasal rhinologic (71% vs 52%), ear/facial (80% vs 48%), psychological (90% vs 78%), and sleep (90% vs 61%) domains at week 24.

Conclusions:

As LYR-210 demonstrated global symptom improvement based on SNOT-22 in CRS, it may be a promising long-acting sinonasal treatment.

8:41 am – 8:49

Effect of bevacizumab injection on epistaxis in HHT patients undergoing surgical cauterization

Ashoke Khanwalkar, MD
 Aakanksha Rathor
 Amelia Read
 Yifei Ma
 Peter Hwang, MD, FARS
 Stanford

Introduction:

Given its role in the disease pathophysiology, inhibition of VEGF-mediated angiogenesis has received attention as a potential strategy to reduce epistaxis associated with hereditary hemorrhagic telangiectasia (HHT). This study evaluates the efficacy of a submucosal injection of bevacizumab, a VEGF-inhibitor, in reducing the severity of epistaxis and improving quality of life when given at the time of operative electrocautery.

Methods:

This randomized, double-blinded placebo-controlled trial was conducted at a single institution from 2014 to 2019. Patients scheduled to undergo operative bipolar electrocautery of nasal telangiectasias were randomized to receive a submucosal injection of saline or bevacizumab at time of surgery. Surveys to assess epistaxis severity and quality-of-life (QOL), including the Epistaxis Severity Score (ESS) and Short Form 12 (SF-12), were administered preoperatively and at 1, 2, 4, and 6 months postoperatively. The minimal clinically important difference (MCID) of the ESS instrument is reported to be 0.71.

Results:

Of 39 patients enrolled, 37 (94.9%) completed the study. The saline group demonstrated reduced ESS versus baseline at 1 (-1.2, $p=0.01$) and 4 (-1.2, $p=0.05$) months post-procedure. The bevacizumab group demonstrated reduced ESS versus baseline at 1 (-2.3, $p<0.001$), 2 (-2.3, $p<0.001$), 4 (-2.0, $p=0.003$), and 6 (-1.3, $p=0.05$) months post-procedure. The additive benefit of bevacizumab over saline was not statistically significant but exceeded the MCID at 1, 2, and 4 months.

Conclusion:

The addition of a single treatment of submucosal bevacizumab may be associated with additional clinically meaningful benefit for up to 4 months when compared to electrocautery alone.

8:50 am - 8:55 am

Q&A

8:55 am - 9:04 am

Awards Ceremony

Jean Kim, MD, FARS

9:05 am - 9:45 am

PANEL: Revisiting the Controversial Role of Fungi in CRS: Examination of Allergic Fungal Rhinosinusitis

Moderator: Amber Luong, MD, PhD, FARS
 Panelists: Amin Javer, MD, FARS; Joshua Levy, MD, FARS; Matthew Ryan, MD, FARS
Sponsored by Allergy & Immunology in Rhinology Section

9:45 am - 10:15 am

Break with Exhibitors - Marsalis Hall**Scientific Oral Presentations: Top Rated Abstracts – Session II**

Moderators: Naweed Chowdhury, MD; Ashleigh Halderman, MD, FARS; David Jang, MD, FARS

10:15 am – 10:23

Chronic IL-13 expression in mouse olfactory mucosa results in progressively aneuronal epithelium

Andrew Lane, MD, FARS – *Presented by Ani Saraswathula, MD*
 Duncan Watley
 Heather Kulaga
 Johns Hopkins School of Medicine

Background:

Olfactory dysfunction is highly associated with chronic rhinosinusitis with nasal polyps, and the severity of loss has been linked with biomarkers of type 2 inflammation. The ability of Dupilumab to rapidly improve the sense of smell prior to improvement in polyp size suggests a direct role of IL4/IL13 receptor signaling in the olfactory epithelium.

Methods:

We created a transgenic mouse model in which IL-13 is inducibly expressed specifically within the olfactory epithelium. Gene expression analysis and immunohistology were utilized to characterize the effect of IL-13 on the structure of the olfactory epithelium.

Results:

After induction of olfactory IL-13, there is a regional, time-dependent loss of neurons from the olfactory epithelium. The thickness of the olfactory mucosa is maintained, but is largely devoid of neurons in areas. A modest inflammatory infiltrate accompanies the loss of neurons. Horizontal basal cells undergo morphologic changes consistent with activation, but regeneration of neurons does not occur as long as IL-13 is present.

Discussion/Conclusion:

Chronic IL-13 exposure has a striking histologic effect on olfactory mucosa with development of an aneuronal epithelium. The loss of neurons with inhibition of normal regeneration is in keeping with other models of allergic type 2 nasal inflammation. Future studies are needed to correlate cellular and molecular alterations in olfactory cell populations with findings in human CRSwNP, as well as to assess olfactory function in behavioral model systems.

10:24 am - 10:32 am

Unsupervised clustering of olfactory phenotypes

Rodney Schlosser, MD, FARS

Allison Gartung, PhD

Anders Cervin, MD, PhD

Joanne Rimmer, A/Prof

Agnieszka Wrobel

Lindsay Brayton, Clinical Project Manager

Background:

LYR-210 is an implantable matrix designed to release mometasone furoate for 24 weeks onto inflamed sinonasal mucosa in chronic rhinosinusitis (CRS) patients. LYR-210 demonstrated dose-dependent and significant improvement in the SNOT-22 total score compared to control, with all LYR-210 (7500µg)-treated patients achieving the 8.9-point minimal clinically important difference (MCID) at week 24. To further assess the impact of LYR-210 on SNOT-22 in the LANTERN study, the change from baseline (CFBL) and proportion of responders for each subdomain were evaluated.

Methods:

Surgically naïve adults with moderate-to-severe CRS who failed previous medical management enrolled in a multicenter, randomized, controlled (LANTERN) study. 23 patients underwent sham-procedure (control); 21 and 23 patients received bilateral administration of LYR-210 (7500µg) and LYR-210 (2500µg), respectively. MCID values for the rhinologic, extranasal rhinologic, ear/facial, psychological, and sleep domain scores are 3.8, 2.4, 3.2, 3.9, and 2.9, respectively (Chowdhury, 2017). CFBL and MCID response in each SNOT-22 subdomain were analyzed using ANCOVA and logistic regression models, respectively.

Results:

LYR-210 demonstrated dose-dependent symptom improvement with LYR-210 (7500µg) achieving statistical significance ($p < 0.05$) in each SNOT-22 subdomain compared to control at week 24. More LYR-210 (7500µg)-treated patients achieved the MCID vs. control in the rhinologic (90% vs 65%), extranasal rhinologic (71% vs 52%), ear/facial (80% vs 48%), psychological (90% vs 78%), and sleep (90% vs 61%) domains at week 24.

Conclusions:

As LYR-210 demonstrated global symptom improvement based on SNOT-22 in CRS, it may be a promising long-acting sinonasal treatment.

10:33 am – 10:41 am

Olfactory epithelium tropism of SARS-CoV-2 and age-dependent intracranial spread via olfactory axons

Andrew Lane, MD, FARS

Mengfei Chen

Heather Kulaga

Nicholas Rowan, MD

Murugappan Ramanathan, MD, FARS

Andrew Pekosz

Johns Hopkins School of Medicine

Background:

SARS-CoV-2 infection of the upper airway and the subsequent immune response are early, critical factors in COVID-19 pathogenesis. The prevalent loss of the sense of smell and the high levels of ACE2 expression by olfactory sustentacular cells suggest that the olfactory epithelium is a primary target of the virus. Intracranial spread of SARS-CoV-2 from the olfactory epithelium has been suggested but remains controversial.

Methods:

In vitro infection of human olfactory explants and in vivo intranasal infection of hamsters was performed with SARS-CoV-2. Olfactory tissue was examined by immunohistochemistry to characterize the pattern of infection and the inflammatory response.

Results:

A striking tropism of SARS-CoV-2 for olfactory neuroepithelium was observed, as compared to nasal respiratory epithelium. In addition to primarily targeting sustentacular cells, SARS-CoV-2 infects a proportion of immature olfactory neurons in hamsters and human biopsies, gaining access to the hamster brain through axonal transport, resulting in a microglial response that is more pronounced in younger hosts. Viral infection induces a predominantly macrophage immune cell infiltration into the hamster olfactory mucosa. Viral clearance by macrophages was substantially compromised in older hamsters.

Discussion/Conclusion:

Our observations identify the olfactory mucosa as a site of initial viral infection, propagation, and brain invasion. The evidence that brain infection may occur more readily in younger age hosts has implications for potential SARS-CoV-2-related neurological and psychological dysfunction in this population. Decreased olfactory epithelium macrophage function may underlie delayed viral clearance in aging.

10:42 am – 10:50 am

Determinants of SARS-CoV-2 entry and replication in airway mucosa and susceptibility in smokers

Jayakar Nayak, MD, PhD
Tsuguhisa Nakayama
Ivan Lee, MD, PhD
Carol Yan, MD
Jonathan Overdevest, MD
Zara Patel, MD, FARS
Stanford University School of Medicine

Introduction:

Understanding viral tropism is essential towards reducing SARS-CoV-2 transmission, decreasing mortality from COVID-19, and limiting the rise of mutant strains. Little is known about the extent to which distinct tissue sites in the proximal respiratory tract selectively permit SARS-CoV-2 infection and replication.

Methods:

The expression of SARS-CoV-2 entry factors, ACE2 and TMPRSS2, was compared across various control human proximal airway mucosal tissues. Intracellular levels of SARS-CoV-2 viral infection in head & neck mucosal tissues from deceased COVID-19 patients was analyzed over an array of distinct head and neck tissue sites. Finally, clinical characteristics of COVID-19 patients, such as smoking status, were assessed.

Results:

ACE2 and TMPRSS2 expression were elevated in the trachea/bronchus compared to the nasopharynx, oro/hypopharynx, and conjunctiva ($p < 0.05$ and $p < 0.01$ respectively). SARS-CoV-2 RNA was detected significantly more in the nasal and tracheal epithelia compared to other sites, with respect to both infected surface area and copies of RNA within the infected area ($p < 0.05$). SARS-CoV-2 RNA levels were significantly higher amongst smokers (both current and former) compared to non-smokers ($p < 0.01$), with downregulation of IFN-beta1 as a potential mechanism for increased SARS-CoV-2 infection in smokers.

Conclusion:

We discover key variabilities in the expression of ACE2 and TMPRSS2 in the mucosal tissues of the human proximal airways. SARS-CoV-2 infection has notable and measurable tropism for the nasal cavity and tracheal mucosa. Smoking is associated with higher SARS-CoV-2 viral infection in the human proximal airway, and increased susceptibility to developing severe COVID-19.

10:51 am – 10:59

Non-invasive biomarker and artificial intelligence model for differentiation of CRSwNP and CRSsNP

Sarina Mueller, MD
Olaf Wendler, PhD
Maria Becker
Heinrich Iro, Prof.
Andreas Kist, Prof.
Benjamin S. Bleier, MD, FARS
Massachusetts Eye and Ear/ Friedrich-Alexander-Universität Erlangen-Nurnberg

Background:

Chronic rhinosinusitis (CRS) has traditionally been classified phenotypically according to the presence (CRSwNP) or absence (CRSsNP) of nasal polyps. However, the phenotypic dichotomy does not represent the complexity of the disease. Current research thus focuses on identifying underlying inflammatory mechanisms and distinguishing different endotypes. The objective of this study was to evaluate the best combination of commonly used non-invasive biomarkers to distinguish between the phenotypes CRSwNP and CRSsNP.

Methods:

IRB approved study of $n = 103$ CRS ($n = 37$ CRSsNP, $n = 66$ CRSwNP) patients. Nasal mucus was collected using merocel sponges after a 3-week washout period from steroids. The nasal mucus was then examined for twelve cytokines/inflammatory protein biomarkers including IFN- γ , IL-4, -5, -17A, -22, IgE, CST-2, ECP, MMP-9, PAPP-A, periostin, and serpin E1). Protein concentrations were determined by ELISAs and Luminex assays. For phenotype classification, different artificial intelligence algorithms including t-SNE, Adaboost and XGBoost were applied to the data from the biomarker analysis.

Results:

The analysis showed that IL-5 is the most suitable non-invasive marker to distinguish between the two phenotypic clusters (94.6%). For the inflammatory protein biomarkers, the classification becomes most accurate with a combination of four different biomarkers including periostin, CST-2, ECP, and PAPP-A (67.6%).

Conclusions: IL-5 as well as the combination of four protein biomarkers including periostin, CST-2, ECP, and PAPP-A were able to cluster the phenotypes CRSwNP and CRSsNP in nasal mucus best. Thus, those proteins may be investigated further to gain more information about the pathophysiology of CRS.

11:00 am - 11:05 am

Q&A

11:05 am - 11:20 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Humanitarian Efforts in Rhinology

Moderator: Danielle Warner, MD, FARS
Anthony Del Signore, MD; Rodney Schlosser, MD, FARS

11:20 am – 12:00 pm

PANEL: Cystic Fibrosis CRS : A New Era

Moderator: Ashleigh Halderman, MD, FARS
Panelists: Daniel Beswick, MD, FARS; Do-Yeon Cho, MD; David Gudis, MD, FARS; Stella Lee, MD
Sponsored by the Pediatric Rhinology Committee

12:00 pm - 1:00 pm

Lunch with Exhibitors - Marsalis Hall

Thursday, April 28, 2022

Afternoon Session

1:00 pm – 5:00 pm CST

Landmark Ballroom C

**Scientific Oral Presentations:
COVID-19 and Olfaction**

Moderators: Angela Donaldson, MD, FARS; Nicholas Rowan, MD; Ahmad Sedaghat, MD

1:00 pm - 1:06 pm

Nasal inflammation in COVID-19

Katherine Chang, MD
Dorina Kallogjeri, MD, MPH
Jay Piccirillo, MD
Stacey House, MD, PhD
Justin Turner, MD, FARS
John Schneider, MD
Nyssa Farrell, MD

Background:

A distinct feature of COVID-19 mediated olfactory dysfunction (OD) is the lack of nasal obstruction and rhinorrhea, indicating a sensorineural mechanism for smell loss. Recent data suggests that local inflammation of the olfactory neuroepithelium may play a key role in COVID-19 OD.

Objective:

We aimed to determine the differences in inflammation within the nasal cavity between those with and without OD during acute COVID-19 infection.

Methods:

Patients with COVID-19 infection were stratified into those with self-reported OD and those without self-reported OD. Mucous samples were obtained using a nasosorption device and multiplex assay was then used to quantify cytokine levels. Smell loss was measured using the University of Pennsylvania Smell Identification Test (UPSIT).

Results:

A total of 21 patients were included: 11 without self-reported OD, 10 with self-reported OD. Median UPSIT scores were 14.5 and 28 for patients with and without self-identified OD respectively with a median difference of 14 [95% CI: 8-20]. Only 1 patient in the group without self-identified OD was normosmic on UPSIT testing. IFN-gamma levels were significantly higher in patients with UPSIT ≤ 25 compared to those with UPSIT > 25 (difference 15.9; 95% CI 1.03 to 187.2; $p=0.023$). There was a nonsignificant trend towards elevated IL-1 β and IL-6 in those with OD.

Conclusion:

Increased IFN-gamma levels were significantly associated with anosmia and severe hyposmia, suggesting that local intranasal inflammation plays a role in acute COVID-19 OD. Further studies are needed to investigate the role of local inflammation in COVID-19 OD.

1:07 pm - 1:13 pm

COVID-19 versus CRS/rhinitis associated olfactory dysfunction on health utility and quality of life

Thanh Luong, BS
Sophie Jang, MD
Mena Said, MD
Adam DeConde, MD
Carol Yan, MD
University of California, San Diego School of Medicine

Background:

Olfactory dysfunction (OD) related to COVID-19 infection and chronic rhinosinusitis/rhinitis (CRS/R) has been well described. However, the former induces a sudden-onset chemosensory loss while the latter has a gradual presentation. This study aims to establish and compare health utility values (HUVs) and olfactory-specific quality-of-life (QoL) measurements between patients with COVID-19 and CRS/R related OD.

Methods:

This study prospectively recruited COVID-19 and CRS/R patients with self-reported OD to complete a survey assessing HUVs (visual analog scale [VAS], EuroQol-5Dimension [5Q-5D]) and olfactory and sinonasal QoL measures (Questionnaire of Olfactory Disorders-Negative Statements [QOD-NS], Sino-Nasal Outcome Test [SNOT-22]). A subgroup of subjects completed objective olfactory testing (BSIT/

UPSIT). Intergroup mean scores were compared using Kruskal-Wallis test.

Results:

88 subjects were enrolled: mean age±SD (41.8±15.2 yrs), 56.8% female. No significant difference in HUVs was seen between COVID and CRS/R group: VAS (0.75±0.18 vs 0.72±0.17, p=0.29), EQ-5D (0.85±0.12 vs 0.85±0.09, p=0.62). CRS/R group had significantly worse SNOT-22 scores (27.0±18.3 vs. 49.1±21.3, p<0.0001). While overall analysis demonstrated similar olfactory-specific QoL impact (QOD-NS, COVID: 31.0±12 vs CRS/R: 35.6±10, p=0.18), sub-analysis among those with objectively tested OD (n=40) showed a greater olfactory QoL burden in the CRS/R cohort (QOD-NS 36.1±12 vs 22.8±13, p<0.05).

Conclusions:

The impact of OD on overall health utility is comparable between patients with COVID-19 and CRS/R related OD. CRS/R appears to have a greater long term burden on sinonasal and olfactory-specific QoL compared to COVID-19 among those with objective OD.

1:14 pm – 1:20 pm

A longitudinal study of olfactory dysfunction and parosmia in mild COVID-19 cases

Aurelia Monk, BA
Daniel Bacon, Mr.
Princess Onuorah, Ms.
Alexander Murr, Mr.
Brian Thorp, MD, FARS
Charles Ebert, MD, FARS
Brent Senior, MD, FARS
Adam Kimple, MD, FARS
University of North Carolina

Background:

COVID-19 related olfactory dysfunction (OD) can persist long after recovery from acute infection. Few studies have investigated the long-term natural history of OD in COVID-19, and existing studies have only addressed decreased sense of smell; however, parosmias are becoming an increasingly prevalent long-term symptom.

Methods:

We completed a longitudinal study on OD in individuals with mild cases of COVID-19. Patients completed a questionnaire and Brief Smell Identification Test (BSIT) 1 week after diagnosis and 1 year after diagnosis. A survey about parosmia was completed in addition to the BSIT and symptom questionnaire at the 1-year follow-up.

Results:

We obtained questionnaire and objective olfactory testing information from 45 patients 1 week after diagnosis and 33 patients at 1-year follow-up. Persistent OD was present in 15.2% of our patients

at 1 year. At 1-year follow up 66.7% (n=22) reported experiencing parosmia. Of the 22 patients with reported parosmia, 2 had delayed onset (>4 weeks after diagnosis). The mean onset of parosmia was 1.3 weeks (standard deviation – 1.9) after diagnosis. Eight patients (24.2%) reported that their parosmia was ongoing at the 1-year follow-up. Of the patients who reported resolution of parosmia, the mean duration of parosmia was 7.2 weeks (standard deviation – 7.3).

Discussion/Conclusion:

Decreased sense of smell associated with COVID-19 has received significant attention in both the popular media and in the medical literature. Approximately 1 year after COVID-19 diagnosis, 15.2% of patients in a cohort with mild disease had persistent OD on the BSIT. The majority of patients at 1-year follow-up reported having experienced parosmia since their COVID-19 diagnosis.

1:21pm – 1:27 pm

Long term olfactory dysfunction in COVID-19

Andy Chua, MBBS
Xuan Dao Liu
See Hui Chiu
Clara Tan
Singhealth

Introduction:

Olfactory dysfunction (OD) and gustatory dysfunction (GD) are highly prevalent in COVID-19 patients. This study aims to characterize long term recovery of olfaction and taste in these patients, by using patient-reported subjective data and objective testing.

Methods:

A total of 40 COVID-19 positive patients who presented to the Emergency Department between 14 Feb to 31 Jul 2020 were recruited. Medical charts were reviewed for OD and GD at time of presentation. After at least 9 months, patients were contacted by phone and answered a questionnaire. Patients were asked to rate their overall olfactory and gustatory function on an 11-point Likert scale, and reported the presence of other symptoms such as cacosmia or phantosmia. This was followed up with objective olfactory testing using the Brief Smell Identification Test (BSIT).

Results:

The prevalence of self-reported acute OD and GD at diagnosis of COVID-19 was 62.5% and 57.5% respectively. The median time interval between COVID-19 diagnosis and the study evaluation was 41 weeks, where 80.0% and 92.5% of patients subjectively reported complete recovery of OD and GD respectively. Thirty three patients completed the BSIT. In this group, although 78.8% had reported perfectly normal olfaction (rated 10 out of 10) and 93.9% had reported good olfaction (rated 7 and above), only 51.5% had BSIT scores within normal

range. Objective BSIT scores did not correlate well with self-reported olfaction ($r=0.246$). Age, gender, and severity of initial loss did not have a statistically significant association with recovery rates.

Conclusion:

Long term OD and GD affect a significant number of patients, and subjective symptoms may not correlate well with objective test results.

1:28 pm - 1:34 pm

Impact of saline irrigations in non-hospitalized patients with COVID-19

Kyle Kimura, MD
Justin Turner, MD, FARS
Michael Freeman, Resident Physician
Vanderbilt University Medical Center

Initial response to the COVID-19 pandemic primarily focused on pharmacologic interventions, including antivirals, convalescent sera, and vaccinations, with each critical in the fight against COVID-19. Given previous studies demonstrating varying efficacy of saline irrigations on other viral diseases, we conducted a randomized controlled trial to evaluate the effect of nasal irrigations on upper respiratory symptoms and viral load in patients with COVID-19.

Methods:

Randomized control trial conducted May 2020-December 2020. Patients with a positive reverse transcriptase polymerase chain reaction SARS-CoV-2 test were enrolled within 24 hours of testing and given swabs, viral preservation media, and a symptom diary incorporating a modified version of the validated Wisconsin Upper Respiratory Symptom-21 Survey. Patients were randomized to 1 of 3 treatment arms: (1) twice-daily irrigations with hypertonic saline, (2) twice-daily irrigation with hypertonic saline with 1% surfactant, and (3) a non-intervention group. Participants performed scheduled mid-turbinate swabs and recorded daily temperatures and symptom scores over the 21-day study duration.

Our hypothesis, that saline irrigations would decrease viral load and improve symptoms in patients with COVID-19, was ultimately not supported by this study. There was no significant difference between the intervention groups and the control group when analyzing viral load and symptomatology. Although essentially a negative study, this is the most comprehensive study evaluating efficacy of saline irrigations in COVID-19 and implies that saline irrigations are unlikely to significantly affect patients in the setting of COVID-19.

1:35 pm - 1:40 pm

Q&A

1:40 pm - 1:55 pm

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Current Treatment for COVID-induced Olfactory Loss

Moderator: Dana Crosby, MD, FARS
Carol Yan, MD; Peter Hwang, MD, FARS

1:55 pm - 2:45 pm

KEYNOTE SPEAKER: Wayne Sotile, PhD

Title: "Resilience"
Combined ARS, ALA, AHNS Session
Presented Virtually

2:45 pm - 3:15 pm

Break with Exhibitors - Marsalis Hall

3:15 pm - 4:05 pm

Scientific Oral Presentations: Sinus Surgery

Moderators: Elisabeth Ference, MD, FARS; Marilene Wang, MD, FARS; Zachary Soler, MD, FARS

3:15 pm – 3:21 pm

Development of an endoscopic sinus surgery preoperative checklist with the Delphi method

Stephen Leong, BA
Amrita Ray, MD
Nathan Yang, Fellow
Anthony Del Signore, MD
Jean Anderson Eloy, MD, FARS
Satish Govindaraj, MD, FARS
David Gudis, MD, FARS
Samuel Helman, MD
Seth Lieberman, MD
Madeleine Schaberg, MD
Abtin Tabaei, MD, FARS
NewYork-Presbyterian/Columbia University Irving Medical Center

Background:

Critical review of computed tomography (CT) imaging is essential in preoperative planning for endoscopic sinus surgery. In this study, we use a modified Delphi method to develop an optimized checklist that facilitates preoperative review of sinus CT imaging.

Methods:

We performed a systematic review of PubMed, Embase, CINAHL, and Cochrane databases to identify existing checklists used to evaluate sinus CT imaging. An inclusive list of items from these checklists was compiled and the modified Delphi methodology was used to assign ranked priority. The process involved 14 rhinologists and had 3 phases: an initial survey with Likert priority (scale of 1-9) and 2 rounds of live discussion to confirm consensus selections.

Results:

Initial literature review identified 81 articles; 29 were selected for full-length review. Ninety-nine possible checklist items were identified from literature review and panelist input. On initial survey, 64 items reached a consensus score of 7+ and 16 items had scores between 6-7; 4 of 16 borderline items were retained. The resulting 68-items were consolidated into a checklist of 35 items and divided into 2 sections: disease (11 items) and anatomy (24 items). Anatomic items were further subdivided based on sinus anatomy (6 subsections: nasal cavity, maxillary, ethmoid, sphenoid, frontal, skull base and orbit). Additionally, panelists identified 8 core facets of patient history to be considered prior to surgery.

Conclusion:

A checklist for preoperative sinus CT imaging review with content validity was created based on literature review and a modified Delphi method. Implementation and further validation of the checklist as a resource for residents and medical students is a plausible next step.

3:22 pm – 3:28 pm

Long-duration pain block for postoperative analgesia after sinus surgery

Jessica Bishop, MD

Ryan Marshall

Justin McCormick, BS, MD

Natalie Garcia

Caitlyn Tomblin

Do-Yeon Cho, MD

Jessica Grayson, MD

Bradford Woodworth, MD, FARS

University of Alabama at Birmingham

Background:

Opioids remain the primary modality for postoperative pain management in sinonasal procedures. This study aims to assess whether a long-duration pain block decreases the need for opioid pills postoperatively.

Methods:

We conducted a randomized, controlled clinical trial in subjects undergoing bilateral endoscopic sinus surgery (ESS). Patients in the experimental group received a local anesthetic block (10-mL of 0.5% bupivacaine with 1:200,000 epinephrine and 2 mg of dexamethasone) targeting the supraorbital, supratrochlear, infraorbital, and sphenopalatine nerves. The control group received no injection. Subjects completed a diary documenting pain scores (VAS) and opioid consumption for 10 days. Demographics, medical history, and additional surgical components (septoplasty, turbinate reduction, modified medical maxillectomy, Draf III) were recorded. Diaries were submitted, and pill counts were conducted on postoperative day (POD)-10.

Results:

Thirty-one patients (42.9 years, 48.4% female) completed the study (16 treatment and 15 control). Demographics and procedure types were not significantly different between cohorts. The average opioid tablets consumed did not differ between control (9.87+/-10.86) and treatment groups (10.63+/-8.91). Similarly, pain scores were not significantly different between groups. Consumption peaked on POD1 at 2.1 pills and dropped <1 pill by POD4. Pain scores were higher for women than men.

Conclusion:

While this long-acting pain block did not decrease narcotic use, results show that regardless of surgical procedure, opioids could be limited to an average of 12 pills to achieve sufficient analgesia after ESS.

3:29 pm - 3:35 pm

3D models to accelerate resident surgical learning curve for endoscopic sinus surgery techniques

Jumah Ahmad, MD

Alexander Citardi

William Yao, MD, FARS

University of Texas - Health Sciences Center at Houston

Objective:

Endoscopic sinus surgery presents significant visuospatial challenges to surgical trainees. We sought to test the utility of novel 3D printed models to simulate sinus surgery "moves" to improve endoscopic skillsets in resident trainees as an adjunct to traditional residency education.

Methods:

This is a prospective quality improvement study of 10 ENT residents (PGY1-5). Participants rotated through 4 stations with different 3D simulation training modules designed to enhance endoscopic skillsets in the axial, sagittal and coronal planes (e.g. straight forceps to grasp a bead from a ledge, angled instruments to cannulate openings). Participants completed a self-assessment survey on the subjective sinus surgical skills using a visual analog scale before and after tasks. Two-tailed paired T-tests were used to analyze the data.

Results:

All residents rated their post-intervention "overall sinus surgery skills" higher than pre-intervention ($p = 0.0002$). They rated simulations to provide more significant utility as an adjunct to surgical education after the intervention. All but one participant reported improved special awareness working with the endoscopes and surgical instruments ($p = 0.0001$). There was subjectively improved proficiency in using 0-degree and angled endoscopes as well as cutting, grasping, and curved instruments after the intervention. The session led to subjective improvements in spatial awareness, bimanual

dexterity, and increased confidence in selecting correct surgical instruments.

Conclusion:

Our set of novel 3D printed models to improve sinus surgery skillset was well accepted by the resident cohort. The 3D models can serve as a tool as an adjunct to the traditional residency education.

3:36 pm – 3:42 pm

Image-guided surgical device failures in functional endoscopic sinus surgery: a MAUDE analysis

Samir Hassanin, BA
Rijul Kshirsagar, MD
Jacob G. Eide, MD
Jonathan Liang, MD, FARS
James N. Palmer, MD, FARS
Nithin D. Adappa, MD, FARS
Kaiser Permanente

Background:

Image-guided surgery (IGS) devices have become widely used for anatomic localization during functional endoscopic sinus surgery (FESS). However, there are no studies that analyze the post-market complications associated with IGS device use during FESS. The objective of this study was to better characterize post-market complications associated with the use of IGS devices during sinus surgery.

Methods:

The US Food and Drug Administration's Manufacturer and User Facility Device Experience (MAUDE) database was queried for event reports associated with neurological stereotaxic devices utilized in IGS between the dates of January 1, 2016 and December 31, 2020. Medical device reports that were analyzed for this study pertained strictly to FESS.

Results:

There were 1,873 reports involving IGS devices for FESS included in this study. 55 reports involved adverse events to patients (2.9%) and 1,818 (97.1%) involved device malfunctions. Of the adverse events to patients, the most common included cerebrospinal fluid leakage (45.6%), tissue damage (12.7%), and nervous system injury (3.6%). The most commonly reported device malfunction was imprecision (20.2%).

Conclusion:

IGS devices are widely utilized in FESS. Of the medical device reports between the years of 2016 and 2020, less than 3% resulted in adverse events. Further studies of the infrequent post-market complications of IGS devices used in FESS can help guide surgeons on the risks of their clinical use.

3:43 pm - 3:49 pm

Ergonomic analysis of hand fatigue in endoscopic sinus surgery

Mason Krysinski, MD
Philip Chen, MD, FARS
Erik Weitzel, MD, FARS
Kevin McMains, MD, FARS
Benjamin Walters, MD
University of Texas Health San Antonio

Background:

Endoscopic sinus surgery has been shown to be physically demanding and may be related to significant physical fatigue and discomfort. Amongst other anatomic sites, the wrists, hands, and fingers appear to be particularly susceptible to the physical effects of performing endoscopic sinus surgery. The objective of this study was to determine if there is objective and subjective evidence of hand fatigue after performing endoscopic sinus surgery.

Methods:

Grip strength was measured using the Camry Electronic Handgrip Dynamometer (CEHD) and hand dexterity was measured using the Purdue Pegboard Test (PPT). Subjective data of discomfort and disability was assessed using a modified Disabilities of the Arm, Shoulder, and Hand Questionnaire (m-DASH) and an adapted Hand Symptom Diagram (HSD). Measurements were taken in a standardized sequence before and after performing endoscopic sinus surgery. Study subjects include fellowship-trained rhinologists (N=3) and residents in training (N=7). Five cases were analyzed per surgeon with data collection ongoing.

Results:

Ten cases of endoscopic sinus surgery were analyzed. Preliminary data suggests a significant decrease in grip strength (5.0 kg, 3.7 kg decrease per surgeon, $p < 0.01$); a trend toward decreased hand dexterity on PPT tasks (right- 1, 0.4, $p < 0.47$; left- 1, 0.4, $p < 0.17$); and significant subjective evidence of wrist, hand, and finger disability on the m-DASH and HSD. Data collection is ongoing and scheduled to finish in coming weeks.

Conclusions:

This study demonstrates significant subjective and objective evidence of hand fatigue after performing endoscopic sinus surgery. Grip strength appears to be significantly affected while there are subtler changes in dexterity.

3:50pm – 3:56 pm

Measurements of foot-pedal reaction time and hand accuracy in seated vs. standing position

Bennett Ahearn

Connor Breinholt

Matthew Liu, Medical Student

Taylor Fish

Patrick Williams

Leonid Bunegin

Byeongyeob Choi

Roman Fernandez

Philip Chen, MD, FARS

Background:

Handheld instruments operated by a foot-pedal such as microdebridors are commonly used in rhinologic surgeries. Critical structures can be injured by such tools; thus, quick and accurate reaction times (RTs) are needed to avoid injury. The objective of this study was to determine RTs in the hands and feet, as well as hand accuracy in different body positions.

Methods:

A tablet-based simulation was created to test 1) foot pedal RTs and 2) hand dexterity. The tablet randomly displayed green and red dots. Subjects were to touch the green dots with their finger while depressing the pedal. The pedal was released upon display of red dots, meant to signify approach of critical structures (and stopping the microdebrider). Subjects were tested under 4 conditions recording foot pedal RTs, accuracy, and the speed of touching dots.

Results:

8 faculty, 10 residents, and 31 students completed the simulation. The mean RTs for pedal release in the sitting position (548.69 ms ± 66.17) were significantly shorter than the mean RTs for pedal release in the standing position (613.29 ms ± 96.53) ($p < 0.001$). Faculty had the best mean hand accuracy (15.57 pixels ± 2.15 away from center) while first year medical students had the lowest accuracy (21.11 pixels ± 0.19 away from center) ($p=0.016$).

Conclusions:

Rhinologists must have the proficiency to use pedal-operated surgical tools and the dexterity to cease use when structures are at risk. These results suggest position affects the ability to optimize both tasks. The faster pedal RT in seated position and training may reduce the risk of trauma during rhinologic surgery when pedal-operated tools are used.

3:57 pm - 4:05 pm

Q&A

4:05 pm - 4:20 pm

TARGETED CONVERSATIONS ON IMPORTANT

TOPICS: Biologics vs Sinus Surgery: Is it either/or?

Moderator: Jivianne Lee, MD, FARS

Kevin Welch, MD, FARS; David Kennedy, MD, FARS

4:20 pm - 5:00 pm

PANEL: Ergonomics, Longevity, and Wellness in Sinus and Skull Base Surgery

Moderator: Vijay Ramakrishnan, MD, FARS

Panelists: Raewyn Campbell, MD, FARS; Sanjeet

Rangarajan, MD, FARS; Renee Witherspoon,

Occupational Hygiene and Safety Manager,

Research, Campus, and Environmental Safety

5:00 pm - 5:10 pm

Business Meeting

5:30 pm - 7:00 pm

ARS President's Welcome Reception - Reunion C

Friday, April 29, 2022

Morning Session

7:00 am – 12:00 pm CST

Landmark Ballroom C

7:00 am – 8:00 am

BREAKFAST SESSION

Guest Speaker: Wayne Sotile, PhD

Title: "The Medical Family"

Presented Virtually

Sponsored by the Women in Rhinology Section and Diversity & Inclusion Committee

**Scientific Oral Presentations:
Rhinologic Procedures & Skull
Base**

Moderators: Mathew Geltzeiler, MD, FARS; Abtin

Tabaee, MD, FARS; Elina Toskala, MD, FARS

8:00 am - 8:06 am

Randomized controlled trial for nasal packing post HHT laser treatment

Justin Pyne, MD

Scott Murray

Jin Soo (Andy) Song

Brandon Rosvall

David W.J. Cote

Background:

Nasal packing postoperatively following KTP laser surgery for hereditary hemorrhagic telangiectasia (HHT) has garnered mixed reviews. This purpose of

this study was to compare a hemostatic fibrin matrix with traditional nasal packing following this procedure in terms of patient pain and comfort.

Methodology:

This was a double-blinded non-inferiority study. Participants were selected from the practice of a single surgeon working in an academic center and randomized to the treatment group (Surgiflo) or the control group (NasoPore). During the first follow-up visit, each subject completed a comfort questionnaire, and a visual questionnaire was completed by the clinician. Non-parametric statistical analysis was employed with a p value of < 0.05 being considered significant.

Results:

Fourteen patients were included in each group. The treatment group reported significantly less pain than the control group (p=0.038, S.D. 0.049-1.58 although this was only perceived as significant in the behavioural rating scale. Similar degrees of hemostasis were observed between the two groups. There were no differences observed in the objective measures outcomes.

Conclusion:

This is the first study investigating recombinant thrombin as postoperative packing for HHT. Surgiflo hemostatic matrix as nasal packing may offer a more comfortable recovery for the patient than traditional methods following KTP treatment for intranasal HHT.

8:07 am – 8:13 am

Middle turbinate attachment's relationship with in-office procedure response for vasomotor rhinitis

Omar G. Ahmed, MD
Timothy Fan, Medical Student
Megha Chandna, Medical Student
Masayoshi Takashima, MD
Travis Haller, Dr.
Prachi Dubey, MD
Jordan J. Garner, NP
Texas A&M College of Medicine

Introduction:

Vasomotor rhinitis (VR) is characterized by prolonged congestion and anterior/posterior rhinorrhea. Although in-office cryotherapy and radiofrequency treatment targeting the posterior nasal nerve (PNN) have minimized the morbidity and time commitment for controlling VR, up to 20-30% patients have limited responses. In this study, we examined the location of the sphenopalatine foramen (SPF), where PNN enters the nasal cavity, in relation to the middle turbinate (MT) attachment in order to predict response rates to in-office procedures for VR, which target the PNN anterior to the MT attachment. Our hypothesis is that patients with unfavorable MT attachment (axial CT: anterior to SPF) would have a

higher chance of failing in-office VR treatment, in contrast to favorable MT attachment (axial CT: at or posterior to SPF).

Methods:

This was a retrospective case-control study to examine the potential correlation between MT attachment and failure rates of in-office procedures for VR.

Results:

Among 30 patients with VR treated with in-office procedures, 13 patients (43.3%) had no response. This failure cohort had a higher proportion of unfavorable MT attachments versus the success cohort (92.3% vs 58.8%, p<0.05) The odds ratio of patients failing their procedures due to unfavorable MT attachment on axial view was 8.4 (CI: 0.9-80.3, P=0.06). Four of the failed patients received vidian neurectomy, which completely resolved their symptoms.

Conclusion:

A statistically higher proportion of patients with unfavorable MT attachment experiences ineffective in-office procedures for VR. Our results were limited by small sample size and continued investigations are required to solidify the correlation.

8:14 am – 8:20 am

Does septoplasty and inferior turbinate reduction impact exercise capacity? A prospective study

Sei Chung, MD
Aaron N. Pearlman, MD, FARS
Polly de Mille
Columbia University/New York Presbyterian Hospital

Background:

Septoplasty/inferior turbinate reduction (ITR) is commonly performed in patients with nasal obstruction hindering exercise capacity. We seek to examine its effects on exercise physiology, and whether this correlates with subjective indices of disease-specific quality of life.

Methods:

In this prospective study funded by the ARS CORE Grant, adults with limited exercise tolerance who undergo septoplasty/ITR are enrolled. Pre- and post-operatively, they complete peak nasal inspiratory flow (PNIF) testing, NOSE and SNOT-22 questionnaires, and formal exercise testing. At four-minute increments, their pace increases and parameters such as heart rate (HR), oxygen consumption (VO₂), and lactate are measured.

Results:

We present preliminary data on 8 subjects who finished this longitudinal protocol. On average, post-operative PNIF increased 50.8 points; NOSE and SNOT-22 scores decreased 53.3 and 21.5 points, respectively. VO₂ max increased 0.63ml/kg/min

(0.2METS), total VO₂ increased 0.06L/min, max HR decreased 1.8bpm, peak pace improved 3min/mile, peak blood lactate decreased 1.4mMole, lactate threshold (LT) HR increased 4.7bpm, percent of max HR at LT increased 2.6%, percent of peak workload at LT increased 6.8%, VO₂ at LT increased 0.58ml/kg/min, and percent of max VO₂ at LT increased 3.7%. NOSE scores correlated with percent of max HR at LT ($r=0.9, P=0.01$), and percent of peak workload at LT ($r=0.9, P=0.01$).

Conclusion:

Our preliminary results suggest that several metrics of fitness may improve after septoplasty/ITR, and subjective NOSE score changes may correlate with certain objective parameters on exercise testing. Completion of our target subject accrual and data will help elucidate whether such findings are salient.

8:21 am - 8:27 am

The incidence of new-onset postoperative diplopia after medial & inferior orbital wall decompression

Tory McKnight, BS
 Maria Armache, MD
 Chandala Chitguppi, MD
 Elina Toskala, MD, PhD, FARS
 Marc Rosen, MD, FARS
 Edmund Pribitkin, MD, FARS
 Alison Watson, MD
 Michael Rabinowitz, MD
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 Jurij Bilyk, MD
 Gurston Nyquist, MD, FARS
 Thomas Jefferson University

Introduction:

Thyroid eye disease (TED) can result in intractable adnexal and orbital changes requiring surgical orbital decompression (OD). Both TED and OD are associated with an increased risk of new-onset postoperative (NOP) diplopia. A lower incidence of NOP diplopia has been hypothesized with a "balanced" OD of the medial and lateral orbital walls; however, lateral OD may be associated with higher perioperative risk. In this study, we investigate the incidence of NOP diplopia at an institution that utilizes an endoscopic transnasal medial orbital wall and transconjunctival inferior wall OD with preservation of the maxillary strut.

Methods:

This is a retrospective chart review of patients with TED who underwent a combined medial and inferior wall OD between 2010-2020 at a single tertiary care institution.

Results:

Results were obtained from 83 patients (59 females) with a mean age of 55 years. Eighty-three patients (138 orbits) underwent OD, with approximately equal number undergoing unilateral OD (n=43) as bilateral

OD (n=40). Most patients reported preoperative diplopia (n=60, 75.9%). Seven of the 19 patients without preoperative diplopia underwent a bilateral OD. Few patients (2/19; 10.5%) developed NOP diplopia. One patient had mild, intermittent diplopia. The other patient had experienced TED progression and diplopia but was successfully treated with prism glasses. No patients suffered from iatrogenic perioperative complications.

Conclusion:

A combined endoscopic medial and transconjunctival inferior orbital wall decompression was associated with a low incidence of NOP diplopia in patients without preoperative diplopia, which suggests that the purported "balancing" advantage of lateral OD may not be valid.

8:28 am – 8:34 am

SNOT-22 scores after repair of CSF rhinorrhea

Matthew Liu, BS
 Alissa Kanaan, MD
 David Jang, MD, FARS
 William Yao, MD, FARS
 Jeffrey Radabaugh, MD
 Bradford Woodworth, MD, FARS
 James Gardner, MD
 Martin Goros
 Jessica Grayson, MD
 Zhu Wang
 Philip Chen, MD, FARS
 UT Austin - Dell Medical School

Background:

Patients with spontaneous cerebrospinal fluid (CSF) rhinorrhea can experience significant sinonasal symptom burden, leading to poor quality of life. The objective of this study is to investigate sinonasal outcome test (SNOT)-22 quality of life (QOL) scores in patients undergoing endoscopic endonasal surgery for spontaneous CSF rhinorrhea and compare them to patients undergoing endoscopic sinus surgery (ESS) for chronic rhinosinusitis without nasal polyps (CRSsNP).

Methods:

A multi-institutional retrospective review of patients with spontaneous CSF rhinorrhea and CRSsNP was performed. Individual SNOT-22 scores and domain scores were compared between the two diseases after surgical intervention.

Results:

Ninety-one patients were included in the spontaneous CSF rhinorrhea group and 105 patients were included in the CRSsNP group. Post-surgery, both groups experienced similar improvements in total SNOT-22 scores. However, the CSF rhinorrhea group improved significantly more in runny nose ($P < 0.001$), postnasal discharge ($P < 0.001$), wake up at night ($P = 0.031$), and embarrassed ($P = 0.002$) along with the sleep dysfunction domain ($P = 0.025$)

while the CRSsNP group improved significantly more in the four cardinal symptoms of chronic rhinosinusitis (CRS) and in the ear/face domain ($P = 0.005$).

Conclusion:

Patients with spontaneous CSF rhinorrhea can experience significant sinonasal symptom burden, leading to poor QOL. Those who undergo CSF leak repair experience significant improvement in symptom burden and QOL similar to patients who undergo ESS for CRS, especially in the symptoms of runny nose, post-nasal discharge, waking up at night, feeling embarrassed, and sleep dysfunction.

8:35am - 8:41 am

Transverse venous sinus stenting in idiopathic intracranial hypertension

Peter Filip, MD
Sarah Khalife, MD
Pedro Escobedo, MS3
Joseph D. Morrison
Richard W. Crowley, MD
Stephan Munich, MD
Milena Stosic, MD
Aimee Szewka, MD
Peter Papagiannopoulos, MD
Pete Batra, MD, FARS
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Background:

Despite successful repair of CSF leaks associated with idiopathic intracranial hypertension (IIH), IIH remains a therapeutic challenge. Diuretics, CSF shunting, and optic nerve sheath fenestration are aimed at decreasing intracranial pressures (ICP). Transverse venous sinus stenting (TVSS) is an additional treatment modality for IIH patients with transverse sinus stenosis. This study aims to evaluate if stenting can reduce the risk of CSF leak and the need for subsequent ICP-reducing interventions.

Methods:

A retrospective review of patients who underwent TVSS was performed. Demographics, clinical presentation, imaging characteristics, treatment modalities and complications were analyzed.

Results:

28 patients with transverse sinus stenosis who underwent TVSS were included. Mean age was 36 years, 93% were female, 64% had visual field defects, 75% had papilledema and mean opening pressure on lumbar puncture was 37mmH₂O. 37% of patients treated with acetazolamide did not tolerate it. Following stent-placement, 23 patients (82%), did not require further ICP-lowering intervention over an average follow up period of 814 days. Only two patients (7%) required CSF leak repair and three (11%) VP shunt placement. Of four patients with skull base bone dehiscence on imaging, two developed CSF leak and required repair. The two patients with

CSF leaks had similar characteristics with a BMI of 47, pulsatile tinnitus and headaches.

Conclusion:

Our findings suggest that TVSS is a promising treatment modality for patients with IIH, notably in those who cannot tolerate medical therapy and possibly in the prevention of CSF leak in patients with bone dehiscence on skull base imaging. Further research is needed to confirm this role.

8:42 am - 8:50 am

Q&A

8:50 am - 9:30 am

PANEL: Endoscopic Skull Base Surgery: Considerations Across the Lifespan

Moderator: Stacey Gray, MD, FARS
Panelists: Nithin Adappa, MD, FARS;
Roy Casiano, MD, FARS; Uma Ramaswamy, MD;
Meghan Wilson, MD
Sponsored by Skull Base and Orbital Surgery & Women in Rhinology Sections

9:30 am - 9:45 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Managing the Orbit in Invasive Fungal Sinusitis

Moderator: Corinna Levine, MD, FARS
Justin Turner, MD, FARS; John DelGaudio, MD, FARS

9:45 am - 10:15 am

Break with Exhibitors - Marsalis Hall

Scientific Oral Presentations: Systemic Diseases Associated with Rhinologic Conditions

Moderators: Cecelia Damask, DO; Sonya Marcus, MD; Jeffrey Suh, MD, FARS

10:15 am – 10:21 am

Radiologic improvement in chronic rhinosinusitis in patients with CF treated with CFTR modulators

Tyler Merrill, MD
Kyle Davis
Gideon Singleton
Alissa Kanaan, MD

Introduction:

Cystic fibrosis transmembrane conductance regulator (CFTR) modulators have been shown to improve SNOT-22 scores in patients with Cystic Fibrosis (CF) but data assessing objective measures in this patient population is lacking. While it has been argued by some authors that computed tomography (CT) scans are not reliable in determining the need for surgery in patients with CF, imaging of the paranasal sinuses

could be useful in providing an objective measure of response to combination CFTR modulator therapy

Methods:

This is a single institution retrospective review of patients with CF who were treated with CFTR modulator therapy between 2016 and 2021. All patients who had CT scans available both before and after initiation of CFTR modulator therapy or a change in CFTR modulator therapy were included. Lund-Mackay scores were calculated. Pre and post-therapy scores were compared.

Results:

265 patients with CF were evaluated. Ten patients had CT scans of the paranasal sinuses available prior to and after initiation of or change in CFTR modulator therapy. 9 out of 10 patients showed objective improvement in Lund-Mackay scores with an average improvement of 8 points. This improvement was statistically significant ($p=0.0045$). The subset of patients that were treated with elexacaftor/tezacaftor/ivacaftor showed significantly more improvement in Lund-Mackay scores compared to patients treated with any other CFTR modulator therapy (15 vs 3 points; $p=0.0009$).

Conclusion:

Patients with CF treated with CFTR modulators showed significant improvement in Lund-Mackay scores with patients treated with elexacaftor/tezacaftor/ivacaftor showing the greatest benefit.

10:22 am - 10:28 am

Correlations between sinus CT and quality of life improvement with CFTR modulator therapy

Jessa Miller, Resident Physician

Daniel Beswick, MD, FARS

Stephen Humphries

Connor Balkissoon

Matthew Strand

Eszter Vadar

David Lynch

Jennifer Taylor-Cousar

UCLA

Background:

Chronic rhinosinusitis (CRS) is prevalent in people with cystic fibrosis (PwCF). Elexacaftor/tezacaftor/ivacaftor (ETI) improves pulmonary disease and CRS in PwCF. Correlations between improvements in quality of life (QOL) and objective measures of CRS severity are understudied in PwCF.

Methods:

Adult PwCF/CRS with genotype F508del/F508del or F508del/minimal function participated in a prospective, observational study. Sinus computed tomography (CT) images and 22-question Sinonasal Outcome Test (SNOT-22) questionnaires were obtained at baseline and after 6 months of ETI. CT

images were analyzed in a blinded fashion via the Lund Mackay (LM) system and via a deep learning algorithm that quantified the percent of sinus opacification (%SO). Correlations between changes in SNOT-22 total/domain scores and changes in CT scores were evaluated.

Results:

25 PwCF/CRS completed the study. Mean LM, %SO and SNOT-22 total scores were elevated at baseline and improved at follow-up (all $p<0.01$). Improvement in %SO was not correlated with improvement in SNOT-22 total or domain scores. Improvement in LM score was correlated with improvements in the SNOT-22 ear/facial pain domain ($r=-0.43$, $p=0.03$) and trended toward correlation with improvement in SNOT-22 total scores ($r=-0.39$, $p=0.054$) and sleep dysfunction domain scores ($r=-0.39$, $p=0.055$).

Conclusions:

Both sinonasal QOL and sinus CT scores improve after the initiation of highly effective modulator therapy. However, only variable correlations exist between improvement in radiologic and patient-reported CRS severity. Optimization of both sinonasal symptoms and objective sinus inflammation is important for PwCF given lower airway effects that stem from upper airway disease.

10:29 am - 10:35 am

Cystic Fibrosis responders to endoscopic sinus surgery

Ashleigh Halderman, MD, FARS

Ajay Narayanan, MD

Uma Ramaswamy, MD

Kathleen Kelly, MD

Stella Lee, MD, PhD

Sandra Lin, MD, FARS

University of Texas Southwestern

Introduction:

The impact of endoscopic sinus surgery (ESS) on pulmonary function (PF) in patients with cystic fibrosis (CF) is poorly understood due to conflicting results in the literature. Some patients appear to improve while others do not. This study aimed to identify differences between patients with CF whose PF improved after ESS (responders) and those that did not (non-responders).

Methods:

A retrospective review was conducted on CF patients who underwent ESS between 2005 and 2017 at 3 academic institutions. Data including age, gender, preoperative PF test (PFT) data for 1 year prior and 1 year following surgery, number of exacerbations and length of antibiotics was collected. Responders were defined as patients who had improvement in both FEV1 and percent predicted FEV1 (ppFEV1) at most time points after surgery through 9-12 months.

Results:

25 responders and 52 non-responders were analyzed. Preoperatively, responders were more likely to show pulmonary decline in both FEV1 ($p=0.018$) and ppFEV1 (0.03) than non-responders. The responder group also had a lower pre-operative ppFEV1 than non-responders (62.5 vs 74.9, $p=0.023$). Post-operatively, responders showed significantly less decline over 1 year based on both the overall PFT trend for FEV1 ($p<0.0001$), ppFEV1 ($p<0.0001$) and average change in FEV1 ($p<0.0001$) and ppFEV1 ($p<0.0001$) and average change between PFTs for FEV1 ($p<0.0001$) and ppFEV1 ($p=0.003$).

Conclusion:

It is possible that some CF patients experience improvement in PF following ESS. Potential responders appear to be patients showing a greater decline in PF in the 1 year prior to ESS compared to non-responders. Further studies are needed to better understand which patients might experience improved PF after ESS

10:36 am - 10:42 am

Cystic Fibrosis chronic rhinosinusitis: An evidenced-based review with recommendations

Daniel Spielman, MD
 Daniel Beswick, MD, FARS
 Adam Kimple, MD, FARS
 Brent Senior, MD, FARS
 Kasper Aanaes, MD, PhD
 Bradford Woodworth, MD, FARS
 Rodney Schlosser, MD, FARS
 Stella Lee, MD, PhD
 Do-Yeon Cho, MD
 Nithin D. Adappa, MD, FARS
 David Gudis, MD, FARS
 New York Presbyterian Hospital

Introduction:

Cystic fibrosis (CF) chronic rhinosinusitis (CRS) has emerged as a distinct diagnostic entity, unique from other endotypes of CRS in its presentation, pathophysiology, treatment, and outcomes. As the sinonasal health of this patient population may have broad effects on pulmonary health and quality of life, a comprehensive understanding of the therapeutic approach to CF CRS is essential. Recognizing recent scientific advances and unique treatment modalities specific to this challenging patient population, this review systematically evaluates the literature and provides an evidenced-based review with recommendations (EBRR) regarding the management of CF CRS.

Methods:

A systematic review of the literature was performed. Studies evaluating interventions for the management of CF CRS were included. An iterative review process was implemented in accordance with EBRR guidelines. A treatment recommendation was

generated based on an assessment of the benefits, harms, and the overall grade of evidence.

Results:

This review evaluated the published literature on five topics. Each of the following therapeutic categories was investigated explicitly with regard to treatment outcomes in patients with CF CRS: 1) nasal saline; 2) intranasal corticosteroids (INCS); 3) topical antibiotics; 4) cystic fibrosis transmembrane conductance regulator (CFTR) modulator therapy; and 5) endoscopic sinus surgery (ESS).

Conclusion:

Based on the currently available evidence, nasal saline, ESS, and CFTR modulators are recommended in the management of CF CRS when appropriate. The use of INCS and topical antibiotics, is an option. Clinical judgment and experience are essential in caring for patients with this uniquely challenging disorder.

10:43 am – 10:49 am

Genetics and olfactory dysfunction in primary ciliary dyskinesia

Zainab Farzal, MD, MPH
 Brian Thorp, MD, FARS
 Brent Senior, MD, FARS
 Charles Ebert, MD, FARS
 Adam Kimple, MD, FARS

Introduction:

Individuals with primary ciliary dyskinesia (PCD) frequently complain of olfactory dysfunction, but this deficit is poorly documented in the literature. The purpose of this study was to 1) characterize the presence and degree of olfactory dysfunction in PCD compared to controls and 2) whether certain PCD genes are associated with worse olfaction.

Methods:

We prospectively administered the University of Pennsylvania Smell Identification Test (UPSIT) to individuals with PCD (ages >15 years) at a tertiary referral center. Participants were divided into 3 age groups (15-29 years, 30-44 years, 45+ years) and were compared to N=2170 age and sex-matched participants with normative olfaction data.

Results:

29 (8 males, 21 females) individuals with PCD met criteria (median age: 38 years; interquartile range:22-47). Only 27.6% of patients with PCD had UPSIT scores within the normosmia range. The UPSIT median scores of each PCD age group was significantly lower than median scores of the controls ($p<0.0001$ for each age group). UPSIT scores generally worsened with age: mean 33 (mild hyposmia) for 15-29 years, 26.8 for 30-44 years (moderate hyposmia), and 20.9 (severe hyposmia) for 45+ years. The most common genes coded for inner dynein arms/microtubule dysfunction (11/29,

37.9%) followed by outer dynein arm dysfunction (8/29, 27.6%). No specific gene was associated with worse olfactory dysfunction.

Conclusion:

Individuals with PCD have a substantially higher prevalence and degree of olfactory dysfunction compared to age-matched controls. Our study is the first to suggest greater olfactory dysfunction with age in PCD, highlighting an important area for further study. No single gene was associated with worse olfaction.

10:50 am – 10:56 am

Olfactory decline predicts frailty in older US adults with chronic lung disease

Esther Wang, BS

Kristen E. Wroblewski, MS

Martha K. McClintock, PhD

Leah J. Witt

Jayant M. Pinto, MD

University of Chicago, Pritzker School of Medicine

Objective:

To determine the utility of olfactory decline as a biomarker for frailty in Chronic Lung Disease (CLD).

Methods:

Odor decline over 5 years (Rounds 2 and 3: R2, R3), an adapted Fried Frailty Index, and physician's diagnosis of CLD were collected/constructed for 1,134 respondents in the National Social Life, Health and Aging Project, a prospective, nationally representative study of older US adults living at home. Developing frailty was defined as being robust/prefrail in R2 and frail in R3. Multivariate logistic regressions evaluated the association between odor decline, developing frailty, and CLD status. Interaction plots examined the effect of CLD on the relationship between odor decline and frailty.

Results:

In individuals with CLD, odor decline over 5 years (R2 to R3) predicted frailty at the 5-year follow-up (R3) (OR=5.20, 95%CI=1.43-18.88, P=0.012); there was no such relationship in those without CLD. This differential association by CLD status was robust (interaction P=0.047). Furthermore, odor decline (R2 to R3) was associated with developing frailty across the same 5 year period in individuals with CLD (OR=9.05, 95%CI=2.12-38.62, P=0.003). These analyses were robust to thresholds for odor decline and frailty development and adjusted for patient demographics, comorbidities, alcohol, and cigarette use.

Conclusion:

Older adults with CLD who experience odor decline over 5 years face higher odds of being frail compared to those who do not, independent of other risk factors. Use of odor decline as a biomarker to identify CLD patients who are more likely to become frail

could allow us to institute pulmonary rehabilitation earlier and decrease adverse outcomes (mortality, exacerbations) that afflict these patients.

10:57 am - 11:05 am

Q&A

11:05 am - 11:20 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Social Media in Rhinology

Moderator: Greg Davis, MD, FARS

Zara Patel, MD, FARS; Michael Setzen, MD, FARS

Scientific Oral Presentations: Pathophysiology and Mechanisms

Moderators: Esther Kim, MD; Edward Kuan, MD, FARS; Nyall London, MD, FARS

11:20 am – 11:26 am

Nitric oxide generating microparticles: Anti-biofilm efficacy and sinonasal epithelial cell toxicity

Kevin Li, MD

Levi Cleare

Nadeem Akbar, MD

Joel Friedman

Andrew Draganski

Joshua Nosanchuk

Waleed Abuzeid, MD, FARS

Introduction:

Bacterial biofilms may be implicated in the pathogenesis of chronic rhinosinusitis. Nitric oxide (NO) is a gaseous immunomodulator with a short half-life, complicating achievement of therapeutic concentrations. We have previously shown potent, sustained antibacterial activity of a novel microparticle-based NO delivery platform (SNO-MP). In this study, we explore the antibiofilm activity of SNO-MP and hypothesize that SNO-MP harbors minimal cytotoxicity.

Methods:

Patient-derived and reference strains of methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa* (PA) biofilms were treated with 10 mg/mL of SNO-MP for 6 hours. Biofilm viability was quantified using confocal laser scanning microscopy and live/dead staining. To evaluate SNO-MP toxicity, patient-derived sinonasal tissue explants were dissociated and grown in submerged culture. Serial dilutions of SNO-MP were applied to the cultures over 5 days and cytotoxicity measured using a lactate dehydrogenase (LDH) assay. All experiments were repeated in triplicate. Statistical analysis was performed with PRISM.

Results:

SNO-MP induced a 43.8% and 58.4% reduction in biofilm viability relative to untreated controls in the

MRSA 6524 (patient-derived) and MRSA 25923 (reference) strains ($p < 0.0001$ and $p = 0.0002$, respectively). SNO-MP produced a similar 43.6% and a 56.4% reduction in biofilm viability in the PA 2 (patient-derived) and PA 15692 (reference) strains, respectively ($p < 0.0001$ for both strains). There was no difference in cytotoxicity of the explant tissues on LDH assay when comparing SNO-MP (2.5–10 mg/mL) and the negative control.

Conclusions:

SNO-MP demonstrates potent antibiofilm effect against MRSA and PA without inducing cellular toxicity.

11:27 am – 11:33 am

Denatonium-responsive bitter receptors and AERD

Jennifer Douglas, MD
Corrine Mansfield
Katherine Bell
Michael Kohanski, MD
John Bosso, MD
Nithin Adappa, MD, FARS
James N. Palmer, MD, FARS
Noam Cohen, MD, FARS
Ralph Butler, Professor
Danielle Reed, Associate Director
University of Pennsylvania

Background:

Aspirin-exacerbated respiratory disease (AERD) consists of a unique endotype of chronic rhinosinusitis with nasal polyposis, and asthma, with accompanying aspirin/NSAID sensitivity. Genetic variation in bitter receptors (T2Rs) on ciliated cells (e.g., T2R38) influences susceptibility to CRS without nasal polyposis (CRSsNP). The solitary chemosensory cell (SCC) also expresses T2Rs and participates in the Th2 inflammatory response typical of AERD. AERD patients show enhanced bitterness sensitivity to denatonium benzoate (DB), and nasal polyps appear enriched in SCCs. Here we investigate whether AERD patients exhibit genetic variation in DB-sensitive T2Rs.

Methods:

Subjects with AERD and CRSsNP were enrolled at a quaternary academic rhinology practice. Demographic and clinical information was collected. All were genotyped using an OpenArray gene chip containing SNPs within the DB-responsive T2Rs genes.

Results:

35 patients with AERD and 24 patients with CRSsNP were identified (54% female, mean age of 51 years). One SNP within TAS2R46 (rs2708381) showed a significant between-group difference with AERD subjects having greater T nucleotide frequency compared with CRSsNP (23.1% vs 20.5%; $p = 0.013$).

The remaining DB-responsive T2Rs showed no significant differences (TAS2R4; TAS2R8; TAS2R10, TAS2R13).

Conclusion:

Exploratory data shows the gene encoding T2R46 in AERD has greater T nucleotide frequency than CRSsNP; the remaining DB-responsive T2Rs showed no significant differences. This result may be due to limited statistical power. Additional studies are necessary to better characterize the role of SCCs on the pathophysiology of AERD.

11:34 am – 11:40 am

Succinate activates solitary chemosensory cells (SCCs) in the nose

Elizabeth Sell, Medical Student
Li Hui Tan, PhD
Cailu Lin, PhD
John Bosso, MD
James N. Palmer, MD, FARS
Nithin D. Adappa, MD, FAR
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Danielle Reed, Associate Director
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Ralph Butler, Endowed Professor for Medical Research
University of Pennsylvania

Succinate, although most famous for its role in the Krebs cycle, can be released extracellularly as a signal of cellular distress, particularly in situations of metabolic stress and inflammation or as a microbial metabolite. Increased extracellular levels of succinate as well as activation of the succinate receptor, SUCNR1, have been implicated in a variety of pathophysiological processes, primarily through pro-inflammatory signaling pathways. Intestinal tuft cells (analogous to nasal solitary chemosensory cells and brush cells) express SUCNR1 and succinate activates tuft cells yielding local type 2 inflammatory responses in the small intestine. Tuft cells/SCCs are the dominant epithelial source of interleukin-25 as well as an important source of cysteinyl leukotrienes in the airway which have been implicated in type 2 inflammation in nasal polyps and asthma.

Additionally, taste receptors expressed on SCCs regulate release of antimicrobial peptides. In this study, we demonstrate that succinate can act as a stimulant of human nasal SCCs.

Results from sc-RNAseq analysis show that approximately 10% of the SCCs express SUCNR1. Using live cell calcium imaging, we demonstrate that discrete cells in primary sinonasal air liquid interface (ALI) cultures initiate calcium-mediated signaling in response to succinate stimulation with similar kinetics to traditional SCCs agonists (denatonium benzoate). Furthermore, primary sinonasal ALI cultures treated with succinate evinced increased levels of apical

antimicrobial peptide beta-defensin 2, compared to treatment with a control solution. Overall, these findings demonstrate the need for further investigation into the activation of the sinonasal epithelium by succinate in the pathogenesis of CRS.

11:41 am 11:47 am

Pseudomonas biofilms in patients with chronic rhinosinusitis

Sarah Khalife, MD
Hanna Ostapska, MSc
Francois LeMauff, MSc, PhD
Thereza Lemos De Oliveira Queiroga, MD, MSc
Marc Tewfik, MD, MSc
Donald Sheppard, MD, FRCPC, FECMM, FACHS
Rush University Medical Center

Background:

Chronic rhinosinusitis(CRS) refractory to treatment is commonly associated with biofilm formation. *Pseudomonas aeruginosa*-derived biofilms have been associated with resistance to antimicrobial treatments and worse outcomes. The profile of biofilm exopolysaccharides produced by *P. aeruginosa* in sinonasal cavities of CRS patients has yet to be determined. Novel recombinant microbial glycoside hydrolases (GH), PslGh and PelAh, have shown promise in degrading *P. aeruginosa* biofilms in vitro and in the treatment of wound infections. However, the activity of these GH against CRS sinonasal *P. aeruginosa* biofilms has not been evaluated.

Objectives:

To characterize CRS sinonasal *P. aeruginosa* biofilm formation, exopolysaccharide production and susceptibility to disruption by GH.

Methods:

Sixty sinonasal *P. aeruginosa* samples were isolated from patients with CRS. Crystal violet staining was used to assess biofilm formation. GH (PslGh, PelAh and their combinations) were tested for their activity against these *P. aeruginosa* biofilms in vitro.

Results:

Of the 60 clinical strains isolated from 12 unique patients, 16 formed biofilms. Six of the biofilm-forming *P. aeruginosa* strains were susceptible to PslGh and 3 were sensitive to PelAh. Four strains were susceptible to combination treatment but resistant to PslGh and PelAh alone. Only 3 samples, derived from one unique patient, were strong biofilm formers that were not susceptible to either or both GHs.

Conclusion:

This is the first study to evaluate the effect of GH on CRS *P. aeruginosa* biofilms. The majority of biofilm forming strains were susceptible to one or more GH. This in vitro study suggests that GHs could be potential novel therapeutic candidates in the treatment of CRS.

11:48 am – 11:54 am

In-vitro release of triamcinolone acetonide from saturated sinus dressings

Do-Yeon Cho, MD
Dong Jin Lim, PhD
Ashwini Tilak, MD
Daniel Skinner, BS
Shaoyan Zhang, PhD
Jessica Grayson, MD
Bradford Woodworth, MD, FARS
University of Alabama at Birmingham

Background:

Saturating commercially available sinus dressings with steroid is a widespread practice to improve wound healing and reduce inflammation after sinus surgery. While multiple dressings are utilized, data regarding the amount of steroid released from these materials in the postoperative period is lacking. The purpose of this study is to provide in-vitro release profiles of triamcinolone acetonide (TA) impregnated dissolvable sinus dressings.

Methods:

Four dissolvable sinus dressing materials (synthetic polyurethane (sPU), esterified hyaluronan (EH), modified amylopectin (mAP), and carboxymethyl cellulose (CMC)) were selected. Identical volumes of each material were prepared using a 6-mm biopsy punch and placed on the porous inserts (0.4-micron pores) of an air-liquid culture system. The material was saturated with TA (0.6mg), and basal liquid (0.9% NaCl) was collected and replaced daily for 14 days. The TA concentration in the collected media was measured using an enzyme-linked immunosorbent assay.

Results:

No initial burst release was identified in any material, and TA levels were detectable up to 14 days. ED and mAP released 40% of TA within a week. EH, mAP, and CMC exhibited significantly faster release of TA compared to sPU (Day 14-TA concentrations (mg): EH 0.3+/-0.08, mAP 0.32+/-0.07, CMC 0.26+/-0.11, sPU 0.13+/-0.06, p<0.0001, Tukey's multiple comparison). TA was released significantly more slowly from sPU compared to other materials starting day 2, with 75% retained by day 14.

Conclusion:

All materials demonstrated sustained release of TA over 14 days. sPU had the slowest release, indicating this dissolvable sinus dressing is more suitable if extended release of steroid is desired.

11:55 am - 12:00 pm

Q&A

12:00

Meeting Adjourns

Friday, April 29, 2022
Morning Breakout Session
8:00 am – 12:00 pm CST
Reunion Ballroom C

Scientific Oral Presentations:
Patient Perceptions and Social
Determinants

Moderators: Edward McCoul, MD, FARS; Theodore Schuman, MD, FARS; Zara Patel, MD, FARS

8:00 am – 8:06 am

Sinonasal outcomes in patients treated for AERD

Glen D'Souza, MD

Rahul Alapati

Kathleen Calaro

Samiat Awosanya

Maria Aramache

Sean Parsel, DO

Aykut Unsal, DO

Mindy Rabinowitz, MD, FARS

Marc Rosen, MD, FARS

Gurston Nyquist, MD, FARS

Elina Toskala, MD, PhD, FARS

Thomas Jefferson University Hospital

Patients with aspirin-exacerbated respiratory disease are managed by endoscopic sinus surgery (ESS), aspirin desensitization (AD), biologics, and topical and oral corticosteroids.

Objective:

To describe the demographics and impact of treatment with ESS, AD and biologics on sinonasal outcomes in patients with AERD

Methods:

This is an IRB-approved, single-institution, retrospective chart review of patients identified by EMR search for two of the three AERD criteria followed by a manual chart review to confirm diagnosis in patients seen between the years 2010 and 2021. Sinonasal outcomes were described by comparing SNOT-22 and Meltzer polyp scores one year before and after initiation of treatment.

Results:

Of the 129 (N) patients in the study, 44% (57) received ESS as the primary treatment modality, while others received ESS either with AD (41, 32%) or Biologics (31, 24%). All patients in the study had undergone ESS for sinonasal polyps previously at a mean interval of 101.5 days for AD and 561.5 days for the Biologics cohorts. 26% of the patients had a history of receiving allergen immunotherapy. The mean age was 47.53 years (SD-16.29), 60% of

the patients were women and 56.9% were Caucasian.

Mean SNOT -22 scores reduced by 46.4% (63.10 to 35.69) in the FESS cohort, 40.35 % (26.27 to 15.67) in the AD cohort and 43% (58 to 33) in the biologics cohort.

Mean Meltzer polyp scores reduced by 87.88% (3.88 to 0.47), 82% (4.53 to 0.82) and 38% (1.81 to 1) in the FESS, biologic and AD cohorts respectively.

Conclusion:

FESS, AD and biologics result in improved sinonasal outcomes within one year of treatment. However, biologics showed improved sinonasal outcomes without the requirement for ESS

8:07 am - 8:13 am

Quality of life in CRS patients treated with long-acting implantable corticosteroid matrices

Anders Cervin, MD, PhD

Allison Gartung, PhD

Joanne Rimmer, A/Prof

Agnieszka Wrobel

Lindsay Brayton, Clinical Project Manager

Background:

LYR-210 is an implantable matrix intended to release mometasone furoate for 24 weeks to inflamed sinonasal mucosa in chronic rhinosinusitis (CRS) patients. LYR-210 (7500µg) demonstrated clinically relevant symptom improvement and decreased both ethmoid opacification and need for rescue medication at week 24. The quality of life of the LANTERN study patients was evaluated using the 36-item short form health survey, version 2 (SF-36v2).

Methods:

Surgically naïve adults with moderate-to-severe CRS who failed previous medical management enrolled in a multicenter, randomized (1:1:1), controlled LANTERN study. Patients received either bilateral administration of LYR-210 (2500µg) (n=23) or LYR-210 (7500µg) (n=21), or sham-procedure control (n=23). The SF-36v2 was completed at baseline and week 24. The mental health component summary (MCS) and its subdomains (vitality, social functioning, role-emotional, mental health), and physical health component summary (PCS) and its subdomains (physical functioning, role-physical, bodily pain, general health) were analyzed as change from baseline. LYR-210 groups were compared to control at a 1-sided significance level of 0.05 using an ANCOVA model.

Results:

Both LYR-210 doses significantly improved the mean MCS score by >8 points over control at week 24. LYR-210 (7500µg) achieved statistical significance in each of the 4 MCS subdomains. LYR-210 (2500µg) and LYR-210 (7500µg) numerically increased the mean PCS score compared to control at week 24, with LYR-210 (7500µg) achieving statistical

significance in 3 PCS subdomains (physical functioning, role-physical, and bodily pain).

Conclusions:

LYR-210 may significantly improve the mental and physical health and quality of life of CRS patients.

8:14 am - 8:20 am

I got sinus: What do we mean when we have a 'sinus infection'?

Edward McCoul, MD, FARS

Charles Riley, MD

Waleed Abuzeid, MD, FARS

Ian Humphreys, DO, FARS

Nadeem Akbar, MD

Jivianne Lee, MD, FARS

John Schneider, MD

Walter Reed National Military Medical Center

Introduction:

Sinus infections are a common reason patients seek medical care. However, the intended meaning of the term 'sinus infection' among patients and otolaryngologists is incompletely defined.

Methods:

In this cross-sectional, multi-institutional survey, a semantics-based questionnaire was provided to consecutive patients presenting to otolaryngology clinics at six academic centers from June 2020 until May 2021. The primary outcome was respondent definitions for sinus infection from a list of twenty-eight proposed terms covering six general categories. Secondary outcome measures included determining differences between geographic regions and education levels.

Results:

Responses were obtained from 400 patients (55% female, mean age 49.7 years) and 26 otolaryngologists (36% female, mean age 37.3 years). Both groups selected a median of 10 terms to define a sinus infection. Among patients the most frequently selected symptom categories were mucus (360, 90.0%), pressure/pain (346, 86.5%), and airflow (338, 84.5%). Compared to patients, clinicians selected with greater frequency the symptom categories of pressure/pain (13.5% difference; 95% CI 5.8%-21.5%), mucus (10% difference; 95% CI 4.2%-17.4%) and airflow (11.7% difference; 95% CI 3.7%-20.7%) domains. Multiple categories were selected by 96% of patients and 100% of providers.

Conclusion:

The definition of 'sinus infection' appears to be variable and ambiguous for many patients, while clinicians have a more focused definition. Patients commonly describe sinus infection in the context of pain-related symptoms. Appreciation of these semantic differences may enable more effective patient-clinician communication.

8:21 am – 8:27 am

The rising cost of rhinological medications: A NADAC analysis

Milind Vasudev, BS

Sina Torabi, MD

Jack Birkenbeuel, BS

Khodayar Goshtasbi, MD, MS

Kelsey Roman, BS

Edward Kuan, MD, FARS University of California, Irvine

Objectives:

To evaluate trends in price changes of highly utilized nasal sprays and over the counter allergy medications.

Methods:

The 2014-2020 Medicaid National Average Drug Acquisition Cost (NADAC) database was queried for drug pricing information for the following classes of medications: intranasal corticosteroids, oral antihistamines, antileukotrienes, intranasal antihistamines, and intranasal anticholinergics. Individual medications were identified by Food and Drug Administration assigned National Drug Codes (NDC). Per unit drug prices were analyzed for average annual prices, average annual percent price changes, and inflation adjusted annual and composite percent price changes.

Results:

Beclometasone (Beconase AQ, 56.7%, QNASL, 77.5%), flunisolide (Nasalide, -14.6%), budesonide (Rhinocort Aqua, -1.2%), fluticasone (Flonase, -6.8%, Xhance, 11.7%), mometasone (Nasonex, 38.2%), ciclesonide (Omnaris 73.8%), combination azelastine and fluticasone (Dymista, 27.3%), loratadine (Claritin, -20.5%), montelukast (Singulair, 14.5%), zileutin (Zyflo (57.2%), azelastine (Astepro 21.9%), olopatadine (Patanase, 27.3%), and ipratropium bromide (Atrovent, 56.6%) had an overall change in inflation adjusted per unit cost between 2014 and 2020 (% change). 11/15 drugs evaluated had an increase in inflation adjusted prices, for an average increase of 42.06 ± 22.27 % (mean \pm SD). 4/15 drugs had a decrease in inflation adjusted prices, for an average decrease of 10.78 ± 7.36 %.

Conclusions:

The rising cost of highly utilized medications contribute to increased patient acquisition costs and may pose barriers of drug adherence to particularly vulnerable populations.

8:28 am – 8:34

Health literacy in rhinology patients

Abdullah Zeatoun, MD
Miryam Makutonin
Douglas Farquhar, Resident Physician
Garret Berk, Medical Student
Keonho Kong, MD
Mark Chaskes, MD
Brian Thorp, MD, FARS
Brent Senior, MD, FARS
Adam Kimple, MD, FARS
Charles Ebert, MD, FARS
UNC

Background:

Patients with lower health literacy tend to have worse medical outcomes due to decreased medication compliance, worse decision-making, and reduced capacity to self-manage disease. Health literacy can be assessed using validated tools such as the brief health literacy screening tool. The purpose of this study was to determine if health literacy in Rhinology patients negatively affects either subjective or objective measurements of sinus disease.

Methods:

As part of patient intake, new, established, and recovered post-surgical patients at our clinic were routinely screened for health literacy and RSDI scores. We identified a retrospective cohort of 218 patients and abstracted their demographics, past medical history, RSDI score, and Lund-Mckay score. Statistical analysis was performed to determine if health literacy was associated with subjective or objective outcomes.

Results:

The patients' mean age was 50.2 years, 56% were females, the mean RSDI score was 20, mean health literacy score was 19. A statistically significant decrease in RSDI total scores correlated to an increase in health literacy ($p=0.0001$). This also translated to RSDI subdomains [Emotional ($p=0.002$), Functional ($p=0.0003$), Physical ($p=0.0001$)]. There was no statistical difference between age and health literacy ($p=0.99$) or yearly income and health literacy ($p=0.58$).

Conclusion:

Health Literacy is an essential factor in how patients receive medical care and affects their outcomes. However, this study demonstrates that patients with lower health literacy have a worse sinonasal quality of life. Therefore, rhinologists need to be aware of this discrepancy and think of educational tools to help patients with low health literacy.

8:35 am – 8:41 am

Impact of social determinants of health on access to rhinology care and patient outcomes

Esther Wang, BS
Ashley Diaz, Medical Student
Nadieska Caballero, Clinical Associate of Surgery
Jayant M. Pinto, MD
Christopher Roxbury, MD, FARS
University of Chicago, Pritzker School of Medicine

Objective:

To determine the impact of social determinants of health on patient-perceived outcomes and patterns in access to rhinology care at a tertiary academic medical center.

Methods:

Adult patients undergoing outpatient care of chronic rhinitis and chronic rhinosinusitis were recruited to enroll in this study. Enrolled patients were asked to participate in a telephone survey assessing symptoms, social/emotional consequences of disease, and barriers to care on a 5-point Likert scale. A social deprivation index (SDI; 0-6) was constructed from survey measures: employment, income, education, car/home ownership, ratio of people/rooms in the home. Ordered logistic regression was used to examine associations between the SDI and perceptions of barriers to rhinology care.

Results:

30 patients (46% response rate) participated in the survey. Respondents were majority female (60%, $n=18$), black (56%, $n=17$), not employed (56.7%, $n=17$), and had low income (lowest 2 tertiles, 86.6% $n=26$). There were significant numbers of single parents (27%, $n=8$), and car and home ownership were reported in 19 (66%) and 11 (37%). Having an SDI score of 2+ was associated with more difficulties obtaining saline ($p=0.039$) and trends towards increased difficulty using saline rinses properly ($p=0.065$) and using saline rinses as often as directed ($p=0.090$).

Conclusion:

Worse social deprivation is associated with difficulties obtaining and using saline rinses in an urban, underserved, majority black population. These findings suggest social factors may affect access to and quality of rhinology care, and indicate the need for attention to social determinants of health in rhinology.

8:42 am - 8:50 am

Q&A

8:50 am - 9:10 am

**A CONVERSATION WITH THE EDITOR-IN-CHIEF:
Preparing a Publishable Paper**

Lauren Roland, MD, Timothy Smith, MD, FARS

9:10 am - 9:30 am

**TIPS FROM THE EXPERTS: Starting a Career as a
Surgeon-Scientist**

Moderator: Victoria Lee, MD

Noam Cohen, MD, FARS; Andrew Lane, MD, FARS

9:30 am - 9:45 am

**TARGETED CONVERSATIONS ON IMPORTANT
TOPICS: Odontogenic Sinusitis**

Moderator: Angela Donaldson, MD, FARS

Panelists: John Craig, MD, FARS; Todd Kingdom, MD, FARS

9:45 am - 10:15 am

Break with Exhibitors - Marsalis Hall

**Scientific Oral Presentations:
Pathophysiology and Mechanisms**

Moderators: Mark Arnold, MD; Philip Chen, MD, FARS; Mindy Rabinowitz, MD, FARS

10:15 am – 10:21 am

**Is there a correlation between radiographic and
histologic findings in rhinosinusitis?**

Do-Yeon Cho, MD

Daniel Skinner, BS

Dong Jin Lim, PhD

Shaoyan Zhang, PhD

Lucian Bloodworth

Lydia Yang

Jessica Grayson, MD

Bradford Woodworth, MD, FARS

University of Alabama at Birmingham

Background:

Computed tomography (CT) of the sinuses is the standard assessment for sinus mucosal disease but is criticized for lack of specificity. Data regarding the correlation between sinus CT findings and histopathology are lacking. The objective of this study is to determine whether the degree of radiologic change noted on CT correlates to the severity of histopathologic changes in a robust, reproducible rabbit model of rhinosinusitis.

Methods:

Six (unilateral) sinuses in 6 rabbits were directly inoculated with *Pseudomonas aeruginosa* (n=3) or *Staphylococcus aureus* (n=3) for 1 week, and ostia blocked with a sponge. Contralateral sinuses served as internal controls. Sponges were removed at 1 week, and animals were evaluated 3 weeks later with CT scan (Kerschner's grading system) and histopathology (epithelial (E)/submucosal (SM) thickness).

Results:

CT scores and E/SM thickness were significantly higher in the infected sinuses compared to the contralateral sinuses (CT: 6.96+/-1.3 vs 0.0+/-0.0, E thickness (μm): 37.77+/-5.87 vs 16.0+/-3.33, SM thickness (μm): 204.2+/-21.74 vs 78.75+/-14.73). CT scores and E/SM depth were strongly correlated (CT vs E depth: $r=0.76$, $p<0.01$, CT vs SM depth: $r=0.92$, $p<0.0001$). Regression analysis demonstrated that SM thickness significantly affected CT scores compared to E thickness ($p<0.0001$). Inflammation in the epithelial layer was noted in the contralateral sinuses despite a lack of CT findings.

Conclusion:

Findings suggest that the severity of sinus disease based upon CT correlates to the degree of histopathologic disease in this rabbit model of rhinosinusitis. CT findings likely represent changes to the submucosal layer of the inflamed sinus.

10:22 am – 10:28 am

**Site-specific detection and differential expression
of inflammatory markers in the sinonasal mucosa**

Wesley Stepp, MD, PhD

Erin Lopez, Resident Physician

Charles Ebert, MD, FARS

Brian Thorp, MD, FARS

Brent Senior, MD, FARS

Megan Rubelli

Ilona Jaspers, Professor

Adam Kimple, MD, FARS

University of North Carolina Hospitals

Background:

Sampling chemical mediators in the sinonasal mucosa has typically been accomplished through sinonasal lavage (SNL). This method is not specific for location within the paranasal sinuses, dilutes analytes and prevents subsite analysis within the sinuses. Recent advancements in sampling technology allows for consistent and highly concentrated extraction of nasal mucosa proteins, permitting site specific analysis of inflammatory proteins throughout the sinonasal cavity. In this study, we examined site specific differences between the mucosa of the inferior turbinate (IT), middle meatus (MM) and the sphenoidal recess (SER).

Methods:

Leukosorb paper strips were placed bilaterally at either the head of the IT, MM or SER under direct endoscopic visualization. Epithelial lining fluid (ELF) was collected and analyzed via direct enzyme-linked immunosorbent assay (ELISA) for 30 key inflammatory mediators. Two-way ANOVA analysis was conducted to determine significance between sites.

Results:

A majority of inflammatory markers assayed (73.3%) had similar levels between distinct sub-sites. A subset of markers was differentially expressed between sites. Eotaxin and MIP1-alpha were more highly expressed at the MM, Eotaxin-3 was more highly expressed at the SER, and IL2, IL4, IL6, IL15 and IFN-gamma were more highly expressed at the MM.

Conclusions:

Site-specific ELF testing of inflammatory mediators within the sinonasal cavity can be accomplished with a high degree of repeatability. There is not significant variability between sites; however, in our preliminary study we noted small, persistent site-specific changes in certain chemical mediators. Additional work is needed to better understand this variability.

10:29 am – 10:35 am

Association between specific endotypes and the presence of discharge or edema after ESS for CRS

Eli Stein, Medical Student
Alexander Schneider, MD
Regan Harmon
Caroline Price
Atsushi Kato, PhD
Stephanie Shintani-Smith, MD
David Conley, MD, FARS
Kevin Welch, MD, FARS
Robert Kern, MD, FARS
Bruce Tan, MD
Northwestern University Feinberg School of Medicine

Background:

Patients with chronic rhinosinusitis (CRS) may have persistence of polyps, discharge, or edema after endoscopic sinus surgery (ESS). Inflammation in CRS can be classified into 3 endotypes, with polyps being associated with the Type 2 endotype. In this study, we evaluate the endotypic underpinnings of discharge or edema without recurrent polyps after ESS.

Methods:

Patients underwent endoscopy at 6-12 months post-ESS and middle meatal mucus (MMM) was obtained at that visit. Endoscopy was scored using the modified Lund-Kennedy scale for edema, polyps and discharge. Luminex analysis of MMM was performed for IFN- γ , ECP, or IL-17a, and Type 1, 2, and 3 endotype was defined as greater than 90th percentile expression of each marker, respectively, in controls. Wilcoxon rank sum and chi-squared tests were used to compare cytokine levels and endotype prevalence between those with and without endoscopic findings.

Results:

123 CRS patients were enrolled at ESS, of which 107 did not have polyps at post-ESS endoscopy. Of these, 48 patients had discharge, 44 patients had edema, and 46 had no recurrence of endoscopic

findings. Compared to those without recurrence, patients with discharge or edema reported significantly worse severity as measured by CRS-PRO. In addition, compared to no recurrence, patients with discharge or edema had higher post-ESS IFN- γ , ECP, and IL-17a. Patients with discharge had higher prevalence of T1 and T3 endotypes ($p=0.027$, $p=0.008$), while patients with edema had higher prevalence of T3 endotypes ($p=0.007$).

Conclusions:

Post-ESS discharge or edema in the absence of recurrent polyps were associated with higher patient reported outcome severity and were more strongly associated with Type 1 or 3 inflammation.

10:36 am – 10:42 am

Histopathologic differences in adult and pediatric patients with chronic rhinosinusitis

Sarah Khalife, MD
Hannah Brown, BS
Veena Ganesan
Pedro Escobedo, MS3
Peter Filip, MD
Anatoli Karas
Jill Jeffe
Peter Papagiannopoulos, MD
Pete Batra, MD, FARS
Bobby Tajudeen, MD, FARS
Rush University Medical Center

Background:

Adult and pediatric patients with chronic rhinosinusitis (CRS) generally undergo similar management. Few studies have undertaken sinonasal tissue-level comparisons of these groups. This study examines potential histopathologic differences between children and adults with CRS, with the goal of optimizing medical management.

Methods:

In a retrospective cohort of CRS patients who underwent functional endoscopic sinus surgery (FESS), demographic factors, pertinent comorbidities, and a structured histopathologic report of 13 variables were compared across pediatric (≤ 18 years) and adult CRS patients with and without nasal polyps (pCRSwNP, pCRSsNP, aCRSwNP, aCRSsNP, respectively).

Results:

411 adult (202 aCRSsNP, 209 aCRSwNP) and 55 pediatric (30 pCRSsNP, 25 pCRSwNP) patients were analyzed. Significantly more children compared to adults had a comorbid asthma diagnosis (62.9% vs. 35.5%, $p=0.002$). Regarding histopathologic characterization, adults with CRS exhibited significantly more tissue neutrophilia (30.3% vs. 11.5%, $p=0.002$), basement membrane thickening (70.2% vs. 44.3%, $p<0.001$), subepithelial edema (61% vs. 28.8%, $p<0.001$), squamous metaplasia (23.5% vs. 3.8%, $p<0.001$), and eosinophil

aggregates (21.1% vs. 3.8%, $p < 0.001$), than children with CRS. The majority of adult CRS patients exhibited a lymphoplasmacytic predominant inflammatory background, whereas the majority of children with CRS exhibited a lymphocyte predominant inflammatory background.

Conclusion:

Sinonasal tissue of adult and pediatric CRS patients demonstrates clear histopathologic differences. Our findings provide insight into differing pathophysiology, which may enable optimization of targeted therapies for patients in each of these unique clinical groups.

10:43 am - 10:49 am

Tissue eosinophilia is a superior metric compared to polyp status for RNA sequencing in CRS tissue

Tripti Kaur Brar, MBBS, MD
Chantal McCabe, Bioinformatician
Michael Marino, MD, FARS
Amar Miglani, MD
Devyani Lal, MD, FARS
Mayo Clinic, Arizona

Background:

RNA sequencing (RNAseq) is being used to study inflammatory pathways in chronic rhinosinusitis (CRS). Our goal was to probe validity of tissue eosinophilia as a metric to study RNAseq in CRS.

Methods:

The study was conducted on prospectively-enrolled subjects undergoing sinonasal surgery. Subjects were categorized as control, CRS, CRSwNP and CRSsNP. CRS was also categorized by tissue eosinophil levels per high power field (EOS/HPF) as ≥ 10 EOS/HPF or < 10 EOS/HPF. Ethmoidal tissue samples were processed, differentially expressed (DE) genes were calculated and mechanistic pathway analysis performed.

Results:

After removing low quality samples and incomplete metadata from 28 subjects, 3 controls and CRS samples ([Analysis 1: 5 CRSwNP, 11 CRSsNP; Analysis 2: 7 CRS < 10 EOS/HPF, 8 ≥ 10 EOS/HPF]) were analyzed. Controls separated clearly from CRS by both study criteria (polyp status, EOS/HPF). In both analyses, CRS differentiated into two distinct CRS subgroups. However, heatmaps showed greater homogeneity within each CRS subtype when studied by eosinophilia vs. polyp status. Overall, higher gene expression was found in controls vs. CRS. When comparing CRS with control, 545 DE genes were found, with 269 being common between CRSwNP and CRSsNP. When analyzing by tissue EOS/HPF, 206 DE genes were common between CRS < 10 EOS/HPF and CRS ≥ 10 EOS/HPF analyses. Tissue eosinophilia as a metric was further validated by finding DE of IL 17 signalling pathway between < 10 EOS/HPF (increased) versus ≥ 10 EOS/HPF samples.

Conclusions:

As a metric, tissue eosinophilia is at least as effective as analysis by polyp status for RNA sequencing and may potentially offer superior insights into mechanistic pathways.

10:50 am – 10:56 am

HIF1-alpha regulates human nasal epithelial cell growth in nasal polyposis

Austin Mattox, Medical Student
Jean Kim, MD, PhD, FARS
Hyun Sil Lee, Post Doctoral Fellow and Research Associate
Johns Hopkins University School of Medicine

Epithelial cell hyperplasia is a key feature of nasal polyps in chronic rhinosinusitis with nasal polyposis (CRSwNP). We have previously shown that overexpression of growth factor VEGF promotes autocrine driven hyperplastic growth of primary nasal epithelial cells (PNEC) in vitro. Therefore, we sought to examine the upstream mechanisms involved in this process. We hypothesize that HIF1 α (hypoxia inducible factor-1), a known master regulator of VEGF, promotes this process. We now report that both HIF1 α and HIF2 α protein and mRNA are highly expressed in PNEC as measured by flow cytometry and realtime PCR. Immunohistochemical analysis shows that HIF1 α is induced in the epithelium of polyps in CRSwNP patients as compared to control patients. Specific inhibition of HIF1 α by siRNA knockdown results in inhibition of VEGF mRNA and protein expression, which subsequently results in inhibition and normalization of hyperplastic growth of PNEC from CRSwNP patients, as measured by DNA binding assay. This was specific for HIF1 α and not observed for knockdown of HIF2 α . Additionally, downstream inhibition of HIF1 α pathway by MAP kinase pathway inhibitors results in inhibition of PNEC cell growth. Exposure of whole human nasal polyps in ex vivo culture to HIF1 α inhibitor digoxin results in induction of PNEC apoptosis as assessed by TUNEL assay. Collectively, these data indicate that in human PNEC and nasal polyp tissue, HIF1 α regulates VEGF in promoting hyperplastic nasal epithelial cell growth and survival in CRSwNP and implicate a critical role for hypoxia in the development of hyperplastic polyp growth.

10:57 am – 11:05 am

Q&A

11:05 am – 11:20 am

TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Standard of Care in Extended Frontal Sinus Surgery: Does Anyone Learn Osteoplastic Flaps Anymore?

Moderator: Raj Sindwani, MD, FARS

Panelists: Stacey Gray, MD, FARS; James Palmer, MD, FARS

Scientific Oral Presentations - Symptom and QOL Measures in Rhinologic Conditions

Moderators: Naveen Bhandarkar, MD, FARS; Garret Choby, MD, FARS; Stephanie Joe, MD, FARS

11:20 am – 11:26 am

Sham-controlled trial of a novel device for the treatment of viral upper respiratory tract infection

Thomas Edwards, MD

Zachary M. Soler, MD, FARS

Matthew Germroth, Research Fellow

Kristina LaPointe, Research Associate

Shaun Nguyen, MD

Rodney Schlosser, MD, FARS

Medical University of South Carolina

Background:

The administration of acoustic vibration and oscillating expiratory pressure with a novel device has been shown in a prior uncontrolled study to improve nasal congestion and air flow. These interventions are hypothesized to release nasal nitric oxide, a molecule with known antiviral properties. This study investigated if use of this device reduced the incidence of viral upper respiratory infections (URI) and the severity and duration of nasal congestion.

Methods:

Community dwelling adults were randomized to receive an active or a sham device (2:1). Subjects used the assigned device twice daily beginning at the start of the fall URI season. A validated metric of viral URI symptoms, Total Symptoms Score (TSS), was assessed each day for 8 weeks. Nasal congestion, an element of the TSS, was measured with a 4-point Likert scale. A viral URI was defined as a TSS \geq 14 with nasal discharge for at least 3 consecutive days.

Results:

Fifty-two subjects (mean age 46.8 years, range 20-69 years, 65.4% female) were enrolled. No subject in either the active or sham group developed symptoms meeting the study definition of a viral URI. However, a statistically significant difference in nasal congestion score was seen between the active and sham groups (mean rank 23.96 vs. 34.12, $U = 352.5$, $z = 2.094$, $p = 0.036$). Those using the active device

also had more days with no nasal congestion (57.2% vs 33.5%, mean rank 29.08 vs. 18.77, $U = 153$, $z = -2.129$, $p = 0.033$).

Conclusion:

No conclusion can be drawn from this data regarding the ability of acoustic vibration and oscillating expiratory pressure to reduce the incidence of viral URI. However, regular use of the active device improved nasal congestion compared to sham.

11:27 am - 11:33 am

Eustachian tube dysfunction (ETD) in chronic rhinosinusitis with comparison to primary ETD

Tiffany Chen, Clinical Research Fellow

Michael Shih

Thomas Edwards, MD

Shaun Nguyen

Ted Meyer

Zachary M. Soler, MD, FARS

Rodney Schlosser, MD, FARS

Background:

Otologic symptoms consistent with Eustachian tube dysfunction (ETD) are common in patients with chronic rhinosinusitis (CRS), but can also occur independently of CRS as primary ETD. It is unclear if CRS+ETD is similar to primary ETD or how treatment outcomes compare.

Methods:

A systematic search of PubMed, CINAHL, Scopus, and Cochrane Library was conducted following Preferred Reporting Items for Systematic Reviews and Meta-analyses. Any study describing ETD in CRS was included. Primary ETD studies were limited to those with pre- and post-operative Eustachian Tube Dysfunction Questionnaire (ETDQ-7) scores in ETD treated only with Eustachian tube balloon dilation (ETBD).

Results:

Sixteen studies were included: nine studies with 1336 consecutive patients with CRS and seven studies with 161 patients with primary ETD. In studies with specific data, 225 (47.2%) patients with CRS had a score greater than 14.5, consistent with ETD. In CRS+ETD, baseline mean ETDQ-7 score was 20.7 ± 8.4 and did not differ by polyp status. In primary ETD, mean ETDQ-7 score was significantly higher than CRS+ETD (29.5 ± 8.1 , $p < 0.0001$). Regarding treatment outcomes, CRS+ETD treated with ESS alone resulted in mean ETDQ-7 in the normal range (13.2 ± 5.3), with a mean change of -7.4 [95%CI $-10.82, -3.99$] ($p < 0.00001$). Patients with primary ETD treated with ETBD had post-operative ETDQ7 scores of 14.9 ± 7.5 with mean change of -13.9 [$-18.01, -9.88$], $p < 0.00001$.

Conclusion:

ETD is noted in approximately half of patients with CRS. Outcomes of CRS+ETD treated with ESS

alone are similar to those of patients with primary ETD treated with ETBD.

11:34 am – 11:40 am

CRS in asthma is not associated with worse asthma control test responses

Amarbir Gill, MD

Jorgen Sumsion, BS

Heather Howe, MD

Jeremiah Alt, MD, PhD, FARS

University of Utah

Background:

Patients with both chronic rhinosinusitis (CRS) and asthma (CRS-A) have increased rates of revision endoscopic sinus surgery (ESS). Research surrounding the impact of comorbid CRS on asthma control has been limited. Herein, we used a case-control study design to examine whether comorbid CRS was associated with worse asthma control test (ACT) scores.

Methods:

ACT scores were prospectively collected among patients evaluated for asthma in a tertiary care pulmonology clinic. The diagnoses of asthma were made/confirmed based on the Global Initiative for Asthma Guidelines 2020. Among this cohort of patients, those with a physician diagnosis of CRS (made in accordance with the criteria put forth by the American Academy of Otolaryngology–Head and Neck Surgery) were retrospectively identified. Baseline and follow-up ACT scores, as well as demographic information, were compared between patients with CRS-A vs. those with asthma-alone.

Results:

Among a final cohort of 497 patients, the mean baseline ACT score was 16.76 for those with asthma-alone (n=400) and 16.23 for those with CRS-A (n=97) (p=0.39). Although comorbid CRS (p=0.39) and comorbid nasal polyposis (p=0.58) were not predictive of ACT scores, male gender was associated with improved control (p=0.01). The mean improvement in ACT among those with CRS-A (mean follow-up 57.6 weeks) vs. asthma-alone (mean follow-up 47.7 weeks) was not significantly different (1.88 vs 1.02, respectively) (p=0.22).

Conclusion:

Baseline and follow-up ACT scores do not significantly differ between patients with asthma-alone and those with CRS-A. Thus, comorbid CRS is not associated with worse ACT scores.

11:41 am – 11:47 am

Correlations between three validated olfactory tests

Michael Shih, BS

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Matthew Germroth, Research Fellow

Jacob Snyder

Shaun Nguyen, Dr.

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Medical University of South Carolina

Introduction:

Multiple tests have been developed and validated to assess olfaction. Studies examining olfaction often use only a single olfaction test or quality-of-life measure, and investigated domains of olfaction may vary. Because there is a paucity of data comparing these psychophysical olfactory tests and quality-of-life measures, results are difficult to compare between studies.

Methods:

Subjects (N=41) were prospectively enrolled for olfaction testing with the Smell Identification Test-40 (SIT40), Sniffin' Sticks (Sniff), and Snap & Sniff (Snap) Olfactory Tests. Tested domains of olfaction included threshold, discrimination, and identification. Each subject completed the seventeen-item Questionnaire on Olfactory Disorders (QOD) and olfactory symptom visual analog scale (VAS). Spearman correlations were conducted for olfaction tests vs QOD and VAS.

Results:

There were 19 normosmic, 13 hyposmic, and 9 anosmic subjects. In general, all 3 psychophysical tests showed moderate to strong correlations. The strongest correlations were found between the identification components of the various tests ($r > 0.836$, $p < 0.0001$). Threshold and discrimination components also had moderate to strong correlations ($r > 0.696$, $p < 0.0001$). Total QOD and olfactory-specific VAS symptom scores correlated moderately with all test measures ($r = -0.407$ to -0.598 , $p < 0.001$ to 0.008) with significant variability for individual questions.

Conclusions:

Olfactory psychophysical tests correlate strongly between 3 common validated measures. Olfactory dysfunction is moderately associated with greater impact on quality of life and olfactory symptom severity with variability among specific questions.

11:48 am – 11:54 am

Drug-induced olfactory and gustatory dysfunction

Peter Debbaneh, MD

Louis McKinnon

Muhibullah Haidari

Jonathan Liang, MD, FARS

Kaiser Permanente

Background:

With the COVID-19 pandemic, there is growing interest and research in olfactory and gustatory dysfunction (OGD). Drug-induced dysfunction is an often overlooked etiology. We aim to describe the patterns of these adverse drug reactions (ADRs) using the FDA Adverse Events Reporting System (FAERS).

Methods:

The FAERS database was queried from 2011-2021 for terms describing ADRs related to OGD. Terms included anosmia, hyposmia, olfactory test abnormal, olfactory nerve disorder, hallucination olfactory, parosmia, ageusia, hypogeusia, dysgeusia, and taste disorder. We identified the top reported medications associated with general smell dysfunction, general taste dysfunction, reduced smell, and altered smell.

Results:

From 2011-2021, 42,172 ADRs were reported with OGD, of which 39,351 (93.3%) and 6137 (14.6%) were associated with gustatory and olfactory reactions, respectively. Zinc products (367 reports) and fluticasone propionate (211) were most commonly associated with olfactory dysfunction, specifically reduced olfaction. Varenicline (24) and adalimumab (20) were most commonly associated with altered smell. Lenalidomide (480) and sunitinib (462) were most commonly associated with gustatory dysfunction. Immunologic/rheumatologic medications accounted for 39.2% and 32.3% of olfactory and gustatory ADRs, respectively. Among this category, immunoglobulin drugs were the most commonly associated with OGD ADRs.

Conclusions:

Gustatory dysfunction is more commonly reported ADR compared with olfactory dysfunction. Immunologic/rheumatologic medications are the leading culprit of reported OGD. With increasing numbers of patients presenting to otolaryngologists for OGD, it is important to consider drug-induced etiology.

11:55 am - 12:00 pm

Q&A

12:00 pm

Meeting Adjourns

Posters

1st Combined Group

ARS, AAFPRS, AHNS, ALA (Marsalis Hall)

Wednesday, April 27

Poster Viewing: 1:00 pm – 7:00 pm

Meet the Authors: 5:30 pm – 6:00 pm

Thursday, April 28

Poster Viewing: 9:00 am – 7:00 pm

Meet the Authors: 5:30 pm – 6:00 pm

Conclusion:

Nodal and distant metastases in patients with SNACC are uncommon at presentation, but their presence on diagnosis portends a worse prognosis. Tumor grade, which affects OS, appears to do so independently of nodal metastases.

Poster C001

A population-based analysis of nodal and distant metastases in sinonasal adenoid cystic carcinoma

Jack Birkenbeuel, BS

Arash Abiri

Sina Torabi

Khodayar Goshtasbi, MD

Edward Kuan, MD, FARS

University of California, Irvine

Objective:

Sinonasal adenoid cystic carcinoma (SNACC) is an uncommon salivary-type malignancy originating within the sinonasal tract. There is a paucity of literature on nodal and distant metastases in SNACC. We present the largest population-based analysis of SNACC to better characterize risk factors for and prognosis of patients with nodal and distant metastases.

Methods:

The Surveillance, Epidemiology, and End Results (SEER) database was queried for all patients diagnosed with SNACC diagnosed between 1973 and 2018. Location codes corresponding to sinonasal subsites and histology codes to SNACC were used.

Results:

599 cases met inclusion criteria, with 381 and 396 containing information on nodal and distant metastases, respectively. Nodal and distant metastases were present in 21(5.5%) and 25 (6.3%) of cases on presentation, respectively. Level II metastases were most frequently observed (n=9, 2.3%). Univariate analysis revealed Asian/Pacific Islander race (OR 17.07, p=0.049) and presence of distant metastases (OR 5.747, p=0.002) as predictors of nodal metastasis on presentation. The presence of nodal metastasis at diagnosis did not predict treatment with neck dissection (OR 1.62, p=0.460), chemotherapy (OR 2.147, p=0.113), or radiation (OR 0.574, p=0.233). Multivariable Cox proportional-hazards analysis revealed age (HR 1.024, p=0.021), tumor grade (HR 1.59, p=0.003), and presence of nodal (HR 1.396, p=0.039) and distant metastases (HR 3.159, p=0.031) as independent predictors of worse OS.

Poster C002

Advances in 3D printing for patient specific sinus and skull base surgery

Ricardo Pulido, MD
 Randall Bly
 Kris Moe, Professor
 Waleed Abuzeid, MD, FARS
 Seth Friedman
 Daniel King
 Yangming Li
 Blake Hannaford, PhD

Background:

Advances in 3D printing have provided patient specific solutions in multiple surgical domains. These advances have been of limited application in sinus and skull base surgery.

Objective:

The objective was to develop a realistic, patient specific 3D printed model that is capable of undergoing image guided surgery and postoperative imaging.

Methods:

Computed tomography (CT) images were imported into the software system, Materialise Mimics (Leuven, Belgium), for segmentation of distinct structures. The structures were printed based on anatomic presets to delineate the soft tissue and bony components. Relevant vascularization was printed for realism. Additional bony struts were created to function as set fiducial points for calibration during image guided surgery. The model underwent a preoperative CT scan and endoscopic sinus surgery (ESS) was subsequently performed. A postoperative CT scan was then completed.

Results:

The 3D printed model had internal characteristics that were anatomically realistic, such as the location of relevant vasculature and accurate positioning of sinus ostia. Performing surgery on the printed model demonstrated similar haptic feedback as ESS in live patients. Instrument tip position could be calibrated to a registration accuracy of <2mm on the model. The postoperative CT scan adequately demonstrated the expected surgical findings.

Conclusions:

Our 3D printed model is capable of providing realistic haptic feedback during ESS, while providing anatomical realism of relevant structures with anticipated postoperative changes on CT imaging. We anticipate that this work will allow precision modeling of sinonasal and skull base pathology optimizing surgical training and planning.

Poster C003

An objective evaluation of popular nasal irrigation systems

Garret Berk, BS
 Abdullah Zeatoun
 Keonho Kong, Clinical Fellow
 Mark Chaskes, MD, MBA
 Brent Senior, MD, FARS
 Brian Thorp, MD, FARS
 Charles Ebert, MD, FARS
 Adam Kimple, MD, FARS

Introduction:

Chronic rhinosinusitis affects ~12% of Americans with an estimated 18-22 million physician visits annually. Saline nasal irrigation is a cornerstone of management. Numerous devices are commercially available to rinse the sinuses, thereby hydrodebriding irritants, thinning the mucus, and moisturizing mucous membranes. This study sought to determine the flow rate of 6 of the more commonly utilized systems.

Methods:

We obtained the NeilMed Sinus Rinse, NeilMed Sinugator, NeilMed Neti Pot, HailiCare Nose Cleaner, Nasopure Nasal Wash, and Navage Nasal Irrigation. Video documentation was used to record the devices being sprayed into a measuring container to allow for precise measurements of volume and time to the hundredth of a second. Three trials were conducted for each device with a different operator each time.

Results:

To deliver the solution, the NeilMed Neti Pot and HailiCare Nose Cleaner use gravity, the NeilMed Sinus Rinse and Nasopure Nasal Wash require hand squeezing a bottle, and the NeilMed Sinugator and Navage Nasal Irrigation utilize a motor. Average flow rates (in mL/s) are as follows: NeilMed Sinus Rinse- 36.02, NeilMed Sinugator- 13.20 (high setting) and 10.57 (low setting), NeilMed Neti Pot- 19.53, HailiCare Nose Cleaner- 18.80 (adult nozzle) and 3.09 (pediatric nozzle), Nasopure Nasal Wash- 27.18, and Navage Nasal Irrigation- 17.71 with 0.98psi suction in the opposite nostril.

Conclusion:

Not all devices deliver saline with the same mechanism and speed. These characteristics likely influence the efficacy of sinonasal irrigation as well as comfort level for patient tolerability. Physicians should be aware of the various nuances of these devices to better provide instruction for our patients.

Poster C004

Antibiotic Irrigations for acute on chronic rhinosinusitis in patients with identical drug allergies

Jessa Miller, MD
Jeffrey Suh, MD, FARS
UCLA

Introduction:

Antibiotic allergies are common and result in limited treatment options for patients with acute exacerbations of chronic rhinosinusitis (CRS). Although topical antibiotics are not considered first line treatment for acute exacerbations, studies have described their utility in select patients. The main objectives of this pilot study were to determine the safety and efficacy of antibiotic irrigations in patients with allergies to the oral form of the drug.

Methods:

The medical records of all patients who received Trimethoprim/Sulfamethoxazole (Bactrim) or Levofloxacin (Levaquin) sinus irrigations between 2017 to 2021 were reviewed. Patient demographics, medical history, prior sinus surgery, drug allergies, nasal endoscopy findings, and microbiology results were analyzed. Side effects to the antibiotic irrigations were recorded.

Results:

Fifteen patients received Bactrim irrigations and four received Levaquin irrigations—both were prescribed twice daily for one month. Four patients were allergic to Bactrim; one was allergic to Levaquin. The reactions to Bactrim included anaphylaxis, rash, fever, nausea and vomiting; the reaction to Levaquin was tendinopathy. The pre-treatment cultures grew *Klebsiella pneumoniae*, *Proteus mirabilis*, *Staphylococcus aureus*, and *Serratia marcescens*. Three patients (75%) had clinical improvement with Bactrim irrigations; one patient (100%) had improvement with Levaquin irrigations. There were no side effects related to the use of topical antibiotics in either group.

Conclusion:

The role of topical antibiotics for patients with CRS is not well defined. This pilot study is the first to suggest that patients with even severe allergies to oral antibiotics may still tolerate the topical form.

Poster C005

AROMA: Real-world global registry to assess long-term outcomes of Dupilumab treatment in CRSwNP

Adam Chaker
Claus Bachert
Joseph Han, MD, FARS
Peter W. Hellings
Anju T. Peters
Enrico Heffler
Scott Nash
Lucia De Prado Gomez
Juby A. Jacob-Nara
Shahid Siddiqui
Technical University of Munich

Rationale:

Chronic rhinosinusitis with nasal polyps (CRSwNP) is a predominantly type 2 inflammatory disease of the nasal and paranasal sinuses. Dupilumab, a fully human monoclonal antibody, blocks the shared receptor component for IL-4 and IL 13, key and central drivers of type 2 inflammation. In clinical trials, dupilumab significantly improved objective and patient-reported measures of CRSwNP vs placebo and was well tolerated. The AROMA global registry (NCT04959448) aims to collect real-world, long-term data on the characterization, utilization, effectiveness, and safety of dupilumab for CRSwNP.

Methods:

AROMA will enroll approximately 1000 adults newly starting dupilumab for CRSwNP (local labelling; 120 global sites). Post-baseline study visits are scheduled every 3 months to Month 24, then every 6 months to Month 36 (end of study; some patient-reported outcomes will be assessed more frequently).

Results:

Baseline characteristics will include demographics, medical/surgical history, and presence of type 2 comorbidities (eg asthma, NSAID-ERD). Effectiveness will be assessed by a range of patient-reported symptoms (eg loss of smell, nasal congestion, 22-item Sino-Nasal Outcome Test) and objective measures conducted as part of routine care (eg Lund-Mackay computed tomography). Treatment patterns and long-term safety will also be recorded.

Conclusions:

AROMA is the first global, real-world, prospective, longitudinal registry to characterize patients with CRSwNP starting dupilumab. Results will complement data from dupilumab randomized clinical trials, generating clinical evidence to address knowledge gaps regarding real-world treatment patterns and outcomes among patients with CRSwNP and associated type 2 disease comorbidities.

Poster C006

Assessing the efficacy of sclerotherapy in patients with hereditary hemorrhagic telangiectasia

Anna Jenkins, Medical Student
 Angela Donaldson, MD, FARS
 Tripti Kaur Brar, MBBS, MD
 Devyani Lal, MD, FARS
 Mayo Clinic School Alix of Medicine

Background:

Recent work suggests a significant benefit with the use of 3% sodium tetradecyl sulfate (STS) over standard therapy as a treatment for Hereditary Hemorrhagic Telangiectasia (HHT)-related epistaxis. STS is a sclerosant that induces coagulation and thrombotic occlusion, leading to fibrosis and ablation of blood vessels. The objective of this study was to expand upon this prior work and evaluate clinical outcomes following STS treatment for HHT-related epistaxis.

Methods:

This retrospective chart review included adult patients who received sclerotherapy for HHT-related epistaxis from November 2012 to October 2021. Patient demographics were analyzed as well as time between interventions and number of visits. These variables were assessed and compared before and after treatment with STS.

Results:

A total of 9 patients met inclusion criteria. The mean age was 63 years (48-80) at initial consultation with a M>F (5:4) predominance. STS procedures ranged from 1 to 6, median of 3 with a mean follow up of 32.8 months (2 weeks-85 months). The largest- time between visits for Avastin, electrocautery and STS was 24 months, 24 months, and 14 months, respectively. Nasal debridement was the most common post-STS procedure with repeat STS being the next most common. Four patients had a documented number of procedures prior to STS, ranging from 3 procedures to 21.

Conclusion:

STS reduces the need for other interventions such as electrocautery. This study is limited based on small sample size and lack of follow up in multiple patients treated with STS. Further study with larger patient population and longer follow up is needed.

Poster C007

Association between hypoalbuminemia and postoperative outcomes of pituitary tumor resection

Sree Chinta
 Keshav Kumar
 Mehdi Lemdani, BA
 Ryan Jin, BS
 Christina Fang, MD
 Jean Anderson Eloy, MD, FARS

Objectives:

Hypoalbuminemia has been used as a proxy for poor nutrition, and has been associated with poor postoperative outcomes in varying surgical procedures. This study specifically investigates the association between albumin status and pituitary tumor resection complications.

Study Design:

Retrospective database review.

Methods:

The National Surgical Quality Improvement Program (NSQIP) database was queried for patients who underwent pituitary tumor resections between 2005 and 2018. Univariate and multivariate analyses were conducted to determine associations between albumin status and postoperative complications.

Results:

1,046 patients undergoing pituitary resection surgeries with available albumin values were queried. The mean serum albumin was 4.07 g/dL (SD = 0.48). Univariate analysis showed that hypoalbuminemia was associated with increased age (58.32 vs. 52.72 years) and female gender (52.8% vs. 45.7%), as well as sepsis, intra-/post-operative transfusions, any surgical complication, postoperative pneumonia, reintubation, extended ventilation use, renal insufficiency, urinary tract infection, cardiac arrest, any medical complication, any complication, and mortality. Multivariate analysis found associations between hypoalbuminemia and any complication (OR 1.790, 95% CI 1.087 - 2.947, p=0.022), any medical complication (OR 1.779, 95% CI 1.001 - 3.163, p=0.050), reintubation (OR 4.210, 95% CI 1.362 - 13.006, p=0.013), and intra-/post-operative transfusions (OR 2.643, 95% CI 1.003 - 6.967, p=0.049).

Conclusions:

This study suggests an association between hypoalbuminemia and postoperative complications in pituitary tumor resections. Albumin levels should be evaluated prior to pituitary tumor resection.

Poster C008

Association of frailty with surgical outcomes with transoral approach to the cervical spine

Mehdi Lemdani, BA

Rushi Patel

Prayag Patel, MD

Jean Anderson Eloy, MD, FARS

Rutgers New Jersey Medical School

Objectives:

Patients undergoing surgery with the transoral approach to the anterior skull base and atlanto-axial cervical spine (TOACS) have significant risk for morbidity. We evaluate the ability of the modified frailty index (mFi-5) to predict adverse surgical outcomes in these patients.

Study Design:

Retrospective database review.

Methods:

The 2011-2018 National Surgical Quality Improvement Program (NSQIP) database was queried for patients undergoing surgery with TOACS. A mFi-5 score was calculated for each patient. Patients with a score of 0 or 1 were classified as low frailty and patients with a score of 2 or greater were classified as high frailty. Univariate and multivariate analyses were conducted.

Results:

230 patients met inclusion criteria. The majority of patients were male (55.2%) and white (83.5%) with a mean age of 56.79 years. Of these cases, 45 patients (19.6%) were classified as high frailty. Patients with high frailty had a significantly longer length of stay (8.16 vs. 3.58 days, $p < 0.001$). Univariate analysis demonstrated patients with high frailty were more likely to have all complications (26.7% vs. 13.0%, $p = 0.023$), medical complications (15.6% vs. 4.9%, $p = 0.011$), and discharge other than home (51.1% vs. 13.5%). On multivariate regression analysis, a significant association between high frailty and adverse discharge destination (OR=4.12 [1.48-11.50], $p = 0.007$) remained. Increasing mFi-5 score was associated with 1.34 days (95% CI: 0.54-2.14, $p = 0.001$) prolongation in length of stay.

Conclusions:

This study finds that patients with high frailty are at increased risk for longer hospital stay and adverse discharge destination despite not having a significantly increased risk for complications.

Poster C009

Chronic rhinosinusitis and sickness behavior: Cytokine profile systematic review

Wasiq Nadeem, BS

Matthew Liu

Eric Shattuck

Matt Hayward

Edward McCoul, MD, FARS

Garret Choby, MD, FARS

Philip Chen, MD, FARS

UT Health San Antonio

Introduction:

Chronic Rhinosinusitis (CRS) is an inflammatory condition with a multifactorial etiology involving the lining of the nasal cavity and paranasal sinuses. The chronic duration of CRS symptoms leads to debilitating psychosocial sequelae. Diminished sleep and productivity, depression, and fatigue are all associated with CRS, which collectively are also characteristic of sickness behavior (SB). Symptoms of sickness behavior have also been associated with other cytokines including IL-4, IL-5, IL-13, and IFN-gamma. As this relationship has not been previously studied, further investigation is warranted. This systematic review aims to summarize the literature describing cytokine profiles in CRS and SB.

Methods:

A systematic review was done in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The keywords used to conduct the search were: sickness, behavior, chronic, rhinosinusitis, fatigue, depression, sleep, appetite, mood, cytokine, interleukin, th2, th1, asthma, inflammation, immune, immunoglobulin, polyp, nasal, obstruction.

Inclusion criteria for studies are: 1) symptoms of sickness behavior with associated cytokines, OR 2) symptoms of chronic rhinosinusitis with associated cytokines. Exclusion criteria are as follows: 1) articles in languages other than English, OR 2) other systematic reviews, OR 3) meta-analyses.

Two authors independently screened titles. Title screening was followed by abstract screening and full-text review. References of full-text articles were also reviewed for any additional possible articles. Any disagreements between selected articles were resolved with review by additional authors.

Results and Conclusion pending completion of review

Poster C010

Chronic rhinosinusitis and statins

Mustafa Bulbul, MD, MPH

Garrett Jones

Sahar Assi

Christopher Bailey, Rhinology fellow

Hassan Ramadan, MD, FARS

Chadi Makary, MD, FARS

Objective:

To investigate the effects of statins on baseline subjective and objective measurements in patients with CRS.

Methods:

Using institutional registry, we identified CRS patients presenting between July 2020 and July 2021. Patients were divided into statin users and non-users. Primary outcome was difference in SNOT-22 scores between statin groups. Secondary outcomes were differences in endoscopy and CT scan scores.

Results:

A total of 188 patients were included (41% statin users, 49% female, mean age 51.3 +/- 16.2, 47% CRSwNP, 29% with allergic rhinitis, 31% with asthma and 20% smokers). Patients on statins were significantly older (60.3 vs 45.2, $p < 0.0001$). The average SNOT-22 score in statin users was 39.4 (+/- 22.7) vs 39.4 (+/- 20.3) in non-users ($p = 0.98$). Endoscopy score was 3.7 (+/- 2.6) in statin users vs 3.5 (+/- 2.9) ($p = 0.75$). CT LM score was 10.3 (+/- 1.5) in statin users vs 9.9 (+/- 1.6) in non-users. Simple and multivariable linear regression adjusting for age, smoking and allergic rhinitis showed no differences in SNOT-22, endoscopy and CT scores between the two groups.

Conclusions:

There was no difference in baseline CRS subjective and objective findings between statin users and non-users. This is in contrast to a recent study that showed that CRS patients who are on statins had lower SNOT-22. Further longitudinal studies are needed to further investigate the role of statins in CRS.

Poster C011

Combined endoscopic sinus surgery and septal perforation repair: SNOT-22 outcomes and closure rates

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Amar Miglani, MD

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Cullen Taylor, MD

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Mayo Clinic, Arizona

Objective:

Describe perforation closure outcomes and patient reported outcome measures (PROMs) following combined functional endoscopic sinus surgery (FESS) and septal perforation repair.

Methods:

Retrospective chart review of patients undergoing combined FESS and septal perforation repair between January 2013 and August 2021 with a minimum of 1-month postoperative follow-up and available Sinonasal outcome test 22 (SNOT-22) data.

Results:

Thirty one patients underwent combined perforation repair and ESS during the study period with a 100% septal perforation closure rate. Sixteen patients (9 males, 7 females) had available SNOT-22 data and were included. Mean(+SD) age was 51(+13.7) years, mean(+SD) pre-operative SNOT-22 score was 50.3 (+16.2), and mean(+SD) perforation length and height was 14(+7) mm and 11(+5) mm, respectively. Perforation etiology was prior nasal surgery in 14 patients, repeated cauterization for epistaxis in 1 patient and cocaine use in 1 patient. Mean (+standard error) SNOT-22 score improvement was 24.6(+5.5) (relative mean improvement of 49%). Eighty-eight percent patients achieved a minimal clinically important difference. All patients achieved complete septal perforation closure without evidence of re-perforation at a mean follow up of 8.6 months (+13.9).

Conclusion:

Combined septal perforation closure and endoscopic sinus surgery can be performed with a high perforation closure success. Improvements in PROMs are sustained when sinus surgery involves septal perforation repair.

Poster C012

Comorbid psychological and pain diagnoses in the pauci-inflammatory endotype of CRS

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 Elizabeth Longino
 Jeffanie Wu, Student
 Ping Li, Researcher
 Rakesh Chandra, MD, FARS
 Naweed Chowdhury, MD
 Justin Turner, MD, FARS
 Vanderbilt University Medical Center

Introduction:

Endotypes of chronic rhinosinusitis (CRS) have been defined but there is a paucity of data examining prevalence of general medical, mental health and pain-related disease processes within these endotypes. The aim of this study is to assess the relationship between comorbid psychological and pain-related diagnoses and the endotypes of CRS.

Methods:

164 patients with CRS who underwent endoscopic sinus surgery (ESS) were included. Pathology specimens from each patient were evaluated for inflammatory infiltrates. Psychological diagnoses or pain-related disease processes that were ongoing at the time of surgery were documented for each patient. Fisher's exact test was used to analyze differences between the groups.

Results:

Patients were divided into pauci-inflammatory, neutrophilic, eosinophilic, and mixed granulocytic endotypes. Compared to the other groups, the pauci-inflammatory group had a significantly increased prevalence of obstructive sleep apnea ($p=0.02$) with a trend toward increased prevalence of migraine ($p=0.09$), Eustachian tube dysfunction ($p=0.11$), otalgia ($p=0.12$), use of psychiatric medicines ($p=0.12$), and migraine prevention or antiseizure medication use ($p=0.13$). GERD prevalence and antidepressant use was similar between the groups.

Conclusion:

The pauci-inflammatory endotype had a higher rate of multiple diagnoses related to psychological health and disorders causing pain, despite similar disease-specific quality-of-life scores. Further examination of comorbid conditions in inflammatory endotypes of CRS may help guide clinicians in the most appropriate treatment options.

Poster C013

Comparison of endoscopic polyp grading scales

Seth Jeong, BA
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 Thomas Edwards, MD
 Shaun Nguyen, MD
 Rodney Schlosser, MD, FARS

Background:

Various nasal polyp scoring systems have been proposed and used in the literature. However, no single system has been identified as superior. Generally, polyp scores and patient symptom and olfaction scores correlate poorly.

Methods:

A systematic search of PubMed, CINAHL, Scopus, and Cochrane Library was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-analyses guideline. Any study describing nasal endoscopy polyp scores and symptom scores were included.

Results:

This review identified 77 studies for a pooled meta-analysis of Lund-Kennedy (LK) polyp scores ($N = 6$), Meltzer scores ($N = 6$), Total polyp scores (TPS; $N = 7$), Nasal polyp scores (NPS; $N = 10$), and Lilholdt scores ($N = 15$). These were correlated to SNOT-22, nasal congestion scores, total nasal symptom scores (TNSS), and Smell Identification Test-40 (SIT40) by meta-regression between various endoscopic polyp grading systems. In cross sectional analysis, none of the polyp grading systems correlated significantly with any symptom or olfactory metric. In studies with monoclonal antibody interventions ($N = 3$), correlations between mean improvement in NPS scores were found to be significantly correlated with mean improvement in SNOT-22 scores ($r = 0.88$; $p = 0.05$).

Conclusion:

Current endoscopic scoring systems poorly predict symptom scores such as SNOT-22, nasal congestion scores, and TNSS as well as objective measures of olfaction. A more predictive polyp grading system is needed.

Poster C014

Complicated sinusitis secondary to streptococcus intermedius: A pediatric case series

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Kathleen McClain
William Parkes, Assistant Professor
Nicole Aaronson, Assistant Professor
Thomas Jefferson University Hospital

Introduction:

Streptococcus intermedius is a gram-positive, pyogenic organism native to the oral cavity, respiratory and gastrointestinal tract. *S. intermedius* sinusitis is rare with few cases in the available literature, though reported cases are severe. Extranasal complications in pediatric patients may occur when frontal or ethmoid sinuses are involved, and enzymes unique to *S. intermedius* mediate these more easily. We report five cases of complicated sinusitis treated at our institution within four months, all caused by *S. intermedius*.

Methods:

Retrospective review of patients treated for complicated sinusitis from July-October 2021.

Results:

Five patients ages 8-14 without significant medical history developed symptoms one day to two weeks prior to presentation including headache, fever, and orbital edema. Imaging was obtained for symptoms including persistent headache, lethargy, seizures, jaw pain, and restricted eye movement. Three patients experienced intracranial spread, and two experienced subperiosteal abscesses. All patients received antibiotics and subsequently underwent endoscopic sinus surgery with neurosurgical interventions when warranted. Length of stay ranged from 3 to 29 days. *S. intermedius* was identified as the sole pathogen for four patients, while the fifth culture also grew *Staphylococcus aureus*. Complications included hemiparesis, sagittal sinus thrombosis, and brainstem herniation with resultant brain death.

Conclusion:

S. intermedius-mediated sinusitis is uncommon, but extranasal complications often ensue in pediatric patients. We describe an anomalous series of patients treated for complicated sinusitis within a short timeframe, all uniquely propagated by *S. intermedius*.

Poster C015

Composite reverse septal flap for nasal tip support after subtotal septectomy

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Justin Sowder, Assistant Professor
Carley Boyce
Charles Ebert, MD, FARS
Brian Thorp, MD, FARS
Adam Zanation, MD
LSUHSC

Introduction:

Surgery and reconstruction for nasal septal cancers can be challenging as it can compromise nasal tip support and internal nasal valve integrity. In this study we propose a method to reconstruct anterior subtotal defects utilizing contralateral septal mucoperiosteum and septal bone in composite fashion.

Methods:

In this series, two patients underwent oncologic resection of nasal septal carcinomas. The defects included the ipsilateral mucoperichondrium, mucoperiosteum, and cartilaginous septum. The contralateral mucoperichondrium, mucoperiosteum, and bony septum were utilized as an anteriorly based flap and rotated into the anterior septal defect. This was secured to the nasal spine and medial crura caudally as well as to the upper lateral cartilages dorsally to re-establish nasal tip and nasal valve support mechanisms.

Results:

Patients were verified to have clear margins and in the immediate postoperative setting were noted to have intact nasal tip and valve support. At three and six months after surgery, the caudal septum was well healed with maintenance of structural support. There were no cases of flap loss or bony absorption over time, and patients were noted to be disease free.

Conclusion:

In appropriately selected patients, the composite reverse septal flap can be considered in reconstruction of the nasal tip support mechanisms following oncologic resection.

Poster C016

WITHDRAWN

Poster C017

CRS cognitive impairment review

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Background:

Chronic rhinosinusitis (CRS) has been associated with cognitive dysfunction in several prospective studies. In this scoping review, we examined the extant literature to characterize the relationship between cognitive dysfunction and CRS regarding disease severity and treatment outcomes.

Methods:

The search was conducted in EMBASE, PubMed MEDLINE, Web of Science, Cochrane Library, CINAHL, and Global Index Medicus databases and included all relevant studies reporting cognitive impairment data in adult patients with CRS. Two independent reviewers utilized prespecified inclusion/exclusion criteria.

Results:

797 articles were identified on initial search, and 22 met criteria for full-text review. Significant variation existed between studies in the cognitive measures employed. The Cognitive Failures Questionnaire was the most utilized method to assess cognitive function (6/22 studies, 27%). Other measures included the Mini-Mental State Examination, Automated Neuropsychological Assessment Metrics, Fatigue Severity Scale, Stroop Color Word Inference Test, and P300 event-related potential assessment. Patients with CRS demonstrate worse overall cognitive function, with inferior performance on measures of reaction time, processing speed, and selective attention. This observed cognitive impairment is associated with CRS-specific quality of life (i.e., SNOT-22 and RDSI scores) and responsive to both medical and surgical intervention.

Conclusion:

Although largely heterogenous and descriptive in nature, the available data suggest a link between CRS and higher-order neural processing. This review indicates an urgent need for additional research and CRS-specific neuropsychological outcomes measures of cognitive dysfunction.

Poster C018

Diabetes mellitus and clinical outcomes following epistaxis treatment

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Objectives:

To analyze the association between diabetes mellitus (DM) and adverse outcomes in patients undergoing inpatient epistaxis treatment.

Study Design:

Retrospective database review.

Methods:

This retrospective cohort analysis utilized the 2003-2014 National Inpatient Sample. ICD-9 codes were used to identify cases with a primary diagnosis of epistaxis and an associated procedure for its control. Higher total charges and prolonged length of stay were indicated by values greater than the 75th percentile. Demographics, hospital characteristics, and complications were compared amongst hospitalized patients with DM and without DM (non-DM) using chi-square analysis and one-way ANOVA. The independent effect of DM on adverse outcomes was analyzed using logistic regression while adjusting for the aforementioned variables.

Results:

Of the 83,958 cases of epistaxis, 24.1% (n=20,275) had a diagnosis of DM. DM patients had significantly different demographics and hospital characteristics. DM was associated with longer hospital stay (3.36 days vs. 3.07 days, p<0.001) and greater hospital charges (\$19,578.52 vs. \$18,319.14, p=0.010) compared to the non-DM cohort. DM patients had increased odds of urinary/renal complications (OR 1.193, 95%CI 1.026-1.386, p=0.022), such as venous catheterization for renal dialysis (OR 2.911, 95%CI 1.109-7.646, p=0.030), postoperative complications (OR 6.611, 95%CI 1.980-22.071, p=0.002), and all complications (OR 1.168, 95%CI 1.033-1.321, p=0.013).

Conclusions:

Diabetes mellitus is an important factor associated with increased incidence of complications in hospitalized patients treated for epistaxis.

Poster C019

Diets in asthma and AERD

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Background:

Diet is associated with food allergy, oral allergy syndrome, and chronic conditions such as diabetes, but its role is less characterized in adult-onset asthma. The aim of this study was to evaluate the association between self-reported diet and asthma, and to characterize patient's alimentary avoidances within the asthma group.

Methods:

We randomly selected 1247 subjects (age range: 31-91) with adult-onset asthma from the Finnish national registry, and age- and sex-matched controls (n=1970). Diets were registered from a self-questionnaire. Analysis adjusted on potential confounders (allergies, AERD, nasal polyps, comorbidities, smoking, BMI, occupation) estimated the association between asthma and diet, and adjusted binary logistic regression models the association between AERD and diet type.

Results:

The presence of self-reported diet (26.0%) was associated with asthma, adjusted OR [CI95%] 1.38 [1.12-1.71], p=0.002. Diets in the asthma group (31.8%) were associated with female sex, AERD, ≥1 allergic disease, and ≥1 comorbidity. Adjusted OR [CI95%] 2.03 [1.49-2.78], 1.62 [1.07-2.45], 1.88 [1.37-2.58] and 2.31 [1.67-3.20], respectively. Allergic patients avoided milk, fruits, spices, fish. AERD patients additionally avoided salicylates, onion, pepper, eggs, tomato, kale, and meat.

Conclusions:

Our study shows association between special diets and adult-onset asthma, as well as with allergic disease, AERD, and other comorbidities within the asthmatic group. Patients with AERD report more low-salicylate diets and avoidance of many basic aliments. The findings might reinforce asking about diets and if needed, give dietary advice for adult asthma patients, to avoid unnecessary avoidance diets in allergy and AERD.

Poster C020

Does lumbar drain affect outcomes for endonasal resection of pituitary neoplasms?

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Objectives:

To evaluate morbidity and complications associated with lumbar drain (LD) usage concurrent to endonasal resection of pituitary tumors.

Study Design:

Cross-sectional database analysis.

Methods:

The 2010-2017 American College of Surgeons National Surgical Quality Improvement database was used to query patients undergoing transnasal resection of pituitary tumor using a microscopic (CPT 61548) or endoscopic approach (CPT 62165). Patients were stratified by concurrent intraoperative use of LD (CPT 62272) and outcomes were compared.

Results:

102 (5.8%) and 1660 (94.2%) patients underwent pituitary tumor resection with and without LD placement. Operative time was significantly longer for patients who had LD placed compared to those without (186 ± 92.7 vs 152.8 ± 84.3 minutes, $p=0.017$). Length of stay was longer for patients with LD placement (7 ± 10 vs 4 ± 5 days, $p<0.001$). There was no difference in overall postoperative complications ($p=0.20$), although patients with a LD were more likely to be reintubated ($p=0.004$), fail weaning from ventilatory support ($p=0.012$), experience pneumonia ($p=0.02$), pulmonary embolism ($p=0.03$) and return to the OR ($p=0.02$). Notably, there was no difference in risk of CSF leak ($p=0.29$), death ($p=0.25$), or readmission ($p=0.08$). Temporal analysis demonstrated no change in lumbar drain use over time ($R^2 = 0.39$, $p = 0.1$).

Conclusions:

Compared to those who did not have a LD placed, patients with a LD had longer surgeries and length of stay. There was no difference in overall postoperative complications, including CSF leak. Although LDs are commonly used in pituitary resections, when to use them should be determined based on case-specific circumstances given some increased risk of morbidity.

Poster C021

Does understanding expectations improve patient satisfaction and communication in rhinology

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Background:

There is a nascent understanding of the patient perspective within healthcare. We aim to assess the effect of knowing patient expectations and its impact on patient satisfaction, communication, and clinic efficiency.

Methods:

A randomized, prospective study by two rhinologists at a tertiary, academic clinic was conducted. A customized questionnaire was created to evaluate expectations of the clinic visit and physician. Patients were randomized into the control (Q-) with no questionnaire, the study arm with a pre-visit questionnaire (Q+) without review, or the study arm with review by the physician (QMD). Following each visit, a survey, with questions derived from the Short Assessment of Patient Satisfaction and three physician-patient communication scales, was completed by the patient and rhinologist and rated using a visual analog scale (range 0-10).

Results:

In total, 51 patients were recruited, with 16, 14, and 21 patients in the Q-, Q+, and QMD arms respectively. Overall, mean \pm SD satisfaction and communication scores were high (patient: 9.03 ± 1.02 , 9.54 ± 0.80 ; physician: 9.00 ± 1.30 , 8.19 ± 1.25). Of the QMD arm for 9/21 (42.9%) of visits, review of the questionnaire influenced patient counseling. Patient satisfaction scores were highest in the Q- arm (9.69), compared to both the Q+ (8.84 , $p<0.01$), and QMD (8.64 , $p=0.047$) groups. No difference was observed in patient communication score (Q-= 9.69 , Q+= 9.55 , and QMD= 9.42 ; $p=0.61$) or visit time (Q-= 9.2 min, Q+= 11.6 min, and QMD= 9.2 min; $p=0.61$).

Conclusions:

Administering a visit expectations questionnaire for patients had a negative impact on satisfaction but may aid in counseling. Further data collection is ongoing to help stratify these preliminary findings.

Poster C022

Dopamine reward and olfaction

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Olfaction is vital for work performance and the detection of danger odors, and is linked to associative learning and emotional processing. The ability of appetitive olfaction to stimulate dopamine release in the reward pathways of the brain has not been investigated. These pathways are integral to mood and are pathological in disorders of addiction. In this work, we showed that appetitive olfaction stimulates dopamine release in the rat brain using fast scan cyclic voltammetry to measure dopamine dynamics in real time in the nucleus accumbens of awake behaving rats. Furthermore, we found that dopamine release can be used to replace the “dopamine hit” that addicted rats get from using cocaine, thus reducing cocaine use using environmental enrichment with appetitive odors. This is an important step towards understanding the mood impacts of anosmia, especially during the COVID-19 pandemic when many patients are reporting ongoing disorders of olfaction.

Poster C023

Effect of chronic obstructive pulmonary disease on endoscopic sinus surgery

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Objective:

The purpose of this study is to investigate the effect of chronic obstructive pulmonary disease (COPD) on endoscopic sinus surgery (ESS) outcomes.

Study Design:

A retrospective database analysis.

Methods:

The 2012-2018 National Surgical Quality Improvement Program (NSQIP) database was queried for ESS cases performed by otolaryngologists. Cases without information on preoperative COPD status were excluded. Cases were separated into two cohorts consisting of cases with and those without COPD. Univariate and multivariate logistic regression were conducted to analyze patient demographics, comorbidities, and postoperative complications.

Results:

A total of 1,327 cases met inclusion criteria. The majority of patients were under 65 years (84.2%), male (52.0%), and white (82.0%). Of these cases, 45 (3.4%) patients had COPD. Univariate analysis demonstrated COPD patients were more likely to be over the age of 65 (50.0% vs. 15.0%, $p < 0.001$), have diabetes (22.2% vs. 12.0%, $p = 0.041$), and smoke (48.9% vs. 17.6%, $p < 0.001$). Independent samples t-test found that COPD patients did not have significantly increased length of stay ($p = 0.056$) or operation time ($p = 0.625$). Multivariate logistic regression revealed no significant association between COPD and postoperative complications, readmission, or reoperation.

Conclusions:

Our study did not find an association between COPD and increased length of stay or operation time in patient undergoing ESS. Furthermore, COPD was not found to be an independent predictor of postoperative complication in these patients.

Poster C024

Effect of hypertension in transsphenoidal surgery outcomes

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Objectives:

To analyze the association between hypertension (HTN) and adverse outcomes in patients undergoing transsphenoidal surgery.

Methods:

This retrospective cohort analysis utilized the 2003-2014 National Inpatient Sample. ICD-9 codes were used to identify cases with a primary diagnosis of benign or malignant pituitary neoplasm that underwent transsphenoidal surgery. Higher total charges and prolonged length of stay (LOS) were indicated by values greater than the 90th percentile. Demographics, hospital characteristics, and complications were compared among hospitalized patients with HTN and without HTN (non-HTN) using chi-square analysis and one-way ANOVA. The independent effect of HTN on adverse outcomes was analyzed using logistic regression.

Results:

Of the 70,711 cases included, 47.0% (n=33,257) had a diagnosis of HTN. Gender, age, race, payer-type, median income quartile, and hospital region were significantly different between HTN and non-HTN cohorts. HTN was associated with prolonged LOS (4.55 days vs. 4.14 days, $p<0.001$) and greater hospital charges (\$60,276.98 vs. \$55,989.41, $p<0.001$) compared to the non-HTN cohort. Following logistic regression analysis, HTN patients had decreased odds of all complications (OR 0.881, 95%CI 0.786-0.988, $p=0.015$) and nervous complications (OR 0.841, 95%CI 0.732-0.967, $p=0.015$). However, HTN patients had increased odds of acute kidney failure (OR 1.742, 95%CI 1.034-2.938, $p=0.037$). There were no significant differences in mortality, higher total charges, or prolonged length of stay between HTN and non-HTN patients.

Conclusions:

Hypertension is an important factor associated with differing incidence of complications following transsphenoidal surgery.

Poster C025

Effect of obesity following inpatient epistaxis treatment

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Objectives:

To analyze the association between obesity and outcomes in hospitalized patients undergoing epistaxis treatment.

Study Design:

Retrospective database review. **Methods:** This analysis utilized the 2003-2014 National Inpatient Sample. ICD-9 codes were used to identify cases with a primary diagnosis of epistaxis and procedure for its control. Higher total charges and prolonged length of stay were indicated by values greater than the 75th percentile. Demographics, hospital characteristics, and complications were compared amongst obese and non-obese hospitalized patients using chi-square analysis and one-way ANOVA. The independent effect of obesity (body mass index ≥ 30 kg/m²) on adverse outcomes was analyzed using logistic regression while adjusting for the aforementioned variables.

Results:

Of the 83,958 cases of epistaxis included, 6.8% (n=5731) were obese. On average, obesity was associated with longer hospital stay (3.50 days vs. 3.12 days, $p<0.001$) and greater hospital charges (\$22,605.34 vs. \$18,334.31, $p=0.010$). Obese patients had increased odds of pulmonary complications (OR 1.976, 95%CI 1.418-2.754, $p<0.001$), specifically acute respiratory distress (OR 1.926, 95%CI 1.289-2.877, $p=0.001$) and mechanical ventilation (OR 1.737, 95%CI 1.099-2.744, $p=0.018$). Obese patients had greater odds of acute kidney failure (OR 1.444, 95%CI 1.105-1.887, $p=0.007$) and septicemia (OR 2.153, 95%CI 1.018-4.556, $p<0.045$). Obese patients were more likely to experience higher total charges (OR 1.192, 95%CI 1.406-1.358, $p=0.008$) and prolonged length of stay (OR 1.265, 95%CI 1.105-1.448, $p=0.001$).

Conclusions:

Obesity is an important factor associated with increased incidence of complications in hospitalized patients treated for epistaxis.

Poster C026

Effect of weight loss on chronic rhinosinusitis

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Objectives:

This study investigates the impact of abnormal unexplained pre-admission weight loss (WL) on the management, charges, and outcomes of inpatients with chronic rhinosinusitis (CRS).

Methods:

The 2017 National Inpatient Sample (NIS) database was queried for inpatients with CRS via ICD-10 codes and WL was identified (ICD-10: R63.4). Univariate and multivariable analyses were performed to determine statistical associations between patients with and without WL.

Results:

Of the 29,921 inpatients identified with CRS, 2428 (8.1%) had WL. On univariate analysis, WL patients were younger (mean 54.2 vs. 57.0 years, $p < 0.001$) and more likely to be male (48.9% vs. 45.6%, $p = 0.002$) and White (76.7% vs. 72.2%, $p < 0.001$) than patients without WL. Patients with WL were more likely to have cystic fibrosis (27.6% vs. 3.7%, $p < 0.001$) and diabetes mellitus (32.0% vs. 26.1%, $p < 0.001$). On multivariable analysis adjusting for patient demographics, hospital data, and significant medical comorbidities, patients with WL had greater total charges (\$128,337 vs. \$61,034, $p < 0.001$), longer length of stay (LOS) (11.3 vs. 5.3 days, $p < 0.001$), and underwent more procedures during their stay (2.5 vs. 1.5 procedures, $p < 0.001$). Patients with WL had increased mortality (OR 3.28, 95% CI 2.59–4.16, $p < 0.001$) and were more likely to develop intracranial complications (OR 1.75, 95% CI 1.21–2.52, $p = 0.003$), but had similar odds for developing orbital complications (OR 1.17, 95% CI 0.75–1.85, $p = 0.489$) compared to those without WL.

Conclusions:

In a cohort of inpatients with CRS, those with WL underwent more procedures and had greater charges, longer LOS, and increased odds for intracranial complications and mortality.

Poster C027

Effects of midvault repair techniques on nasal drug delivery

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Background:

Nasal drug delivery must be optimized for pathologies at variable locations in the nasal airway. Intrinsic particle properties and methods of particle delivery influence aerosolized pharmacotherapy, however, the impact of structural factors remains unclear. This study evaluates the efficacy of two midvault repair techniques in optimizing drug delivery to the olfactory.

Methods:

Midvault reconstructions with spreader graft (SG) and spreader flap (SF) were compared to a baseline soft tissue elevation (STE) in two cadaveric specimens. Computational fluid dynamics modeling was utilized to model particle transport to the olfactory region in both specimens. Variables evaluated included flow rate, particle velocity and release location, and subject head position.

Results:

In specimen 1, best deposition in the olfactory was on the left post-SG (3.19%) at 15L/min, with particles released at 1m/s from the center position with supine head position; in the olfactory bulb, it was on the left post-SG (0.91%) at 15L/min with particles released at 10m/s from the lateral position with supine head position.

In specimen 2, best deposition in the olfactory was on the left STE (2.1%) at 30L/min with particles released at 1m/s from the top position supine head position; in the olfactory bulb, best deposition was on the right STE (1.32%) at 30L/min with particles released at 1m/s from the center position with tilted head position.

Conclusion:

Multiple parameters of drug delivery influence the location of greatest particle deposition in the olfactory. Likewise, structural alterations of the nasal airway may favor one location of greatest particle deposition, particularly when other variables are optimized for a subject's specific airway.

Poster C028

Endoscopic endonasal approach to intraconal malignant tumor of the orbit

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Background:

Orbital solitary fibrous tumors (SFT) are exceptionally rare spindle-cell tumors, which can be benign or malignant. Only a handful of dedifferentiated malignant orbital SFTs have been documented, which were all managed with an open technique.

Case Report:

A 71-year old woman presented with left-sided ptosis, mild diplopia, and intractable frontal headache. Magnetic resonance imaging demonstrated a nodular, enhancing, intraconal orbital mass, approximately 1.8 x 1.6 cm in size, abutting the medial rectus muscle and optic nerve. An endoscopic endonasal approach (EEA) with image guidance was employed, and a left-sided maxillary antrostomy, total ethmoidectomy, and sphenoidotomy was performed for complete exposure of the inferior and medial orbital walls. Oculoplastics and Otolaryngology teams in conjunction removed the lamina as well as the inferomedial strut of the orbital floor. Periosteum was incised both medially and inferiorly to allow for fat to prolapse into the sinonasal cavity. Dissection separated the well-encapsulated tumor from the optic nerve, medial rectus, and skull base. It was removed entirely, and margins were taken including medially at the middle turbinate and posteriorly along the periorbita adjacent to the orbital apex. Final pathology was consistent with anaplastic (dedifferentiated) SFT, and all margins were negative for malignancy. Tumor cells revealed a strong positivity for BCL-2 and STAT6. Interestingly, heterologous rhabdomyosarcomatous elements were present, which is extremely rare in SFTs and to our knowledge has never been reported in the orbit.

Conclusion:

We demonstrate that an EEA can be employed to surgically resect anatomically favorable orbital SFTs.

Poster C029

Endoscopic repair of iatrogenic carotid artery injury using a lateral tongue muscle patch

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Background:

Iatrogenic injury to the internal carotid artery (ICA) is one of the most catastrophic complications of endoscopic sinus and skull base surgery. Previous research has shown that packing with a crushed muscle graft at the injury site can be an effective management technique to control bleeding and may prevent the need for ICA sacrifice. Here we describe a new and a readily available repair donor site – an autologous lateral tongue muscle patch.

Methods:

Two representative cases of a successful repair of ICA injuries using a lateral tongue muscle patch. The graft measured approximately 2 x 3 cm and was taken from the lateral intrinsic muscle of the tongue. We describe the harvest of the graft, its advantages, and the details of operative repair.

Results:

The lateral tongue provides a large and readily accessible source of muscle within the surgical field that can be quickly harvested during an endoscopic procedure. Advantages include the speed of harvest, the donor site being readily accessible in the surgical field, and its low morbidity. The first case involved repair of a delayed cavernous ICA pseudoaneurysm following functional endoscopic sinus surgery. The second case involved ICA injury during an expanded endonasal approach for a craniopharyngioma. Postoperative angiograms and serial CTAs showed complete resolution of the pseudoaneurysm and durable repair.

Conclusions:

Lateral tongue muscle graft appears to be an effective and an efficient method to manage ICA injuries during endoscopic endonasal surgery. It should be added to the repertoire of possible donor sites while dealing with catastrophic bleeding and has the advantage of being in the surgical field and easily harvested with minimal morbidity.

Poster 030

Evaluating distance bias in chronic rhinosinusitis outcomes

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Background:

Distance traveled for medical care influences patient outcomes (i.e., distance bias) and is a limitation in outcomes research. However, distance bias has not been examined in rhinologic studies. We sought to assess the impact of distance on baseline disease severity and treatment outcomes within a cohort of patients with chronic rhinosinusitis (CRS).

Methods:

Patients with CRS were prospectively enrolled in a multi-institutional, cross-sectional study, and self-selected continued appropriate medical therapy or endoscopic sinus surgery. 22-item SinoNasal Outcome Test (SNOT-22) and Medical Outcomes Study Short-Form 6-D (SF-6D) health utility value scores were recorded at enrollment and follow-up. Distance from the medical center, based on residence zip code, and medical comorbidities were determined.

Results:

A total of 505 participants with CRS traveled a mean distance of 87.94 (1.1-2594) miles. Baseline and post-treatment SNOT-22 ($r=0.08$, $p=0.09$ and $r=-0.06$, $p=0.22$) and SF-6D ($r=-0.09$, $p=0.06$ and $r=0.03$, $p=0.48$) scores across the entire cohort were not impacted by distance. There was no correlation between distance traveled and mean comorbidity burden ($p=0.48$). Nevertheless, patients with a history of prior ESS ($p=0.001$) were significantly more likely to travel longer distances to obtain care.

Conclusion:

Although some patients appear more willing to travel further distances for CRS care, distance traveled to academic tertiary care centers did not impact disease severity, outcomes, or comorbidity burden. These findings argue for greater generalizability of study results across various cohorts independent of distance traveled to obtain rhinologic care.

Poster C031

Evaluating opioid prescriptions after functional endoscopic sinus surgery (FESS) and/or septoplasty

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Background:

In 2017, the North Carolina General Assembly passed the Strengthen Opioid Misuse Prevention (STOP) Act, which limits opioid prescriptions to a five-day regimen for post-surgical pain. During implementation of the law, there was concern that these restrictions would be a burden to patients and providers if refills were frequently needed. We hypothesized the implementation of the STOP Act resulted in frequent opioid refills in the post-operative period. The aim of this study is to evaluate post-operative prescribing patterns and refill rates of narcotic prescriptions after functional endoscopic sinus surgery (FESS) and/or septoplasty.

Methods:

A retrospective review of electronic health records from January 2020 through December 2020 was performed. Patients who underwent FESS and/or a septoplasty at a large academic medical center were included in our analysis. The number of refills and pills prescribed were recorded. For patients receiving refills, previous opioid use was evaluated. Analysis was performed by descriptive statistics.

Results:

263 patients were identified and 252 had an opioid prescription. Amongst those patients who did receive a prescription ($n=252$), the refill rate was 3.6%. Of patients who received a refill, 66.7% had a history of opioid use. The average number of 5 mg oxycodone tablets prescribed was 13.5 tablets (standard deviation 4.5 tablets).

Discussion:

In a sample of 252 patients who underwent FESS and/or septoplasty and received post-operative opioids, an average of 13.5, 5 mg oxycodone tablets were prescribed with only 3.6% of patients receiving refills. The STOP Act does not appear to have generated a substantially high refill rate for opioids following FESS and/or septoplasty.

Poster C032

Extra-nasopharyngeal angiofibromas: Case report and literature review

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Poster C033

WITHDRAWN

Introduction:

Primary extra-nasopharyngeal angiofibromas (ENAs) are a rare form of juvenile angiofibromas (JNA) that do not involve the nasopharynx. ENAs have been sporadically reported in literature, and very infrequently observed in the infratemporal fossa (ITF). We present a unique case of a large ENA centered in the ITF, with extension into the pterygopalatine fossa (PPF) and sphenoid sinus without involving the nasopharynx. In addition, a literature review of ENAs involving the ITF was conducted and findings are summarized.

Case Report:

A 13-year-old male presented with persistent right cheek and infraorbital swelling. He did not have any history of epistaxis. CT and MRI confirmed a soft tissue mass (4.5 cm x 3.2 cm x 8.2 cm) centered in the ITF and PPF, with extension into the sphenoid sinus and skull base erosion into the middle cranial fossa. Notably the nasopharynx remained patent and free of tumor. Given the atypical presentation, a biopsy was obtained which confirmed angiofibroma. The tumor was embolized then subsequently resected via a combined expanded endoscopic approach and sublabial incision given tumor extension lateral to the mandible and extensive involvement into the cheek. The patient has been followed for 12 months postoperatively and is recovering well without any neurological deficits or tumor recurrence.

Conclusion:

ENAs are rare variants of JNAs and should be considered in the differential diagnosis. This case report provides clinical insight and additional literature on the extremely rare occurrence of ENAs in the ITF.

Poster C034

Frailty predicts worse survival in sinonasal squamous cell carcinoma

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Background:

Sinonasal squamous cell carcinoma (SCC) is an aggressive malignancy frequently requiring surgical resection and adjuvant treatment. Frailty is increasingly being recognized as an independent determinant of health status and treatment outcomes. There is a paucity of work describing frailty in patients undergoing sinonasal cancer treatment. We sought to determine the impact of frailty on survival in patients undergoing treatment for sinonasal SCC.

Methods:

Retrospective review of patients undergoing surgical resection of sinonasal SCC at two academic medical centers was performed. Demographic, treatment, and survival data were recorded. Frailty was calculated using validated indexes, including the modified 5-item frailty index (mFI-5) and the Charlson Comorbidity Index (CCI). The primary outcome was overall survival (OS).

Results:

39 patients met inclusion criteria. There were 23 (60.5%) men with an average age of 59.6 ± 12.1 years. Pre-operative mFI-5 was 1.13 ± 0.84 and CCI was 5.68 ± 2.57 . All patients underwent surgical resection. The average length of hospital stay was 3.05 ± 3.83 days. The 1- and 5-year OS were 93.8% and 82.5%, respectively. Increased age (hazard ratio [HR]: 1.08; 95% confidence interval [CI]: 0.98-1.19, $p=0.12$) and mFI-5 (HR: 1.56; CI: 0.50-4.86, $p=0.4$) were not associated with OS, while increased CCI was associated with worse OS (HR: 1.74, CI: 1.19-2.55, $p=0.004$).

Conclusions:

Our results suggest that frailty plays an important role in SCC treatment outcomes. This is the first study to examine frailty in sinonasal SCC patients. Identifying these patients offers an early opportunity to address vulnerabilities, potentially improving treatment outcomes.

Poster C035

Frailty status and dietary patterns in adults with olfactory dysfunction

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Background:

Though olfactory dysfunction (OD) is a strong predictor of frailty, the pathways underlying this relationship are not well understood. This study evaluated the impact of dietary patterns on frailty measures in older adults with OD in a nationally representative population.

Methods:

This cross-sectional study utilized the 2013-2014 National Health and Nutrition Examination Survey. Dietary patterns (DPs) characteristic of OD were derived using exploratory factor analysis (EFA). Multiple logistic regressions adjusted for demographics and frailty risk factors were used to assess the association of DPs with two frailty metrics: the frailty index (FI) and physical frailty (PF).

Results:

EFA yielded 6 DPs, accounting for 63.4% of the variance in nutritional data. A high-protein/selenium diet (OR 0.82 [95% CI 0.74 to 0.92], $p=0.041$) and a high β -carotene/vitamin-A diet (OR 0.76 [95% CI 0.66 to 0.88], $p=0.028$) were independently associated with lower frailty risk by FI. Only the high-protein/selenium diet (OR 0.82 [95% CI 0.74 to 0.92], $p=0.036$) was associated with lower frailty risk by PF. No other DPs were associated with frailty risk by FI or PF, and no identified DPs were associated with frailty in normosmic persons.

Conclusions:

Dietary patterns characteristic of persons with OD, particularly diets high in protein/selenium and β -carotene/vitamin-A, are associated with reduced risk of frailty prevalence. Though the relationship between OD and frailty is multifaceted, dietary changes may be a potential pathway underlying this relationship. These findings may provide a framework for future investigations into interventions and screenings for frailty prevention.

Poster C036

Frailty status and perioperative outcomes in sinonasal tumors

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Objective:

Frailty is a clinical syndrome characterized by impaired response to physiologic stressors, increasingly associated with poor surgical outcomes. We utilized a national database to assess whether a measure of frailty was associated with postoperative outcomes in patients with sinonasal tumors.

Methods:

The National Surgical Quality Improvement Program database was utilized to identify 789 patients undergoing sinonasal tumor surgery between 2005-2019. The 5-factor modified frailty index (mFI-5) was calculated as a marker of frailty. Multivariable logistic regression was used to predict the impact of frailty on postoperative outcomes, controlling for patient and surgical factors. Evaluated outcomes included surgical site infection, bleeding requiring transfusion, pulmonary embolism, readmission, unplanned reoperation, and hospital length of stay (LOS).

Results:

A total of 108 (13.7%) patients were frail. Frail patients were older (65.2 [95% CI 63.2-67.2] vs. 58.4 [95% CI 57.3-59.5]) with a higher BMI (30.3 [95% CI 28.9-31.6] vs. 28.1 [95% CI 27.6-28.7]) and ASA class (3.0 [95% CI 2.9-3.1] vs. 2.6 [95% CI 2.6-2.7]). Frailty was not associated with tumor location or malignancy. A mFI-5 of ≥ 3 was associated with a 12.0-day (95% CI 8.9-15.1) longer LOS compared to a mFI-5 of 0. Frailty did not predict the odds of other postoperative complications.

Conclusion:

Frail patients are at risk for an increased LOS following surgery for sinonasal tumors, independent of tumor location or malignancy. Increased LOS in frail patients may not be fully accounted for by postoperative complications. Brief frailty indices may be a time- and cost-efficient tool to assess perioperative risk, and aid in treatment planning and counseling.

Poster C037

Free mucosal grafting and bioabsorbable steroid-eluting stents in skull base surgery

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Background:

Inflammation and resultant stenosis can lead to early disease recurrence after endonasal endoscopic surgery for evacuation and drainage of cholesterol granuloma and Rathke's cleft cyst (RCC). Several techniques have been utilized in recent years to maintain outflow tract patency for longterm drainage including free mucosal grafts, nasoseptal flaps, and silastic spacing.

Methods:

In this study, we evaluated the efficacy and safety of bioabsorbable mometasone furoate eluting stents. We reviewed three cases, one with a primary cholesterol granuloma and two with recurrent Rathke's Cleft Cysts.

Results:

In each patient, free mucosal grafts from the posterior septum were utilized and held in place by steroid-eluting stents across the fenestrations. Average follow-up duration was 6 months with no recurrence and no evidence of outflow tract stenosis upon evaluation of MRIs from all three patients.

Conclusion:

Steroid-eluting stents may decrease recurrence rates in endoscopic endonasal skull-based surgeries for RCCs and cholesterol granulomas. Further studies are warranted to better assess long term results.

Poster C038

Granulomatosis with polyangiitis and invasive fungal sinusitis

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Introduction:

Invasive fungal sinusitis (IFS) is a life-threatening infection, however little is known about the association between granulomatosis with polyangiitis (GPA, formerly referred to as Wegener's granulomatosis) and invasive fungal sinusitis. Infections by mucorales species or other invasive fungi can present as a rhino-orbital invasive lesion and be mistaken for an inflammatory process, resulting in delayed diagnosis and treatment.

Study Design:

Case report and systematic review.

Methods:

We first present the case of a 23-year-old male with a 5-year history of recurrent GPA complicated by acute endonasal and orbital IFS due to mucormycosis, and its treatment. We then conducted a review of the literature with systematic searches of all indexed studies in PubMed/Medline and Cochrane databases through July 12th, 2021. Data extraction focused on the association between GPA and IFS clinical presentation.

Results:

A total of 63 studies were identified, of which 5 specifically discussed the association between GPA and IFS. All identified articles were case reports and described the similarities and confounding factors between GPA and IFS. Most authors reported chronic use of corticosteroids and underlying immunosuppression secondary to long term management of recurrent GPA.

Conclusion:

There are very few studies that describe the association between GPA and mucormycosis infection. This review highlights the clinical difficulty in establishing the diagnosis of IFSs in patients with GPA and emphasizes the risk of prolonged corticosteroid therapies in increasing the likelihood of developing IFS.

Poster C039

Head position for drug delivery to OMC and MS in patients with CRS

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Background:

Factors influencing efficient delivery of intranasal steroids to the ostiomeatal complex (OMC) and maxillary sinus (MS) in patients with chronic rhinosinusitis (CRS) have not been fully investigated. Identifying an optimal head position and drug delivery parameters can improve CRS outcomes.

Methods:

Intranasal airflow and drug particle transport were simulated in five patient-specific sinonasal cavities using computational fluid dynamics. Airflow simulations were performed at 15Pa inhalation pressure. Intranasal spray particles (1-100 microns) were simulated with velocities of 1, 5, and 10m/s from six release locations (Bottom, Center, Top, Lateral, Lateral-Bottom, and Lateral-Top) at 15mm nozzle insertion depth. Simulations head positions were Mygind, Supine, Tilted-Back, Tilted-Forward, and Upright.

Results:

Mygind head position resulted in best OMC depositions. No head position demonstrated superior MS delivery. Maximum drug depositions were 1.063% to 12.57% (OMC) and 0.021 % to 1.619% (MS) across all patients. The lateralized spray release locations produced maximum OMC deposition, while locations maximizing MS deposition included lateral, lateral top, and top. In general, 6–10 micron particles had the highest MS deposition (5 and 10 m/s released from the top and lateral locations); 6-10 microns and 21–30 microns had the highest OMC deposition (1 and 5 m/s from the lateral locations).

Conclusion:

This preliminary study suggests distinguishable trends in head positioning and release location for best OMC deposition and particle size for efficient MS deposition. Otherwise, it has proven challenging to determine the same spray parameter combinations that maximizes target sites drug delivery across all patients.

Poster C040

Histopathologic characterization of pediatric chronic rhinosinusitis

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Background:

Though the histopathologic characterization of sinonasal tissue from adult patients with chronic rhinosinusitis (CRS) is well-documented, the same cannot be said for the pediatric CRS population.

Methods:

In a retrospective cohort of CRS patients who underwent functional endoscopic sinus surgery (FESS), demographic factors, pertinent comorbidities, and a structured histopathologic report of 13 variables were compared across pediatric CRS patients with and without nasal polyps (pCRSwNP and pCRSsNP, respectively).

Results:

48 pediatric (27 pCRSsNP, 21 pCRSwNP) patients were analyzed. Relative to pCRSsNP patients, pCRSwNP patients exhibit increased overall inflammation (66.7% vs. 33.3%, $p=0.022$) and tissue eosinophilia (>10 /high power field [HPF]) (54.5% vs. 17.9%, $p=0.008$). Intraoperative cultures did not display any differences in terms of growth between pCRSwNP and pCRSsNP patients. However, a small subset of interest (3 cystic fibrosis, 1 ciliary dysmotility syndrome, 1 common variable immune deficiency), all of whom demonstrated NPs, showed significantly increased growth of difficult-to-treat gram negative bacteria, in particular *Pseudomonas aeruginosa* and *Haemophilus influenzae*, relative to the remainder of the cohort.

Conclusion:

Pediatric CRS sinonasal tissue with and without nasal polyps demonstrate unique histopathologic features. Tissue-based characterization is an important step in optimizing therapeutic management of pediatric CRS patients.

Poster C041

Hypoalbuminemia and open anterior skull base surgery

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Objectives:

Hypoalbuminemia has been associated with adverse outcomes in a variety of surgical fields. We aim to evaluate the impact of hypoalbuminemia on postoperative complications in patients undergoing open anterior skull base surgery (SBS).

Study Design:

Retrospective database review.

Methods:

The 2012-2018 National Surgical Quality Improvement Program (NSQIP) database was queried for patients undergoing open anterior SBS. Patients with missing albumin levels were excluded. A patient albumin level of 3.5g/dl was used to stratify into two cohorts: hypoalbuminemia (<3.5 g/dl) and normal albumin (>3.5 g/dl). Univariate and multivariate analyses were conducted.

Results:

A total of 399 patients met inclusion criteria. The majority of patients were less than 65 years (65.9%), White (76.9%), and male (55.4%). Of these cases, 80 patients (20.1%) met criteria for hypoalbuminemia. These patients were more likely to have disseminated cancer (11.3% vs. 3.4%, $p=0.004$), history of chronic steroid use (22.5% vs. 10.7%), and systemic sepsis (8.8% vs. 1.6%). Independent samples t-test analysis demonstrated patients with hypoalbuminemia had a significantly prolonged length of stay (12.32 vs. 6.73 days, $p=0.001$). Multivariate regression analysis revealed a significant association between hypoalbuminemia and surgical complications (OR: 2.03 [1.11-3.71], $p=0.021$). Individual complication analysis revealed increased risk for wound disruption (OR: 8.10 [1.24-52.92], $p=0.029$).

Conclusions:

Our study finds a significant association between hypoalbuminemia and surgical complications in patients undergoing open anterior SBS. Preoperative albumin testing may help identify patients at increased risk for surgical complications in this patient.

Poster C042

IIH related CSF rhinorrhea leaking through an ecchordosis physaliphora

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Ecchordosis physaliphora (EP) is a congenital hamartoma derived from remnant embryonic notochord. It is characteristically slow growing, intradural, and located in the midline retroclival area. The lesion itself has been reported as an incidental finding in up to 2% of autopsies, though symptomatic presentation is extremely rare.

We present the case of a 51-year-old obese female with no past history of nasal surgery or head trauma who reported an 8 month history of headaches and right-sided, clear rhinorrhea exacerbated by bearing down. Nasal secretions returned beta-2 transferrin positive confirming the diagnosis of spontaneous CSF leak. CT imaging demonstrated 'dehiscence' of the superior clivus at the level of the infrasellar recess, which on MRI was revealed to be a non-enhancing, T1 hypointense, T2 hyperintense 8x5x10mm lesion with central calcification and a tiny osseous stalk projecting into the posterior fossa. This was consistent in appearance with a congenital EP. In addition, she was also noted to have dilation of the bilateral optic nerve sheaths, flattening of the sclera, and a partially empty sella. She was ultimately diagnosed with CSF leaking through a congenital EP secondary to idiopathic intracranial hypertension (IIH). She was treated medically for IIH and underwent endoscopic CSF leak repair with no recurrence of rhinorrhea at three months postoperatively.

There is a paucity of literature regarding management of this usually incidental lesion. Our case serves to highlight the clinical implications of EP in the setting of concurrent IIH.

Poster C043

Image guided obturator design and fabrication for maxillectomy defect in the case of IFS

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Introduction:

Acute invasive fungal sinusitis (IFS) requires a high clinical suspicion and rapid diagnosis for initiating surgical and medical treatment. Surgical debridement often results in maxillary defects which can disrupt speech, deglutition, and respiration. A surgical obturator (SO) can occlude the palatal defect. Traditionally these SOs are manufactured by a maxillofacial prosthodontist through the application of dental impressions. This case report presents an option for the digital fabrication of such a device using computed tomography (CT) data without taking impressions.

Case description:

Patient WS is a 60M with uncontrolled diabetes who presented with right sided facial hypesthesia and acute right sided vision loss. Physical exam demonstrated right upper lid ptosis, reduced right extraocular movement, palatal necrosis, and blanched turbinates. The turbinate biopsy on frozen pathology was consistent with IFS. Imaging confirmed the diagnosis. He was diagnosed with orbital apex syndrome secondary to IFS, was started on antifungal therapy, and underwent aggressive surgical debridement. Serial endoscopic exams demonstrated stability and the maxillofacial prosthodontists were consulted for SO fabrication. He survived the infection and is doing well.

Discussion:

The case report increases awareness of this uncommon but insidious disease process and highlights the multidisciplinary approach to managing IFS as well as an alternative approach to fabricating a surgical obturator. As an inpatient unable to transport to the offsite dental clinic for impressions, CT data was used to successfully model and fashion the obturator. This technique offers practicality for the prosthodontist, the surgeon, and the patient.

Poster C044

Impact of a combination CFTR modulator on mucosal inflammation in CF patients

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Background and Significance:

Elexacaftor/tezacaftor/ivacaftor (ETI) is a novel triple combination CFTR modulator for cystic fibrosis (CF) patients who have at least one F508del mutation in the CFTR gene. While prior studies show that ETI reduces progression of pulmonary disease and symptoms related to sinus manifestations of CF, objective data relating to radiographic evidence of paranasal sinus inflammation and tissue healing have yet to be explored. We investigate a cohort of CF patients on ETI to understand how ETI therapy impacts chronic rhinosinusitis.

Methods:

Seven patients were included in this case series. All subjects had undergone at least one ESS. SNOT-22 scores, Lund-Mackay Scores, and Discharge, Inflammation, and Polyps/edema (DIP) scores were compared before and after initiation of ETI. Among the cohort, four patients underwent ESS with pre-operative treatment with ETI for at least one month. Statistical comparisons were made with paired t-test.

Results:

Seven patients were included (mean age 33). Mean duration of ETI therapy was 17.7 months. SNOT-22 scores decreased after ETI initiation (mean 47.3 versus 18.0, $p=0.028$). Similarly, Lund-Mackay scores decreased after initiation of ETI (mean 15.7 versus 2.8, $p=0.045$). In two patients with available pre- and post-ETI recorded endoscopies, post-ETI endoscopic exams demonstrated a reduction in DIP scores from 13 to 4 and 10 to 5. Patients who underwent revision ESS demonstrated improvement in mucosal inflammation.

Conclusion:

ETI represents a promising new therapeutic for CF patients for treatment of chronic rhinosinusitis. These data support improved mucosal healing after sinus surgery in patients who start ETI prior to surgery.

Poster C045

Impact of combination surgery and radiation therapy on survival in esthesioneuroblastoma

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Objectives:

Esthesioneuroblastoma (ENB) is a rare malignancy of the olfactory neuroepithelium. The current treatment paradigm consists of surgical resection with or without radiotherapy. This study assesses the impact of combination radiotherapy and surgery as compared to surgery alone on survival.

Methods:

The 2010-2016 National Cancer Database was queried for all cases of ENB. Clinicopathologic features between patients receiving surgery and surgery and radiotherapy were compared. Kaplan-Meier and Cox multivariable survival analyses were performed to determine differences in outcomes between the groups.

Results:

1103 cases of ENB were analyzed, of which 415 (37.6%) were treated with surgery and 688 (62.4%) were treated with surgery and radiotherapy ($p<0.001$). No significant differences were seen in sex, age, race, insurance status, income, or education between the two groups. However, patients with Kadish stages C and D were significantly more likely to receive combination surgery and radiotherapy than those with Kadish stages A and B ($p<0.001$). Advanced T stage was also associated with combination therapy ($p=0.024$), with an OR of 2.31 for T4. There was no significant difference in overall survival rates between the two treatment groups. On Cox multivariable survival analysis, combination surgery and radiotherapy did not portend a significantly higher hazard of death as compared to surgery alone ($p<0.330$).

Conclusions:

Although ENB is most frequently treated with combination surgery and radiotherapy, survival was not significantly different between the two treatment groups. Further study is warranted to assess the impact of radiotherapy in outcomes for patients with this malignancy.

Poster C046

Impact of delay in treatment on survival in sinonasal undifferentiated carcinoma

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Background:

Sinonasal undifferentiated carcinoma (SNUC) is a rare, aggressive malignancy with a poor prognosis. Surgery with adjuvant radiation treatment is the standard of care. We sought to characterize treatment delays in SNUC managed with surgery and adjuvant radiation and to determine the impact on survival using the National Cancer Database (NCDB).

Methods:

This was a retrospective, population-based cohort study of patients with SNUC between 2004 and 2016 in the NCDB. The intervals of diagnosis to surgery (DTS), surgery to radiation (SRT) and radiation duration (RTD) were examined. Recursive partitioning analysis (RPA) was performed to identify the variables with the greatest impact on survival. The association between treatment delay and overall survival (OS) was then assessed using multivariate Cox proportional hazards regression.

Results:

Of 173 patients that met inclusion criteria, 65.9% were male, average age at diagnosis was 56.6 years, and 5-year OS was 48.1%. Median durations of DTS, SRT and RTD were 18, 43, and 46 days, respectively. Predictors of treatment delay included black race, government insurance excluding Medicare/Medicaid, and positive margins. RPA was used to derive optimal thresholds including 29, 28, and 38 days for DTS, SRT and RTD, respectively. On multivariate analysis, positive margins (hazard ratio [HR]: 4.82; 95% confidence interval [CI]: 2.28-10.2) and DTS less than 29 days (HR: 2.41; 95% CI: 1.23-4.73) were associated with worse OS.

Conclusion:

Our results likely reflect the aggressive nature of the disease with surgeons taking more invasive disease to the operating room more quickly. Median treatment intervals described may serve as relevant national benchmarks.

Poster C047

Impact of Dupilumab on sleep/function scores in patients with CRSwNP

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Introduction:

Chronic rhinosinusitis with nasal polyps (CRSwNP) frequently impacts sleep and functioning. We report the impact of dupilumab on Sino-nasal Outcome Test (SNOT-22) sleep and function (fatigue/productivity/concentration) scores in patients with CRSwNP in the SINUS-24/52 studies (NCT02912468/NCT02898454).

Methods:

Mean SNOT-22 sleep and function domain scores (0–5) were assessed in patients receiving dupilumab q2w 300 mg (SINUS-24 n=143/SINUS-52 n=150) or placebo (n=133/n=153) for 24/52 weeks. This post hoc analysis included the intention-to-treat population and subgroups with/without comorbid asthma, NSAID-ERD, allergic rhinitis, systemic corticosteroid (SCS) use, prior sinonasal surgery, and patients reporting 1 SNOT-22 sleep or function item as most important at baseline; P values are nominal.

Results:

Baseline mean SNOT-22 sleep and function scores were similar in placebo (2.25–2.50) and dupilumab arms (2.00–2.33). Dupilumab improved sleep and function scores by first assessment (W8), maintained at W24 (SINUS-24, LS mean difference vs placebo [95% CI], sleep: –0.97 [–1.24, –0.71], –49.27%; function: –0.86 [–1.11, –0.61], –44.45%; both P<0.0001) and W52 (SINUS-52, sleep: –0.93 [–1.18, –0.68], –41.04%; function: –0.76 [–1.01, –0.51], –35.92%; both P<0.0001). Dupilumab improved sleep and function scores vs placebo across all subgroups at W24/52 (SINUS-24/52; all P<0.05).

Conclusion:

Dupilumab-treated patients reported improved sleep and function scores, which were maintained through W52, irrespective of comorbid asthma, allergic rhinitis, prior surgery, and/or SCS use. Sleep scores potentially improved through reduction in daily CRSwNP symptoms (e.g. congestion/rhinorrhea), which in turn may improve function scores.

Poster C048

WITHDRAWN

Poster C049

Improvement in 'taste', and association with smell with Dupilumab-treated patients in CRSwNP

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Background:

Loss of patient-reported 'taste' is common in chronic rhinosinusitis with nasal polyps (CRSwNP) and is associated with loss of smell. This post hoc analysis evaluated the impact of dupilumab on 'taste' and assessed associations between 'taste' and smell in the phase 3 SINUS-24/52 trials (NCT02912468/ NCT02898454).

Methods:

Patient-reported 'taste' was assessed weekly in patients randomized to dupilumab 300 mg or placebo using a loss-of-'taste' severity scale (0–3). Scores were analyzed in the intention-to-treat population (baseline loss-of-'taste' >0). Associations between loss-of-'taste' severity and smell (loss-of-smell score [LoS], University of Pennsylvania Smell Identification Test [UPSIT], and 22-item Sino-Nasal Outcome Test [SNOT-22] smell/taste item), were assessed using Spearman's rank.

Results:

Improvements in patient-reported loss-of-'taste' severity were seen with dupilumab vs placebo in SINUS-24 (Least Squares mean difference vs PBO [95% CI] $-0.94 [-1.14, -0.74]$) and SINUS-52 ($-0.77 [-0.95, -0.59]$; both $P < 0.0001$) at Week 24. In the pooled SINUS-24/52 population a higher proportion of patients achieved improvement in loss-of-'taste' severity (≥ 1 point) at Week 24 with dupilumab vs placebo (61.2% vs 26.2%; $P < 0.0001$), maintained at Week 52 ($P < 0.0001$), and moderate associations were observed between improvement in loss-of-'taste' severity and improvements in LoS, UPSIT, and SNOT-22 smell/taste item scores at Week 24 ($r = 0.56, -0.39, \text{ and } 0.58$, respectively; all $P < 0.0001$), also maintained at Week 52 ($P < 0.0001$).

Conclusions:

In patients with severe CRSwNP, dupilumab improved smell and patient-reported 'taste' vs placebo, consistent with the known central role of smell in 'taste'.

Poster C050

Improvement in rhinologic symptoms and quality of life in CF patients undergoing combination therapy

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Background:

Triple combination therapy of elexacaftor/tezacaftor/ivacaftor (E/T/I) has been shown to reduce morbidity and mortality in cystic fibrosis (CF) patients. Although patient BMI improves with E/T/I treatment, factors contributing to this improvement are poorly characterized. Nearly all CF patients have symptoms of chronic rhinosinusitis including nasal congestion, sinonasal discharge and olfactory impairment (OI). Because olfaction contributes to the anticipation of eating, the elevated rates of hyposmia and anosmia in CF patients could implicate OI as a contributing factor to malnutrition and BMI instability in the CF population.

Methods:

We performed a prospective cohort study analyzing 45 CF patient responses to the Cystic Fibrosis Questionnaire-Revised (CFQ-R) and the Sino-Nasal Outcome Test 22 (SNOT-22) to understand the change in patients' quality of life (QoL), rhinologic health, and smell status before and after E/T/I therapy.

Results:

Patients reported 70% fewer instances of moderate to severe rhinologic symptoms after starting E/T/I. Self-reported QoL increased after three months on E/T/I ($p=0.0001$). Additionally, many patient-reported rhinologic symptoms (e.g. nasal blockage, post-nasal discharge) dramatically decreased across this period ($p<0.02$). However, patients did not self-report a significant change in their sense of smell ($p=0.17$).

Conclusion:

Our results support the impression that E/T/I therapy improves CF-associated rhinologic symptoms and may contribute to improvement in rhinologic QoL. The lack of improvement in self-reported olfactory function argues for other etiologies for elevated BMI; however, psychophysical evaluation is needed to characterize objective smell function in these patients.

Poster C051

Incidence of invasive fungal sinusitis prior to and during the COVID-19 pandemic

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Background:

Multiple cases of invasive fungal sinusitis (IFS) in patients with active or recent COVID-19 infection have been reported throughout the world. The relationship between COVID-19 and IFS remains incompletely defined.

Methods:

A systematic review using the Preferred Reporting in Systematic Reviews and Meta-analyses (PRISMA) framework was done to identify publications of IFS cases associated with COVID-19. Search terms were "COVID-19," "invasive," "fungal," and "sinusitis". IFS cases from extracted publications were evaluated for COVID-19 status, fungal etiology, comorbidities, treatment, and outcome. A case series of patients at our center with IFS between 12/1/2018 to 3/31/2020 ("pre-covid") and 4/1/2020 to 8/1/2021 ("post-covid") was also performed with the above parameters.

Results:

Fourteen studies totaling 206 cases of IFS associated with active or recent COVID-19 were identified. Most cases came from India (140/206, 68.0%), followed by Egypt (62/206, 30.1%), and North America (4/206, 1.9%). Diabetes was the most common comorbidity (151/206, 73.3%). Recent or prolonged steroid use was noted in 65.0% of cases (134/206). In our series, 5 pre-covid and 4 post-covid cases were identified. One had a recent history of COVID-19. History of acute myeloid leukemia was the most common pre-covid comorbidity (3/5, 60.0%), while diabetes was the most frequent post-covid comorbidity (2/4, 50.0%). Chronic steroid use was noted in 2 pre-covid and 1 post-covid cases.

Conclusion:

Diabetes and recent steroid use, known risk factors for IFS, were found in most of the reported cases of IFS related to COVID-19. The number of cases of IFS in our institution did not change appreciably in equal time periods before and after the pandemic.

Poster C052

Income disparities in chronic rhinosinusitis management

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Objectives:

This study investigates the impact of patient income on the management, charges, and outcomes of inpatients with chronic rhinosinusitis (CRS).

Methods:

The 2017 National Inpatient Sample database was queried for patients hospitalized with CRS via ICD-10 codes. High income (HI) and low income (LI) patients were defined as being above and below the national median income, respectively. Statistical associations between the income groups were determined via univariate and multivariable analyses.

Results:

Of the 29,045 inpatients with CRS, 13,391 (45.5%) were HI and 16,014 (54.5%) were LI. On univariate analysis, HI patients were older than LI patients (mean 57.2 vs. 56.3 years, $p < 0.001$) and more likely to be White (78.6% vs. 67.6%, $p < 0.001$) and have private insurance (36.0% vs. 24.4%, $p < 0.001$). On multivariable analysis adjusting for age, sex, race, primary payer status, hospital region and significant medical comorbidities, HI patients had greater total charges (\$68,596 vs. \$64,392, $p < 0.001$), underwent more procedures during their stay (1.9 vs. 1.5 procedures, $p < 0.001$), and had shorter length of stay (LOS) (5.2 vs. 5.9 days, $p < 0.001$) than LI patients. Mortality ($p = 0.454$) and odds for developing orbital ($p = 0.444$) or intracranial complications ($p = 0.679$) were similar between HI and LI patients.

Conclusions:

In a cohort of patients hospitalized with CRS, health care utilization varied based on patient income. HI patients had greater total charges, underwent more procedures, and had shorter LOS compared to LI patients. Mortality and complication risk were similar between the two income groups.

Poster C053

Infratemporal fossa mature teratoma in a pediatric patient: A case report

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Case:

A 3-year-old girl presented with two years of recurrent monthly swelling of the left lower eyelid without erythema, proptosis, or fevers. The swelling was often accompanied by subjective fevers and pain.

On exam, she had mildly tender non-erythematous swelling of the left upper and lower eyelid without conjunctival injection. The remainder of her exam, including ophthalmologic, was normal. Peripheral WBC was 15.4. CRP and ESR were within normal limits.

MRI of the brain showed a T1 and T2 hyperintense, cystic lesion with enhancing mural nodule centered in the left pterygopalatine fossa and infratemporal fossa. Sinus CT showed a 3.1 x 1.7 cm expansile lesion centered within the left pterygopalatine fossa without aggressive features.

She was taken for endoscopic endonasal biopsy of the lesion where a well-encapsulated cystic lesion with brown, oily fluid was encountered. Frozen section was negative for malignancy. Permanent pathology revealed an adult mature teratoma characterized by minor salivary glands, sino-nasal mucosa, and pancreatic tissue with exocrine cells and islets (confirmed by INSM-1 immunostain, a neuroendocrine marker).

Her subsequent course was unremarkable, and she was discharged on post-operative day 1.

Discussion:

Congenital teratomas of the head and neck are rare and may involve the neck, face, oral cavity, oropharynx, nasopharynx, or orbit. They are further subdivided into mature and immature teratomas. This is one of the first reported cases of mature teratoma in the infratemporal fossa in a pediatric patient. Teratoma should be considered in the differential for cystic lesions in the pterygopalatine fossa/infratemporal fossa in the pediatric patient.

Poster C054

Internet search for balloon sinuplasty

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Objective:

Internet search data offers a unique opportunity to evaluate public interest in procedures, which may inform clinical educational efforts. The purpose of this study was to examine Internet search data as a resource for evaluating public interest in balloon sinuplasty compared to endoscopic sinus surgery (ESS).

Methods:

This was a cross-sectional study in which United States Internet search data were retrieved using Google Trends from January 2006 to December 2019 for sinus procedure search terms. Sinus Surgery” was used as an umbrella term to assess general interest in sinus procedures. “Balloon Sinuplasty” and “Endoscopic Sinus Surgery” were used to evaluate each procedure group. Normalized relative search volumes (RSV) were obtained.

Results:

Average yearly mean RSV for sinus surgery did not change significantly from 2006-2019 ($R^2=0.001$, $p=0.93$). RSV for balloon sinuplasty increased by 297%, with an annual linear increase ($R^2=0.83$, $p<0.001$). RSV for endoscopic sinus surgery decreased by 40%, with an annual linear decrease ($R^2=0.84$, $p<0.001$). These were inversely correlated ($p<0.001$). By 2019, search for balloon sinuplasty was three times higher than ESS. Southern states had a higher average annual RSV for balloon sinuplasty than all other regions ($p<0.03$).

Conclusions :

Since 2006, online search for balloon sinuplasty has significantly increased while search for endoscopic sinus surgery has significantly decreased within the United States. Internet search data may be a valuable asset to explore procedural trends, and may provide clinicians, professional societies and institutions with guidance for preprocedural counseling and designing online educational resources.

Poster C055

Inverted papilloma during pregnancy: A case report

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Every year 2% of pregnant women undergo non-obstetric surgical interventions worldwide. According to the ACOG, pregnant women should never be denied the most appropriate surgical treatment regardless of the trimester of pregnancy. However, additional attention should be paid during the first trimester since there is the highest risk of inducing teratogenic mutations; similarly, during the third trimester, due to the possibility of preterm birth and low weight of the new-born great care should be paid. We present a 36-year-old woman during her 21st week of pregnancy who referred an increasing nasal obstruction associated with rhinorrhoea of the left nasal cavity, episodes of sleep apnoea and hyposmia. An ENT examination allowed to identify a mass within the left nasal cavity. The nasal endoscopy confirmed a greyish polypoid mass lesion with a multinodular surface occupying the entire nasal fossa. The lesion totally obliterated the left maxillary sinus resulting in obstruction of the anterior osteomeatal unit and ethmoidal sinusitis. She was referred for functional endoscopic sinus surgery using analgosedation with Remifentanil Target Controlled Infusion. The final histological examination of the lesion revealed an inverted papilloma. To the very best of our knowledge this is the first case described in literature about the use of analgosedation with Remifentanil Target Controlled Infusion for otolaryngology surgery. It could be an interesting option to avoid the use of inhaled anaesthetics that could induce foetal damage. Furthermore, patient intubation is not necessary, avoiding cases of difficult intubation or any trauma to the airways. An adequate informed consent and the appropriate compliance are elements of paramount importance.

Poster C056

Management of acute sinusitis with orbital complications: A systematic review

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Objective:

Acute sinusitis presents with complications in 4-20% of cases, with the most common major complications affecting the orbit. In this study, we performed a systematic review of the current literature and proposed a treatment algorithm, specifically with regards to the role of surgery.

Methods:

Bibliographic search was performed in January 2021 in PubMed, Embase, and Cochrane library databases. Three independent reviewers assessed 1224 unique references for eligibility according to the inclusion criteria using the Rayyan web application for blinded screening, and two additional authors assessed references to resolve conflicts. 81 articles were identified for full review according to PRISMA guidelines.

Results:

Treatment of acute sinusitis with orbital complications often requires a multidisciplinary approach with ENT and ophthalmology. Surgery is indicated if patients present with decreased visual acuity, ophthalmoplegia or proptosis. In general, Chandler stages 1 and 2 are managed with antibiotics alone while stages 4 and 5 are managed with the addition of surgery. The management of stage 3, however, is more controversial. Some advocate immediate surgery while others favor a more conservative approach, especially if the abscess is located medially and is within certain dimensions. Regardless of Chandler stage, surgery is typically recommended when no clinical improvement is observed within 48 hours of starting antibiotics.

Conclusion:

Management of acute sinusitis with orbital involvement requires accurate diagnostic staging. Surgery is required in all cases of orbital cellulitis and cavernous sinus thrombosis, but may not be necessary for subperiosteal abscesses depending on certain characteristic features.

Poster C057

Management of intracranial complications of acute sinusitis: A systematic review

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Background:

Early management of acute sinusitis with intracranial complications is crucial to prevent devastating sequelae. However, the optimal treatment strategy has not been clearly established. The objective of this study is to investigate the optimal time and criteria for surgical intervention for acute sinusitis with intracranial involvement.

Methods:

Bibliographic search was performed in January 2021 in PubMed, Embase, and Cochrane databases. Three independent reviewers assessed 1682 unique references for eligibility according to the inclusion criteria using the Rayyan web application for blinded screening, and two additional authors assessed any references without consensus decisions to resolve conflicts. 33 articles were identified for full inclusion and review according to the PRISMA guidelines.

Results:

A multidisciplinary approach with otolaryngology and neurosurgery is warranted for acute sinusitis with intracranial complications. Immediate endoscopic drainage of involved sinuses is generally recommended, with studies suggesting early endoscopic sinus surgery may reduce the risk of further intracranial sequelae. Conflicting recommendations for open neurosurgery exist, with some studies advocating for its early usage and others suggesting a less invasive approach. IV antibiotic therapy alone without surgery was only adequate for limited cases of meningitis.

Conclusions:

Acute sinusitis with intracranial complications generally warrants immediate surgical intervention of involved sinuses. Neurosurgical drainage was done in certain types of intracranial involvement, with some conflict on recommendations for open neurosurgery. IV antibiotic therapy alone was successful in treating only certain cases of meningitis.

Poster C058

WITHDRAWN

Poster C059

Metabolic syndrome and skull base surgery

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Objective:

This study utilizes a large-population database to evaluate whether there is an association between metabolic syndrome and various short-term adverse events in skull base surgery.

Methods: The 2005-2017 American College of Surgeons National Surgical Quality Improvement Program database was queried for 30-day outcomes of patients undergoing skull base surgery. Metabolic syndrome (MS) was defined as meeting the following three criteria: hypertension requiring medication, diabetes, and body mass index (BMI) >30 kg/m².

Results:

A total of 52,261 patients (51.8% female) with a mean age of 56.5±15.7 years were included, 2888 (5.5%) of which had MS. Patients with MS were more likely to be older (62.7±10.9 vs. 55.9±15.9 years, p<0.001) and have higher ASA class (91.9% vs. 71.3% ASA 3-4, p<0.001). Despite having similar length of operation (p=0.972), patients with MS had longer length of hospitalization compared to the rest of the cohort (5.9±7.6 vs. 7.3±8.8 days, p<0.001). A significantly higher proportion of patients with MS experienced unplanned reoperation (8.6% vs. 6.7%, p<0.001), readmission (13.5% vs. 10.3%, p<0.001), surgical complications (10.2% vs. 7.6%, p<0.001), medical complications (21.7% vs. 13.4%, p<0.001), and mortality (6.3% vs. 1.8%, p<0.001). After adjusting for age, gender, length of operation, and length of hospitalization as potential confounders, MS was an independent predictor of readmission (odds ratio [OR]=1.35, p<0.001), surgical complication (OR=1.24, p<0.001), medical complication (OR=1.50, p<0.001), and mortality (OR=1.43, p<0.001).

Conclusion:

Patients with MS are at higher risk of adverse events following skull base surgery, such as readmission, surgical or medical complication, and mortality.

Poster C060

Monoclonal antibodies and chronic rhinosinusitis with nasal polyps: Our multidisciplinary experience

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The introduction in chronic rhinosinusitis with nasal polyposis (CRSwNP) of monoclonal antibodies (MAbs), which are routinely used in the management of other chronic eosinophilic diseases such as asthma and atopic dermatitis, has allowed new therapeutic options. Dupilumab represents the first approved biological agent in Italy since December 2020 for non-responders CRSwNP patients to conventional therapies.

For several years in our hospital there has been a multidisciplinary management between our centre of Rhino-Allergology and Pneumology Unit. We collected more than 50 patients with simultaneously asthma and CRSwNP at different stages. A special focus was reserved for those cases of patients with asthma and CRSwNP who have been treated with MAbs. We have developed a dedicated collection form to monitor patients' compliance to therapy and their clinical outcomes.

Since December 2020 we have enrolled 18 patients with CRSwNP and / or without asthma and a therapy with Dupilumab has been set up. By monitoring our patients with the internal protocol we have noticed a considerable respiratory gain associated with a significant improvement of nasal congestion, loss of smell, post-nasal drip, nasal polyp score, SNOT-22 and VAS.

The role of Dupilumab in the management of patients with type 2 inflammation is emerging in literature. Since the MAbs have different mechanisms of action targeting distinct interleukines, it could be worth investigating a possible combination of therapy with different biologics in selected patients. Further studies are needed to improve recommendations about the start of MAbs therapy and a possibly to compare different biologics with current standard of care.

Poster C061

Multi-institutional review of sinonasal and skull base chondrosarcoma: A 20-year experience

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Introduction:

Chondrosarcomas of the sinonasal cavity and skull base are uncommon. The rarity of these tumors has prevented robust outcomes data. We sought to provide long-term outcomes at two tertiary care hospitals in patients who were treated with surgery.

Methods:

Pathology databases and case logs were searched for chondrosarcoma specimens of the sinonasal cavity and/or skull base from 2000 to 2021. Patient demographic, treatment, and outcome data was recorded. The primary outcome was overall survival (OS).

Results:

There were 38 patients (39.5% male) that met inclusion criteria. Average age was 47.8 ± 15.8 years. 14 patients had sinonasal (36.8%), 7 petroclival (18.4%), and 17 other primary skull base lesions (44.7%). 24 patients (63.2%) had surgery at the treating institutions, and the remainder presented for post-operative radiation. Five patients (13.2%) had previous surgical resection prior and 8 patients (21.1%) had positive surgical margins. One patient had a post-operative cerebrospinal fluid leak (2.6%), 1 had a pulmonary embolism (2.6%), and 1 had pneumonia (2.6%). 6 patients (15.8%) required readmission within 30 days. Twenty-eight patients (73.7%) underwent radiation (67.3 ± 15.1 Gy). 18 (47.4%) required revision surgery for recurrence or persistent disease, undergoing an average of 1.88 ± 1.59 procedures. 1, 5, and 10-year OS were 97.3%, 93.1%, and 74.7%. Adjuvant radiation was associated with improved OS (HR: 0.12; 95% CI: 0.02-0.75, $p=0.023$).

Discussion:

Chondrosarcomas of the skull base and sinonasal cavity are rare. We present the largest case series to date reflecting our experience. Favorable survival outcomes can be achieved with surgery, however, local recurrence requiring repeat resection is common.

Poster C062

Nasal septal perforations of unknown etiology

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Objectives:

This study aimed to identify characteristics of nasal septal perforations of unknown etiology and compare them with nasal septal perforations with known causes.

Study Design:

Retrospective Case Series.

Methods:

A pool of 160 adult patients with nasal septal perforations were identified between 2002 and 2018 at the University of Utah. Information including etiology, symptoms, perforation size, workup and treatment were recorded. Collected laboratory data included, but was not limited to: CBC, BMP, ESR, CRP, ANCA, ANA, RPR and pathology (if biopsied).

Results:

Of the 160 patients evaluated, 85 (53%) patients had NSPs of unknown etiology. Known diagnoses included: surgery (41%), trauma (20%), autoimmune (17%), drugs/toxins (17%), neoplasm (3%), and infection (1%). NSPs of known etiologies were significantly more symptomatic (obstruction, whistling, crusting, bleeding) compared to unknown NSPs. The average perforation size for known etiologies was 17.28mm compared to 17.36mm for unknown. Biopsies were obtained in 24/75 (32%) patients with known NSPs etiologies compared to 1/85 (1%) of unknown NSPs ($p < 0.01$). 35/75 (47%) patients with known NSPs had at least one autoimmune laboratory data obtained compared to 18/85 (21%) patients with unknown NSPs ($p < 0.01$).

Conclusion:

NSPs of known etiology were more likely to have significant symptoms, and also have had a workup involving laboratory and pathological evaluation. Further studies are needed to determine the appropriate utilization of these areas when assessing NSPs.

Poster C063

Nasal swell body characteristics in patients with septal perforations

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Objective:

To determine if there is a difference in the size of the nasal swell body in patients with a septal perforation compared to a control group.

Study Design:

Retrospective cohort study.

Setting: Two tertiary academic medical centers.

Methods:

Computed tomography scans of 126 patients with a septal perforation and 140 control patients from November 2010 to December 2020 were evaluated. Perforation etiology was noted. Measurements included perforation length, height, and distance to the nasal floor. Nasal swell body width was measured and volume calculated. The relationship between a high septal deformity and swell body size was examined. Student's t test, Chi square analysis, ANOVA, and Pearson's correlation coefficient were used for comparative statistical analysis.

Results:

The width and volume of the nasal swell body is significantly smaller in perforation patients when compared to controls. The swell body is significantly smaller and thinner in large perforations compared to small perforations. Perforation etiology grouped into prior septal surgery, septal trauma, septal inflammatory, and mucosal vasoconstriction categories all demonstrated decreased swell body volume and width compared to controls. Inflammatory etiology had the greatest relationship to decreasing swell body size. The hemi-swell body on the contralateral side of a septal deviation is significantly thicker than the ipsilateral side.

Conclusion:

The nasal swell body is smaller in patients with a septal perforation regardless of perforation etiology, and this is more pronounced particularly with large perforations. The nasal swell body is thicker on the side opposite a septal deviation, which could affect attempted surgical repair.

Poster C064

**Nasopharyngeal depth and facial anthropometry:
A normative analysis**

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Introduction:

As a reservoir of respiratory pathogens, the nasopharynx (NP) is a common target of diagnostic testing. Improper swab insertion depth can result in false negativity along with complications of swab misplacement. This multi-center study aimed to determine normative data on NP depth and its correlation to external facial measurements.

Methods:

After obtaining demographic information, endoscopic distance along the nasal floor to the NP was assessed from 5 centers. Comparisons were made to measurements from the alar-facial groove along the face to the tragus and the distance from the tragus to a plane perpendicular to the alar-facial crease. Additionally, computed tomography measurement from the NP to nasal sill was performed when imaging was available.

Results:

371 patients participated in the study (41% female; mean age 51 ± 18). The average endoscopic depth was 94mm (± 8.6 mm) and 101mm (± 9 mm) for females and males, respectively ($p < 0.001$; 95% CI 8.6 to 4.9). Measurement from the tragus to a plane perpendicular to the alar-facial crease was strongly correlated to endoscopic measurement ($r = 0.775$; $p < 0.001$), with a mean difference of 1.3mm (± 6.5 mm; 95% CI 0.68 to 2). Distance from the tragus to alar-facial groove overestimated nasopharyngeal depth by 20.7 mm, and CT measurement underestimated depth by 12 mm. These relationships were unaffected by sex or ethnicity.

Conclusions:

Appropriate nasopharyngeal swab insertion can be performed by approximating swab depth to that of the distance from the tragus to a plane perpendicular to the alar-facial crease on lateral view. This compliments training by personalizing the procedure technique to each patient, respecting their anatomy.

Poster C065

ODS management duration

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Background:

Effective odontogenic sinusitis (ODS) management hinges on multidisciplinary collaboration. One point of debate has been the optimal timing of primary dental treatment and endoscopic sinus surgery (ESS), but differences in time to completion of these treatment pathways has not been studied.

Methods:

A single-institution retrospective review of all ODS patients was conducted from 2015-2021. Demographic and clinical variables were recorded, and various durations of time were analyzed from symptom onset through evaluation and treatment completion.

Results:

Eighty-three ODS patients were included for analysis (49.4% male, median 59 years-old). Median symptom duration was 6 months (IQR: 3-12). Patients were evaluated by the rhinologist prior to dental providers in 89.2% of cases (74/83). Overall, patients experienced a median 416.2 days (IQR: 163.6-888.0) from symptom onset through completion of dental treatment and ESS. Of 53 ODS patients with treatable dental pathology, 33 elected primary dental treatment, and 27/33 (81.8%) required subsequent ESS. In patients who underwent primary dental treatment followed by ESS, median time for evaluation and treatment completion was 173.0 days (IQR: 85-511). If ESS was pursued primarily followed by dental treatment, median time to treatment completion was 112.0 days (IQR: 63-157), which was significantly shorter than if primary dental treatment was pursued ($p = 0.029$).

Conclusions:

From symptom onset through treatment completion, patients experienced the effects of ODS for over a year. In patients with ODS due to treatable dental pathology, primary ESS followed by dental treatment resulted in a shorter overall treatment duration than primary dental treatment followed by ESS.

Poster C066

Orbital pseudotumor associated with CRS and fungus ball responsive to antifungals

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Introduction:

Orbital pseudotumor is a benign idiopathic inflammatory disease that may be associated with chronic rhinosinusitis (CRS). It is typically treated with high dose corticosteroids.

Methods:

Case report and literature review.

Results:

A 66 year-old immunocompetent male presented with a 10-month history of unilateral epiphora and facial pain. Imaging demonstrated a heterogeneous mass of the right maxillary sinus with orbital extension along with inflammatory changes. Right-sided FESS with tissue sampling demonstrated CRS and non-invasive fungal debris. After 3.5 months of symptomatic improvement, he developed ipsilateral facial pain, proptosis, and diplopia. Interval progression of the orbital and retroantral mass was noted on imaging, but sinuses appeared healthy on endoscopy. Workup demonstrated elevated IgG1,2,4 subtypes. Transorbital biopsy demonstrated fibrous tissue, mixed inflammation, focal plasma cells, rare IgG-4 positive cells, and noninvasive Aspergillus. Following consultation with rheumatology and infectious disease, the patient was treated with high-dose corticosteroids for possible IgG4-related disorder, without improvement. Subsequently, a 3-month trial of voriconazole was instituted, with rapid resolution of orbital signs and symptoms.

Conclusion:

Orbital pseudotumor is a benign inflammatory disorder that is typically responsive to corticosteroids, although in recalcitrant cases alternate therapies can be pursued. In this patient, histologic evidence of non-invasive fungus was demonstrated, and salvage treatment with voriconazole resulted in resolution of symptoms. The precise pathophysiology is unclear but may represent a pseudotumor-like process triggered by non-invasive fungus.

Poster C067

Pain control with sphenopalatine ganglion block after endoscopic sinus surgery

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Background:

Various regimens have been trialed for pain management following functional endoscopic sinus surgery (FESS). This study evaluates the postoperative pain experience of patients treated with intraoperative topical anesthetic with or without sphenopalatine ganglion (SPG) block.

Methods:

This is a single-blinded, randomized control trial of patients undergoing FESS for inflammatory conditions. In both arms, epinephrine and ropivacaine soaked pledgets were used. In one arm, patients additionally received an SPG block using Marcaine. Primary outcomes measured included interval Visual Analog Scale (VAS) pain scores and pill counts. Secondary outcomes included symptom evaluation with the SNOT-22 questionnaire and intravenous narcotic requirements in the recovery room.

Results:

19 patients were randomized into group A (SPG block) and B (no block). In group A and B, respectively, mean preoperative adjusted VAS was 1.0 ± 2.24 and 0.15 ± 0.44 , and SNOT-22 was 19.8 ± 21.2 and 26 ± 26.5 . There is no statistical difference in pre-op scores between groups. At 1 week VAS scores were 2.4 ± 2.3 , 1.43 ± 2.6 and SNOT-22 scores were 30.0 ± 16.5 , 29.3 ± 27.3 for group A and B, respectively. On average in the first 24 hours, patients in group A took two narcotic pills and only one in group B. There was no significant difference between groups for VAS at 1-hr or 24-hrs postop or for pills taken at 24-hrs. There was no significant difference in recovery room parenteral pain control requirements between groups.

Conclusions:

In the immediate postoperative setting, use of topical anesthetic with or without SPG block both confer good pain outcomes with limited resultant use of narcotics.

Poster C068

Parosmia and COVID-19: An evidence-based review with recommendations for the clinician

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Background:

Nearly 40% of patients who experience smell loss during SARS-CoV-2 infection may develop qualitative olfactory dysfunction, most commonly parosmia. Our evidence-based review summarizes the evolving literature and offers recommendations for the clinician on the management of patients experiencing parosmia associated with COVID-19.

Methods:

We performed a systematic search using independent queries in PubMed, Embase, Ovid and Cochrane databases, then categorized articles according to themes that emerged.

Results:

We identified 117 unique references meeting eligibility and performed title and abstract review with two independent reviewers, with 70 articles undergoing full-text review. An inductive approach to thematic development provided seven central themes regarding qualitative olfactory dysfunction following COVID-19: epidemiology, effect on quality of life, disease progression, prognosis, pathophysiology, diagnosis, and treatment.

Conclusions:

The incidence of parosmia following COVID-19 is notable, and correlates positively with age. The presence of parosmia predicts persistent quantitative olfactory dysfunction. Onset can occur months after infection, and symptoms may persist for well over 7 months. Affected patients report increased anxiety and decreased quality of life. Structured olfactory training with essential oils is the preferred treatment, where parosmia predicts recovery of aspects of quantitative smell loss when undergoing training. There is limited evidence that nasal corticosteroids may accelerate recovery of olfactory function. Patients should be prepared for the possibility that symptoms may persist for years, where providers should guide them to resources for coping with their psychosocial burden.

Poster C069

Patient risk factor analysis for procedural intervention in management of epistaxis

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Introduction:

Epistaxis affects 60 million Americans annually and accounts for a significant portion of emergency room visits each year. While most episodes are self-limiting, patient factors such as hypertension and anti-coagulant use may increase the risk of epistaxis. There is considerable variation in the management of epistaxis with little evidence to suggest which patients may benefit from early procedural intervention.

Objective:

To identify risk factors associated with either embolization or endoscopic sphenopalatine artery ligation for management of epistaxis.

Methods:

Retrospective chart review of patients presenting with epistaxis to a tertiary care medical center between July 2017 to July 2021. Patients were stratified into two cohorts based on management: conservative, non-operative management vs procedural intervention. Records were reviewed for age, gender, transfer status, tobacco use, anti-coagulant use, recent sinonasal surgery or facial trauma, hospital length of stay (LOS), and management of epistaxis.

Results:

329 patients were identified for interim analysis, of which 13 required procedural intervention. When compared to patients receiving non-operative management, patients requiring procedural intervention were more often male (77% vs 56%, $p=0.086$) and presented at a younger age (mean age 56 vs 61 years). Those receiving non-operative management were more likely to be on anti-coagulation (40% vs 15%, $p=0.087$) and have a prolonged LOS (6 vs 4 days). Conclusion: Our study suggests that procedural intervention may be associated with male gender and younger age. Although uncommon, procedural intervention for epistaxis should be considered early in those with risk factors for recurrent or prolonged epistaxis.

Poster C070

Patient safety indicator events vs. insurance type in transsphenoidal pituitary surgery patients

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Objectives:

To investigate the relationship between Patient Safety Indicator Events and Insurance Type in Patients undergoing Transsphenoidal Pituitary Surgery.

Study Design:

Retrospective database review.

Methods:

The 2003-2011 National Inpatient Sample (NIS) was queried for transsphenoidal pituitary surgery cases. Insurance type was categorized into Medicare, Medicaid, Private Insurance, and Other. PSIs were extracted through NIS ICD-9 codes from the Agency for Healthcare Research and Quality. Univariate analysis was performed to assess relationships between PSIs and insurance type.

Results:

16,039 cases were queried, 622 with at least one PSI and 15,417 without. PSIs disproportionately affected males (4.7% vs. 3.1% in females), Black patients (5.6% vs. 3.5% in other races) and patients on Medicare and Medicaid (6.0% and 5.8%, respectively, vs. 2.7% in private insurance). Increased likelihood of a poor outcome was associated with PSIs for patients with Medicare (OR 3.2, 95% CI 2.3 – 4.4, $p < 0.001$), Medicaid (OR 5.9, 95% CI 3.6 – 9.9, $p < 0.001$), and private insurance payer types (OR 3.0, 95% CI 2.1 – 4.2, $p < 0.001$). Increased likelihood of mortality was associated with PSIs for patients with Medicare (OR 31.7, 95% CI 14.0 – 72.1, $p < 0.001$), Medicaid (OR 33.0, 95% CI 10.8 – 101.0, $p < 0.001$), private insurance (OR 41.9, 95% CI 18.3 – 96.0, $p < 0.001$), and other payer types (OR 28.9, 95% CI 6.3 – 132.2, $p < 0.001$).

Conclusion:

PSIs are associated with increased likelihood of both poor outcomes and mortality in Medicare, Medicaid, and private insurance patients. However, Medicaid and Medicare patients with PSIs are associated with an even higher likelihood of poor outcomes and mortality compared to private insurance patients.

Poster C071

Patient volume and online ratings for academic rhinologists in the United States

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Objectives:

To determine whether patient volume predicts online reviews for United States academic rhinologists.

Methods:

Online reviews for US academic rhinologists were extracted from Google.com, Healthgrades.com, Vitals.com, and RateMD.com from website inception to December 2019 and combined to generate composite weighted ratings. Demographic information for the cohort was collected and the 2018 Open Payments Database was queried for physician reimbursement and patient data. Rhinologists were classified by patient volume. Demographic and payment parameters for volume cohorts were compared using Fischer exact test and Mann-Whitney U test. The relationship between patient volume and online ratings was evaluated on univariable and multivariable linear regression.

Results:

180 academic rhinologists were included in this analysis. The total number of Medicare patients seen in 2018 ranged from 41 to 774 with a mean of 215 and a standard deviation of 126. The mean was used to establish volume cohorts, such that 68 rhinologists were classified as high volume and 112 as low volume. Median composite ratings were similar between high and low volume physicians (4.36, interquartile range [IQR] 3.91-4.69 versus 4.38, IQR 4.03-4.76; $p = 0.910$) and between female and male physicians (4.48, IQR 3.66 to 4.93 versus 4.35, IQR 3.98 to 4.66; $p = 0.278$). There was no significant relationship between online ratings and patient volume on either univariable or multivariable analysis ($p = 0.368$ and $p = 0.093$, respectively).

Conclusion:

Online reviews for US academic rhinologists do not differ by volume, which suggests that patient satisfaction may not depend on factors associated with busy practices like longer wait times and shorter appointments.

Poster C072

Patterns of care for elderly patients with sinonasal undifferentiated carcinoma

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Poster C073

WITHDRAWN**Objectives:**

Sinonasal undifferentiated carcinoma (SNUC) is an aggressive neoplasm of the nasal cavity and paranasal sinuses. This study explores the clinicopathologic features and treatment outcomes for SNUC in the elderly.

Methods:

The 2010-2016 National Cancer Database was queried for all cases of SNUC and patients were stratified by age >65 or less than 65. Demographic, clinicopathologic features, and treatment regimens between both groups of patients were compared. Kaplan-Meier and Cox multivariable survival analyses were performed to determine differences in outcomes between the groups.

Results:

727 cases of SNUC were analyzed of which 478 (65.7%) were under 65 and 249 (34.3%) were 65 years or older. No significant differences in demographics or primary site were seen between both groups. Although no clear patterns in AJCC stage and T stage were observed in elderly patients, they were significantly less likely to receive combination radiotherapy and chemotherapy and multimodality therapy than their younger counterparts ($p < 0.001$). Overall survival (OS) was significantly lower in elderly patients with a 10Y-OS of 54.4% as compared to 79.0% in younger patients ($p < 0.001$). Despite this, on Cox multivariable survival analysis, elderly status did not portend a significantly higher hazard of death as compared to younger patients ($p = 0.167$).

Conclusions:

Elderly patients were less likely to receive multimodality therapy than their younger counterparts. Although OS rates were lower for the elderly, elderly status did not result in a higher hazard of death. Further study is needed to understand the treatment options for elderly patients with SNUC.

Poster 074

Postoperative impact of delay in surgery in patients undergoing ventral skull base surgery

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Objectives:

Delay in surgery (DIS) following admission has been shown to increase postoperative length of stay (LOS) for patients, though this impact has not been studied in patient undergoing ventral skull base surgery (VSB).

Study Design:

Retrospective database review.

Methods:

The National Surgical Quality Improvement Program database was queried for patients who underwent VSB between 2011 and 2018. Multivariate analyses were conducted to investigate the association between delay in surgery and postoperative complications, LOS, and outcome. DIS was defined as any time greater than zero days between admission to operation.

Results:

3,100 patients were included. The mean age was 53.6 years. The majority of patients were White (59.1%), nonobese (52.2%), and had an ASA Class 3 (53.5%), with an equal sex distribution. The median time from admission to surgery was 0 days. Multivariate analysis, controlling for age, race, sex, comorbidities, ASA status, and CPT code, showed that delay in surgery strongly predicted adverse discharge (OR 3.117, 95% CI 2.194 – 4.429, $p < 0.001$), any complication (OR 2.027, 95% CI 1.393 – 2.950, $p < 0.001$), life-threatening complications (OR 2.104, 95% CI 1.364 - 3.245, $p = 0.001$), mortality (OR 6.430, 95% CI 1.428 – 28.956, $p = 0.015$) and increased postoperative LOS by 2.650 days (95% CI 2.137 – 3.162, $p < 0.001$).

Conclusions:

This study found an association between DIS and mortality, any complication, life-threatening complications, adverse discharge, and increased postoperative LOS in patients undergoing VSB. Identifying and minimizing factors that result in operative delays can prevent post-operative complications and decrease hospital burden by decreasing patient LOS.

Poster C075

Postoperative impact of transfer status for patients undergoing ventral skull base surgery

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Objectives:

Patients transferred in from entry points of care typically have complex comorbidities and complications that require management at tertiary level facilities. The impact of patient transfer has not been examined in ventral skull base surgery (VSB). Our study seeks to understand whether transfer status predicts postoperative complications following VSB.

Study Design:

Retrospective database review.

Methods:

The National Surgical Quality Improvement Program database was queried for patients with known transfer statuses who underwent VSB between 2011 and 2018. Multivariate analyses were conducted to investigate the association between transfer status and postoperative complications.

Results:

5,123 patients were included. The mean age was 54.6 years. 325 patients (6.3%) were transferred in rather than directly admitted. Univariate analysis showed that transferred patients were more likely to experience postoperative renal insufficiency ($p < 0.001$), urinary tract infection ($p = 0.001$), cerebrovascular incident ($p = 0.048$), blood transfusion ($p < 0.001$), deep vein thrombosis ($p = 0.009$), sepsis ($p < 0.001$), septic shock ($p < 0.001$), pneumonia ($p < 0.001$), extended ventilator use ($p < 0.001$), any medical complication ($p < 0.001$), and mortality ($p < 0.001$). Multivariate analysis controlling for age, race, sex, ASA status, and comorbidities found transfer status associated with increased likelihood of any medical complication (OR 2.032, 95% CI 1.399–2.952, $p < 0.001$).

Conclusions:

This study found transfer status associated with any medical complication but not with any specific complication or mortality. Transferred VSB patients have more complications, though transfer status generally does not impact postoperative outcomes.

Poster C076

Postoperative sinonasal infection following endoscopic skull base surgery

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Background:

Despite advancements in endoscopic skull base surgery, disruption of sinonasal microbiota has remained a major concern for sinonasal morbidity. The aim of the present study was to evaluate the characteristics and treatment outcomes of postoperative sinonasal infection (PSNI) following the endoscopic endonasal approach (EEA).

Methods:

Retrospective chart review was conducted on all skull base procedures performed between June 2018 to August 2021 at a tertiary academic medical center. Clinical, surgical, and microbiological findings were retrieved and collated for analysis.

Results:

Of 183 consecutive cases, 21 cases of PSNI in 19 patients (10.4%) were identified. Symptoms at time of culture included nasal congestion (38.1%), headache (23.8%), nasal crusting (19.0%), nasal discharge (19.0%), facial pain/pressure (14.3%), and dysosmia (14.3%). The most common cultured-directed antibiotics prescribed were trimethoprim-sulfamethoxazole (71.4%) and clindamycin (23.8%). The most common predominant organism cultured was methicillin-susceptible *Staphylococcus aureus* (76.2%). Overall, significant symptomatic improvement was achieved upon pre- vs. post-antibiotic treatment comparison of SNOT-22 scores (27.96 vs. 13.46, $p=0.003$) and Lund-Kennedy scores (3.56 vs. 2.19, $p=0.001$). The presence of nasal congestion symptoms at time of culture was also associated with greater symptomatic improvement post-treatment (-24.3 vs. -8.7, $p=0.045$).

Conclusion:

A minority of patients undergoing EEA may develop PSNI requiring an additional course of culture-directed antibiotics. Early sinonasal care, including moisturization, irrigations, and endoscopy with possible debridement are crucial in preserving sinonasal function during recovery.

Poster C077

Pott's Puffy Tumor: A review of the literature

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Objectives:

Pott's puffy tumor (PTT) is characterized by osteomyelitis of the frontal bone associated with subperiosteal abscess collection. The purpose of this study was to characterize intracranial involvement in pediatric and adult patients with PPT and to assess therapeutic modalities of this disease process. To date, this represents the largest scale review to examine this.

Methods:

We conducted a systematic review of the literature through a PubMed and MEDLINE search (1945-2020). The authors reviewed all cases of PPT, focusing specifically on those papers describing therapeutic management of PPT.

Results:

A total of 55 articles that described 107 pediatric and adult patients with PPT were included. Both MRI and CT imaging modalities were commonly obtained for pre-surgical assessment of sinusitis and intracranial extension. Approximately 48% of cases had intracranial involvement. In 70% of cases, an endoscopic endonasal approach for the management of underlying sinusitis was utilized. Length of treatment varied, but primarily consisted of prolonged broad spectrum antibiotic therapy ranging 4 to 8 weeks postoperatively.

Conclusions:

Based on the available literature, this review describes the essential clinical findings, diagnostic modalities, microbiologic and antimicrobial considerations, as well as the medical and surgical treatment approaches commonly utilized for the management of PPT. The core of surgical treatment is an early and aggressive approach to prevent long-term neurologic complications.

Poster C078

Prevalence of type 2 inflammatory signatures in patients with CRSwNP from 2 phase 3 clinical trials

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Background:

Chronic rhinosinusitis with nasal polyps (CRSwNP) is a disease of the nasal cavity and paranasal sinuses characterized by type 2 inflammation. Recent publications described algorithms for identification of type 2 inflammation in CRSwNP without tissue analysis. We assessed the prevalence of type 2 inflammation in patients with severe CRSwNP from two phase 3 studies (SINUS-24/SINUS-52 [NCT02912468/NCT02898454]).

Methodology:

Type 2 inflammation was assessed at baseline (pooled SINUS-24/SINUS-52; N=724) according to: 1. EPOS consensus guidelines (eosinophils ≥ 250 cells/ μ L or IgE ≥ 100 IU/mL); 2. EUFOREA 2020 position paper (comorbid asthma or eosinophils ≥ 300 cells/ μ L); 3. GINA threshold for airway inflammation (eosinophils ≥ 150 cells/ μ L); 4. eosinophils ≥ 150 cells/ μ L or IgE ≥ 100 IU/mL; 5. type 2 comorbidity (atopic dermatitis/allergic rhinitis/asthma/nonsteroidal anti-inflammatory drug-exacerbated respiratory disease); 6. eosinophils ≥ 150 cells/ μ L or IgE ≥ 100 IU/mL or type 2 comorbidity.

Results:

The proportions of patients by each type 2 inflammation definition were: 1. 83.4%; 2. 76.4%; 3. 85.8%; 4. 92.3%; 5. 78.6%; and 6. 96.7%. In patients without comorbid asthma (n=296) the proportions were: 1. 75.0%; 3. 79.1%; 4. 87.8%; 5. 47.6%; and 6. 91.9%.

Conclusions:

Up to 96.7% of patients with CRSwNP, with or without comorbid asthma, displayed a type 2 inflammatory signature based on these algorithms.

Poster C079

Primary ciliary dyskinesia: a case of misdiagnosis and an update on diagnostic tools

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Background:

Primary ciliary dyskinesia (PCD) is characterized by upper and lower respiratory tract disease, situs anomalies, conductive hearing loss, and infertility. Symptoms begin in infancy with nasal congestion and a wet cough, and progress to chronic sinusitis and bronchiectasis. Early diagnosis and treatment can prevent or delay this progression. Unfortunately, PCD is often misdiagnosed because there is no perfect test and, until recently, no standard of diagnosis.

Methods:

A case of a patient misdiagnosed with PCD in childhood is presented. Current diagnostic standards from the American Thoracic Society (ATS) are reviewed.

Results:

A 26-year-old man with seasonal allergies, who carried a diagnosis of PCD since childhood based on electron microscopy (EM) but lost to follow up, presented for evaluation. He endorsed intermittent dry cough and nasal congestion. He denied sinusitis or pulmonary disease. Nasal endoscopy and otoscopy were unremarkable. His lungs were clear to auscultation. An audiogram showed normal conductive hearing and type A tympanograms. CT imaging demonstrated normally developed sinuses and no evidence of bronchiectasis. Nasal nitric oxide (nNO) was within normal range. His diagnosis was reversed. Historically, PCD was diagnosed using EM, which is neither sensitive nor specific. While other diagnostic tests are described, no single modality is an agreed upon gold standard. Rather, the ATS recommends a panel of diagnostic tests be applied-specifically, nNO, genetics, EM, and clinical presentation to help aid in an accurate diagnosis.

Conclusion:

Diagnosis and management of PCD requires a multidisciplinary team. Otolaryngologists are critical members of the team and should be familiar with ATS PCD guidelines.

Poster C080

Prophylactic antibiotics and septoplasty

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Background:

Postoperative infection is a common complication after septoplasty. The WHO recommends preoperative, prophylactic antibiotics in such clean-contaminated surgery. Still, postoperative antibiotics are widely used after septoplasty, which warrants further investigation.

Materials and Methods:

Retrospective study on 772 septoplasties performed in 2015, 2016 and 2018. We classified surgical site infections (SSI) into superficial and deep infections according to Centers for Disease Control and Prevention (CDC) criteria. We divided patients into four categories: no prophylactic antibiotics, preoperative-, postoperative, or both pre- and postoperative antibiotics and compared the categories with SSI rates, recognizing surgical and patient-related confounding factors. The mainly used antibiotics were cephuroxime intravenously 30-60 minutes before incision or cephalexine 1500 mg/day for 7 days.

Results:

Twenty-nine cases (3.8 %) suffered from a postoperative SSI. In the none-antibiotic group, the rate was 6.8%, and 3 of the 4 deep infections (abscess or high fever and identified micro-organism) occurred in this group. Any kind of prophylaxis reduced the SSI risk to 2.6 % ($p=0.018$). After one dose of prophylactic cephuroxime the SSI rate was 2.9% ($p=0.045$). Postoperative antibiotic alone resulted in a reduced rate (statistically nonsignificant). General anesthesia associated with higher SSI rate compared to local anesthesia ($p<0.001$). Other factors such as age, BMI, smoking, surgeon's experience, or method of closure (stapler, packings, stitches) did not affect SSI rate.

Conclusion:

One dose of prophylactic cephuroxime i.v. 30-60 minutes before septoplasty effectively diminishes the risk of SSI effectively.

Poster C081

Quantifying ethmoid sinus dimensions with relevance to skull base injury in endoscopic sinus surgery

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Introduction:

To avoid complications during endoscopic sinus surgery(ESS), detailed spatial understanding of complexities in ethmoid sinus anatomy is essential during pre/intraoperative analysis of imaging. Underrecognized ethmoid sinus metrics, and correlation with known ethmoid skull base injury during ESS, were analyzed.

Methods:

Sinus computed tomography(CT) imaging was compared between 500 patients who underwent primary ESS without complication and 7 patients who sustained intraoperative skull base injury. CTs were acquired through blinded database search, and analyzed bilaterally in coronal plane at standardized landmarks for these metrics: maxillary height:ethmoid height ratio(M:E), orbit-to-cribiform distance(ethmoid width), interorbital distance, and asymmetry in ethmoid height.

Results:

Overall, mean ethmoid height was 18.4mm, ethmoid width was 7.6mm, and interorbital distance was 33.2mm. Mean M:E ratio was 2.1:1 for all CTs, with distribution of M:E ratios being 1:1 (12.6%), 2:1(64.4%), 3:1(21.6%), and 4:1(0.2%). Patients who sustained iatrogenic skull base injury had significantly higher mean M:E ratio at 2.5:1($p=0.02$), with no significant differences between groups in ethmoid height($p=0.11$), ethmoid width($p=0.83$), or interorbital distance($p=0.33$). Regarding skull base asymmetry, mean difference in ethmoid height between sides was 1.6mm, with 7.2% having >4mm difference. Patients with iatrogenic skull base injury had higher mean difference in ethmoid sinus height at 2.5mm($p=0.05$).

Conclusion:

Elevated M:E ratio and increased ethmoid skull base asymmetry may be significant risk factors for skull base injury during ESS, and are important new parameters to assess during pre/intraoperative analysis of sinus CT imaging.

Poster C082

Rates of antidepressant, anxiolytic, and ADHD medication use among patients undergoing ESS

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Introduction:

Patients with chronic rhinosinusitis (CRS) are estimated to have psychiatric comorbidity at a rate higher than the general population; however, self-report of depression diagnoses or symptoms often underestimates true prevalence. Our goal was to determine if patients undergoing endoscopic sinus surgery (ESS) are more likely to have concurrent antidepressant/anxiolytic use or attention deficit disorder (ADHD) medication use, and thus, pharmacologically-treated psychiatric comorbidity.

Methods:

Adult patients undergoing ESS during 2018-2019 were identified in a large healthcare system. A control group of patients without ESS was identified, and matched for age, sex, race and health status. For patients and controls, the presence or absence of a prescribed antidepressant/anxiolytic or ADHD medication during the study period was tabulated and relative rates of medication use were compared.

Results:

2,279 ESS patients were identified (50.9% female; mean age, 51.0 years) and successfully matched to 2,279 control patients (50.9% female, mean age, 51.2 years). The rate of antidepressant/anxiolytic utilization among ESS patients was 22.1% versus 11.3% for controls ($p < 0.001$, $OR = 2.23$ [1.90-2.63]). The rate of ADHD medication utilization among ESS patients was 3.6% versus 2.0% for controls ($p = 0.001$, $OR = 1.85$ [1.28-2.68]). Females were significantly more likely to be taking antidepressants/anxiolytics ($p < 0.001$, OR , 1.75 [1.43-2.14]) versus males.

Conclusions:

Patients undergoing ESS exhibit significantly higher rates of antidepressant and ADHD medication utilization relative to a matched control population. These data objectively support higher rates of medically treated psychiatric comorbidity among ESS patients.

Poster C083

Rationale and design for EDS-FLU trials in CRS without and with nasal polyps

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Background:

While several treatments are FDA-approved for nasal polyposis, there are no FDA-approved treatments for CRS broadly, specifically for CRS without nasal polyps. FDA guidance stated that a medication for CRS should demonstrate benefits for both symptomatic and objective signs of sinus disease. We aim to evaluate and address the challenges in designing clinical studies for medications intended to treat CRS. The rationale and design reported here will provide guidance for future clinical trials.

Methods:

In the absence of a standardized drug development pathway for CRS, a panel of experts developed a novel study design for the exhalation delivery system with fluticasone (EDS-FLU) that meets the criteria set forth in prior FDA draft guidance and is feasible to conduct and generalizable to the CRS population.

Results:

Two similar 24-week, double-blind, placebo-controlled trials were developed with co-primary endpoints of change in (1) symptom severity score (composite of nasal congestion, facial pain/pressure, and nasal discharge); and (2) volumetric assessments of sinus opacification on CT scan. Patient selection criteria were chosen to ensure that the study population is generalizable to a broad population with CRS with adequate disease severity to allow for treatment effects to be detected. Additional prespecified endpoints of clinical importance included frequency of acute exacerbations, health-related quality of life, study-defined surgical eligibility, and health utility. Details of CT measures and initial results including primary endpoints from one study will be presented.

Conclusions:

Thoughtful preparation, input from FDA, and applying an iterative process yielded a novel study design for testing CRS therapies.

Poster C084

Real world use of Dupilumab for nasal polyposis

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Background:

Treatment options for patients with Chronic Rhinosinusitis with Nasal polyposis (CRSwNP) have expanded in recent years. Biologic medications have been increasingly incorporated into the complex management strategy that goes into caring for CRSwNP patients. Although Dupilumab has been approved for treating CRSwNP, little is known about prescribing patterns in real world settings and how this relates to proposed treatment algorithms.

Objectives:

To better characterize the utilization patterns of Dupilumab for patients with CRSwNP in relation to proposed guidelines. Attention was given to treatment options presented to patients, history of sinus surgery and/or oral steroid use, previous biologic failure and confirmation of persistent nasal polyposis prior to Dupilumab use.

Methods:

The TriNetX registry was used to identify patients who had been prescribed Dupilumab and had a documented diagnosis of nasal polyposis at the University of Rochester Medical Center. Patient charts were screened to ensure patients were prescribed Dupilumab for a CRSwNP indication, and all others were excluded. Patient demographics and clinical characteristics such as method of nasal polyposis confirmation, sinus surgery history, oral steroid use, topical steroid use, use of other biologic medications were recorded.

Results:

In total, 155 patients were found meeting our search criteria. After secondary review, 135 out of 155 patients were prescribed dupilumab for a CRSwNP indication and were included in our analysis. Of these, 102 patients (66%) met current recommended step wise treatment considerations for institution of a biologic for CRSwNP, and 33 did not. Reasons for not meeting criteria include having never failed sinus surgery or never being offered sinus surgery (12%) and having no documentation of nasal polyps (39%), and not utilizing various topical nasal steroid methods or considering unaddressed revision surgical goals (27%). 45 patients (33%) failed another biologic (57 total attempts) prior to the start of dupilumab: 24 on mepolizumab (42%), 14 on omalizumab (25%), 12 on benralizumab (21%), and 7 on reslizumab (12%).

Conclusion:

Dupilumab is becoming increasingly considered in the care of patients with CRSwNP. Although no definitive guidelines for biologic use in this setting are established, recommended algorithms have been proposed. In our experience, upwards 66% of patients were placed on dupilumab according to current recommendations, however it is frequently difficult to discern if surgical goals have been accomplished, if optimal topical steroid regimens have been utilized and if a shared decision was reached with the patient regarding biologic use given the limitations of electronic medical record documentation. Additionally, patients who were switched from other biologics to Dupilumab appeared to improve from a sinonasal standpoint in our institutions experience. Further study of the prescription and use of dupilumab will help solidify its efficacy for CRSwNP in the real world setting and improve judicious use for patients who have failed more cost-effective measures.

Poster C085

Real-world persistence and adherence in subcutaneous allergen immunotherapy: A systematic review

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Objective:

Most current literature examines subcutaneous immunotherapy (SCIT) adherence for the treatment of allergic rhinitis in closely monitored trials. The purpose of this review is to assess SCIT adherence in real-world settings.

Study design:

Systematic review.

Methods:

A literature search of PubMed, Embase, Cochrane Library, Web of Science, and Scopus for studies performed in real-world settings which examined SCIT adherence and compliance. Paired investigators independently reviewed all articles. Due to inconsistent use of adherence-related terms across studies, for this review “persistence” was defined as continuing therapy and not being lost to follow-up after initiating SCIT, and “adherence” defined as persistence in accordance with prescribed SCIT dosing and scheduling. Article quality was assessed with a modified Newcastle-Ottawa scale; score then converted to AHRQ standards (good, fair, and poor).

Results:

The search yielded 1596 nonduplicate abstracts. Screening criteria were met by 151 articles, and 13 of these met full inclusion criteria (n=158,991 patients). Ten (77%) studies reported persistence rates, ranging from 16-96.4%. Five (38%) studies reported adherence rates, ranging from 15.1-80.1%. Four (31%) studies collected original data on reasons for discontinuing SCIT—most common were inconvenience, local side effect, and injection frequency. All studies were Oxford Level of Evidence 2b, with good (n=7) to fair (n=6) quality.

Conclusion:

Real-world SCIT persistence and adherence rates range widely, partly due to inter-study differences in measuring and reporting adherence-related findings. Increasing the understanding of reasons for discontinuation of SCIT may help devise strategies to maximize persistence.

Poster C086

Reconstruction of oroantral fistulas

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Introduction:

Management of oroantral fistulas (OAF) is variable, often dependent on the size of the defect and/or surgeon preference, with the most widely employed methods of surgical repair being palatal flaps, buccal advancement flaps (BAF), and buccal fat pad (BFP) flaps.

Methods:

PubMed, Embase, CINAHL, Biological Abstracts, and Web of Science databases were queried for original English articles without restrictions on the date. This review was conducted in accordance with the 2020 PRISMA guidelines. A meta-analysis of pooled success rate with an inverse variance statistical method and random effects analysis model was performed. The methodological index for non-randomized studies (MINORS) criteria was used to assess the quality of studies.

Results:

Of 1,696 abstracts initially screened, 39 full-text articles were included in this review, consisting of 1,587 patients. Dental extraction was the most common etiology of OAF. Success was defined as a closed oroantral communication on post-operative follow-ups. Data was pooled from 18 of the 39 studies into a meta-analysis which demonstrated that the BFP flap combined with endoscopic repair had a pooled success rate of 99%, compared to BFP alone (94%), BAF + endoscopic repair (93%), platelet-rich fibrin repair (94%), and palatal flap repair (81%). The summary estimate of pooled success rates from all techniques was 92% (95% CI 0.88-0.97, I² 84%). The average MINORS score of included studies was low-moderate at 9.1.

Conclusion:

A variety of well-known surgical techniques can be employed with similar success to manage OAFs, and heterogeneity in study protocols and clinical management precludes the recommendation of any one technique.

Poster C087

Resilience and symptom severity in patients with sinonasal complaints

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Introduction:

Recent research suggests that resilience, or the ability to adapt to or recover from stress, has important implications for health status and quality of life.^{1,2} The purpose of this study is to examine the association between resilience and perceived symptom severity in patients with sinonasal complaints and identify patient factors associated with resilience.

Methods:

We conducted a cross-sectional analysis of patients presenting to various otolaryngology outpatient clinics with a sinonasal chief complaint. Resilience was measured using the Brief Resilience Scale (BRS), which is a previously validated, patient reported questionnaire assessing a one's ability to recover from stress.³ Self-reported severity of sinonasal symptoms was assessed via the Nose Obstruction Symptom Evaluation (NOSE) Scale.⁴ The association between the BRS and NOSE Scale, and patient factors associated with the BRS were analyzed via univariate and multivariate analysis.

Results:

139 participants were included in this study. Diagnoses included allergic rhinitis, septal deviation, and acute and chronic rhinosinusitis. Mean overall NOSE scale score was 39.2 ± 27.9 . Mean overall BRS score was 3.7 ± 0.8 . Higher resiliency scores on the BRS were associated with lower NOSE Scale scores (indicating lower severity of symptoms) ($r^2 = -0.26$, 95% CI: -12.0 to -0.52). Age, gender, race, education level, or income were not significantly associated with BRS scores ($p=0.05$).

Conclusion:

Our study suggests that patient resilience may play a significant role in perceived symptom severity and quality of life in patients with sinonasal complaints. Further study is needed to identify factors associated with resilience in this patient population.

Poster C088

Retrobulbar Amphotericin B in the treatment of invasive fungal sinusitis with orbital involvement

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Background:

Standard management of acute invasive fungal rhinosinusitis (AIFRS) includes reversal of the underlying immunocompromised state, systemic antifungal treatment, and aggressive surgical debridement of involved tissue. Surgical management remains controversial when significant orbital and cavernous sinus involvement is present. We discuss two patients with AIFRS and orbital and cavernous sinus invasion treated adjunctly with retrobulbar amphotericin B injections.

Methods:

This is a case series performed at a tertiary care medical center.

Results:

Here we report two patients presenting in diabetic ketoacidosis and concomitant invasive fungal disease with associated cranial neuropathies. Despite both patients undergoing systemic antifungal treatment and aggressive endoscopic sinonasal surgery, both patients had progression of disease that included invasion into the cavernous sinus with development of ophthalmoplegia. Retrobulbar liposomal amphotericin B injections (3.5 mg/ml solution) were administered in series to both patients, ultimately resulting in improvement in the orbital exam and sparing exenteration.

Conclusion:

Retrobulbar amphotericin B injections may be considered as an adjunct to standard therapy in patients with invasive fungal rhinosinusitis with orbital involvement, possibly sparing orbital exenteration in the appropriate clinical setting.

Poster C089

Review of the association between olfactory dysfunction and idiopathic intracranial hypertension

Presented by Sriram Navuluri

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Introduction:

Hyposmia has been demonstrated to have a strong association with elevated intracranial pressure (ICP) including in conditions such as idiopathic intracranial hypertension (IIH). No single hypothesis has been put forward to explain the mechanism of this phenomenon.

Methods:

A comprehensive search of literature was performed using keywords 'anosmia,' 'pseudotumor cerebri,' 'idiopathic intracranial hypertension'. Studies evaluating associations between disease processes in addition to evaluation of the underlying pathophysiologic mechanisms were reviewed.

Results:

A growing body of evidence has linked increased ICP to impaired olfactory function. Recent studies have speculated that olfactory dysfunction testing could serve as an inexpensive screening or disease monitoring test for IIH. Multiple studies have noted significant decreases in olfactory thresholds in IIH patients compared to controls; however, literature remains controversial over whether other disease course factors also correlate with level of olfactory dysfunction. Moreover, the mechanism behind impaired olfactory function is poorly understood, but hypothesized to be related to impaired CSF dynamics in relation to olfactory neurons.

Conclusion:

Studies have provided evidence of a statistically significant relationship between olfactory dysfunction and IIH (or elevated ICP) worthy of continued investigation. Far less clear, is by what mechanism this injury occurs. Answering this question may provide insight into the poorly understood universe of the olfactory system and of the body's CSF outflow tracts that could have far-reaching impacts on our understanding of neuroanatomy, intracranial hypertension, and therapies for such conditions.

Poster C090

Rhinosinusitis-related complications in transplant recipient

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Background:

Transplant patients are predisposed to several upper airway complications, including chronic rhinosinusitis (CRS). 21% of bone marrow transplants (BMT) patients develop CRS. Moreover, 40% of solid organ transplant recipients have been found to need endoscopic sinus surgery (ESS). Given the limited of data on recalcitrant CRS in various types of transplants, our aim is to analyze the difference in incidence of CRS requiring ESS between non-solid and solid transplant populations.

Methods:

This is a retrospective chart review of 338 transplant recipients who underwent ESS after transplant at Mayo Clinic between 2017 and 2021. A total of 127 patients were included in this study. Subgroup analysis based on solid organ transplant or non-solid transplant was performed.

Results:

Of the 127 patients in the study, 98/127 (77.2%) had solid transplants while 29/127 (22.8%) had non-solid transplants. The mean immunosuppressors per recipient in non-solid versus solid organ transplant was 2 and 4, respectively ($p < 0.05$). The incidence of ESS in non-solid transplant recipients was 47% and 37% in solid organ transplant (95% CI (35.53 – 59.84), $p = 0.06$) with an odds ratio of 1.53 (95% CI 35.53 – 59.84), $p < 0.05$). Risk of ESS in non-solid transplant recipients was 4.1 times greater than those with solid organ transplant (95% CI (0.94–1.74), $p = 0.11$).

Conclusion:

Risk of ESS in non-solid transplant recipients was significantly greater than those who received solid organ transplant. Number of immunosuppressants does not appear to correlate with risk of ESS in non-solid organ transplant patients.

Poster C091

WITHDRAWN

Poster C092

SNOT-22 scores in CSF rhinorrhea

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Background:

Spontaneous cerebrospinal fluid (CSF) rhinorrhea is a diagnostic challenge due to its similar symptomatology with other sinonasal diseases. The objective of this study is to investigate whether the sinonasal outcome test (SNOT)-22 can help differentiate between spontaneous CSF rhinorrhea and the symptoms of chronic rhinosinusitis without nasal polyps (CRSsNP).

Methods:

A multi-institutional retrospective review of patients with spontaneous CSF rhinorrhea and CRSsNP was performed. Individual SNOT-22 scores and domain scores were compared.

Results:

One hundred fifteen patients were included in both cohorts. The CSF rhinorrhea group had more females ($P < 0.001$) and a higher average body mass index ($P < 0.001$) compared to the CRSsNP group. The CSF rhinorrhea group scored significantly higher for runny nose (Score = 3.74, SD = 1.62) ($P < 0.001$) as opposed to the CRSsNP group (Score = 1.85, SD = 1.57) and was more likely to designate this symptom as most important ($P < 0.001$). Conversely, the CRSsNP group scored significantly higher in three of the four cardinal symptoms of CRS and in the ear/facial ($P < 0.001$) and rhinologic ($P = 0.003$) domains. No significant difference was observed in total SNOT-22 scores between the two groups (Total CSF Score = 39.77 [SD = 21.93], Total CRSsNP Score = 41.51 [SD = 22.88]; $P = 0.676$).

Conclusions:

Spontaneous CSF rhinorrhea can be misdiagnosed as other less serious sinonasal pathologies. The SNOT-22 can aid in increasing diagnostic accuracy. Spontaneous CSF rhinorrhea should be suspected in patients who have high scores on runny nose and report this symptom as most important, but have lower scores related to the cardinal symptoms of CRS.

Poster C093

Spontaneous nasal septal abscess of odontogenic origin

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Poster C094

WITHDRAWN

Introduction:

Nasal septal abscesses typically arise from a hematoma after trauma or surgery. We describe a rare case of a spontaneous nasal septal abscess of odontogenic origin.

Case Report:

A 66-year-old healthy male presented with 3 days of nasal swelling and pain with no inciting event. On exam, he had a widened, boggy anterior septum concerning for fluid collection. He also had poor dentition with single maxillary incisor that was loose. He was afebrile with normal white blood cell count. CT scan with contrast showed a 2.8 x 1.6 cm rim-enhancing fluid collection in the anterior septum with air-fluid level, suggestive of a septal abscess. In addition, the maxillary incisor had a large periapical abscess in direct continuity with the septal abscess, likely representing the source of infection.

Decision was made to proceed with operative incision and drainage as well as tooth extraction. Significant purulent drainage was noted from the septal incision as well as the tooth socket after extraction. Irrigation of the septum exited from the tooth socket, confirming continuity of the two sites.

Cultures grew *Streptococcus constellatus* and *Prevotella intermedia*. After discharge home on IV antibiotics, the septum and tooth socket had completely healed at 3 week follow up.

Conclusion:

Septal abscess is an uncommon diagnosis typically preceded by a traumatic or iatrogenic inciting event. Spontaneous etiology, as seen in this patient, occurred secondary to odontogenic infection, likely from direct spread of a periapical abscess via the incisive foramen. Understanding of the maxillary anatomy and addressing both the abscess itself as well as the odontogenic source of infection were critical for this patient's recovery.

Poster C095

Symptom severity in primary English and non-English-speaking patients with sinonasal complaints

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Objective:

While symptom severity (SS) in primarily English-speaking patients has been documented, SS in a primarily non-English speaking population with sinonasal complaints has not been examined. This study aims to examine the relationship between English fluency and SS in patients with sinonasal complaints.

Methods:

Cross-sectional analysis was performed on patients presenting with sinonasal complaints at three Otolaryngology clinics located in Los Angeles. Self-reported symptom severity of the participant's sinonasal symptoms were assessed via the Nose Obstruction Symptom Evaluation (NOSE) Scale. Primary language status was assessed via questionnaires available in English, Spanish, and Chinese. Health literacy was assessed using the Brief Health Literacy Screen. Multivariable linear regression analyses were conducted to analyze the effect of primary language status on SS. The model was adjusted for health literacy and other sociodemographic variables.

Result:

The study included 187 patients (mean age 49 years; 53% non-English primary; 47 percent Hispanic/Latino). Diagnoses amongst this cohort included allergic rhinitis (18%), septal deviation (56%), and acute and chronic rhinosinusitis (26%). Patients who did not speak English as their primary language were associated with significantly lower NOSE scores than primary English-speaking patients ($p > .05$). Health literacy, age, and ethnicity was not significantly associated with perceived symptom severity at presentation.

Conclusion:

Among otolaryngology patients with sinonasal complaints, patients who did not speak English as their primary language were less likely to report obstructive symptoms than patients who spoke English as their primary language.

Poster C096

Systematic review of preoperative embolization in juvenile nasopharyngeal angiofibroma removal

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Objective:

This systematic review compares outcomes of juvenile nasopharyngeal angiofibroma (JNA) resection between embolized and non-embolized cohorts.

Methods:

Per PRISMA guidelines, PubMed, Embase, Web of Science, Scopus and Cochrane databases were searched for original manuscripts reporting endoscopic resection of JNA with or without preoperative embolization. All study designs with original data were included while reviews and non-English studies were excluded. Univariate comparisons were made using students' T and chi square tests with $P < 0.05$ considered statistically significant.

Results:

A total of 877 patients from 65 studies were included. For studies with age data available, mean age was 15.7 years and 99.7% ($n=709/711$) were male. Preoperative embolization was performed in 80.1% ($n=702$) of cases. Of patients undergoing embolization ($n=618$), 80.6% ($n=498$) had indirect embolization and 19.4% ($n=120$) had direct puncture embolization. Among patients with reported blood transfusion data ($n=354$), 39.8% ($n=141$) required transfusion during or after surgery. In comparing 391 embolized patients and 99 non-embolized patients with intraoperative blood loss data, average blood loss was significantly lower in the embolized patients (714.5ml vs 1433ml, $p < 0.001$). Overall, 19.4% ($n=126$) of patients had complications and no perioperative mortalities were reported. The overall recurrence rate was 13.9% ($n=89$), and odds of JNA recurrence in embolized patients was significantly lower (OR 0.42, 95% CI 0.255-6.14, $p < 0.001$).

Conclusions:

These data suggest that preoperative embolization decreases blood loss and leads to more favorable resection outcomes in JNA. Future studies are needed to determine the optimal embolization technique.

Poster C097

Temporality and the relationship between radiographic and patient reported outcome severity in CRS

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Background:

Symptomatic burden of chronic rhinosinusitis (CRS) has been quantified using patient reported outcome measures (PROMs) like the SNOT-22 and the CRS-PRO. Similarly, radiographic severity is frequently quantified using the Lund-Mackay score (LMS), yet, numerous studies find no to weak correlations between PROMs and LMS in patients undergoing endoscopic sinus surgery (ESS). Since radiographic assessment is frequently asynchronous with PROM assessment, we investigated whether temporal proximity affected correlation of LMS and PROMs.

Methods:

LMS were calculated from CT images from CRS patients prior to their ESS. SNOT-22 and CRS-PRO were collected at the time of ESS. Patients were divided into 2 categories: those with CTs taken and PROMs administered less than 60 days ($\leq 60d$), and those greater than 60 days ($>60d$), apart. Pearson correlations were assessed between PROMs and LMS in the entire cohort and then within the temporal subgroups.

Results:

214 CRS patients with CT and PROM data were assessed of which 119 were in the $\leq 60d$ subgroup and 95 were in the $>60d$ subgroup. Patient characteristics, including age, sex, past medical and surgical history did not differ between the two subgroups. SNOT-22 did not significantly correlate with LMS when viewed as a whole group, nor when assessed as two subgroups. CRS-PRO did correlate with LMS when assessed as a whole ($r=0.17$, $p=0.015$) and in the $\leq 60d$ group ($r=0.21$, $p=0.024$), but did not significantly correlate in the $>60d$ group ($r=0.11$, $p=0.275$).

Conclusions:

PROM and radiographic findings are not strongly correlated at the time of surgery. Unlike the SNOT-22, the CRS-PRO does weakly correlate with the LMS, especially when administered within close proximity to the time of imaging.

Poster C098

The anatomy of revision sinus surgery

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Introduction:

Endoscopic sinus surgery (ESS) plays an essential role in the management of patients with chronic rhinosinusitis (CRS). Despite surgical advancements, revision rates after initial ESS remain high at around 17-25%. Prior studies have detailed common anatomic findings in revision ESS, but to date none have evaluated the relationships between these findings. The aims of this study were to identify anatomic patterns and common technical errors associated with initial ESS failure.

Methods:

A retrospective review was conducted of patients who underwent revision ESS. Data including patient demographics, co-morbid diseases, symptoms, number and extent of prior ESS, Lund-Mackay scores (LMS), and presence of various anatomic findings at revision were collected.

Results:

84 patients were included (35 male (42%), 49 female (58%)) with an average age of 54.2 years. Common anatomic findings included incomplete ethmoidectomy (78%), retained uncinata (58%), osteitic bone (50%), middle turbinate lateralization (MTL) (44%), and recirculation (30%). Significant associations between anatomic aberrations were identified including retained uncinata and recirculation ($p<0.0001$), incomplete ethmoidectomy ($p=0.0010$) and incomplete frontal sinusotomy ($p=0.0248$). Finally, incomplete ethmoidectomy was associated with incomplete frontal sinusotomy ($p=0.01$), as well as increased ethmoid LMS ($p=0.0351$).

Conclusions: Common anatomic factors contributing to revision ESS appear to be associated with one another, suggesting a synergistic effect on initial ESS failure. Surgeons must assure complete dissection of each anatomic structure to eschew technical errors that may limit exposure and dissection of subsequent anatomic structures.

Poster C099

The predictive utility of SNOT-22

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Background:

The 22-item sino-nasal outcome test (SNOT-22) is a widely used and powerful patient-reported outcomes measure for chronic rhinosinusitis (CRS). More recently, however, the SNOT-22 has been evaluated as a predictive tool for multiple conditions. The objective of this scoping review is to investigate the extent to which SNOT-22 is used in this manner and present this information in a way useful for clinicians.

Methods:

A systematic search of PubMed, Scopus, Cochrane Library, and Web of Science was performed. Studies that evaluated SNOT-22's predictive utility were considered for eligibility in this scoping review.

Results:

A total of 39 studies met eligibility. The SNOT-22 was found to be used as a predictive tool in 3 broad categories: 1) to predict a diagnosis, 2) to predict an outcome of an intervention, and 3) to predict a patient treatment preference. Thirteen studies were included in the diagnosis category, which made up ten different individual predictions. Twenty-four studies were included in the outcomes category and investigated seventeen different individual predictions. Finally, two studies were included in the patient preferences category, which together made one prediction.

Conclusions:

The SNOT-22 is a versatile tool that has the potential to be used in predicting various diagnoses, outcomes, and patient preferences. However, care must be taken in applying these predictions to clinical practice, as further research must be done in validating these predictions based on SNOT-22 responses.

Poster C100

The weekend effect in transsphenoidal pituitary surgery: A national analysis

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Background:

The "weekend effect" is described as decreased quality of care and increased complications in patients admitted during a weekend relative to a weekday. This effect has not been studied in patients undergoing transsphenoidal pituitary surgery (TSPS). This study investigates associations between weekend admission and the management and outcomes of inpatients undergoing TSPS.

Methods:

The National Inpatient Sample database was queried for inpatients undergoing TSPS between 2003 and 2014. Univariate and multivariable analyses were performed to determine statistical associations with weekend admission.

Results:

Of the 22,093 inpatients undergoing TSPS, 805 (3.6%) were admitted on a weekend. On univariate analysis, weekend admits were more likely to be male (55.8% vs. 47.8%, $p < 0.001$) and less likely to be White (45.1% vs. 62.3%, $p < 0.001$), have private insurance (43.0% vs. 59.3%, $p < 0.001$), and have an elective admission (33.6% vs. 87.4%, $p < 0.001$) compared to weekday admits. On multivariable analysis adjusting for patient demographics, elective admission status, hospital data, and significant comorbidities, weekend admits had greater total charges (\$90,840 vs. \$57,309, $p < 0.001$), longer length of stay (LOS) (8.4 vs. 4.4 days, $p < 0.001$), longer length of time from admission until first procedure (2.8 vs. 0.4 days, $p < 0.001$), and underwent more procedures (3.2 vs. 2.4 procedures, $p < 0.001$) when compared to weekday admits. Weekend admits had increased odds for mortality compared to weekday admits (OR 2.29, 95% CI 1.04–5.04, $p = 0.040$).

Conclusions:

In a cohort of inpatients undergoing TSPS, patients admitted on a weekend had increased healthcare utilization and mortality compared to those admitted on a weekday.

Poster C101

Transorbital management of incidental intracranial mass in a patient with AERD and nasal polyposis

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Background:

A 74-year-old male with a history of aspirin-exacerbated respiratory disease and nasal polyposis presented with concern for pansinusitis and thinning of the left anterior skull base. Imaging showed a potential second concomitant intracranial lesion versus intracranial extension of polyps. The diagnostic approach and management of this patient with minimally invasive innovative imaging and surgical technique is described.

Methods:

The patient was taken for image-guided biopsies of the skull base lesion, revealing only inflammatory sinonasal mucosa. DOTATATE PET/CT scan showed a somatostatin receptor-avid lesion at the skull base, concerning for synchronous intracranial pathology. The patient underwent transorbital neuroendoscopic surgery (TONES) and biopsy in conjunction with the neurosurgery service, confirming olfactory groove meningioma. This was completely resected via TONES and the patient then underwent routine endoscopic sinus surgery.

Results:

The patient's perioperative course was notable only for mild periorbital edema and mild diplopia with extreme gaze directions. He had minimal pain, no CSF rhinorrhea, and visual acuity and extra-ocular movements were intact by post-operative week two.

Conclusion:

TONES is an emerging and highly effective surgical technique that improves access, surgical comfort, and morbidity in the management of select anterior cranial fossa pathologies. There have been no reports in the literature of its use as a diagnostic tool. TONES represents a reasonable approach to obtain tissue diagnosis of intracranial pathology and a therapeutic tool, mitigating the need for more invasive procedures and complex reconstruction given the preservation of the skull base in this technique.

Poster C102

Transsphenoidal pituitary surgery patients in the ICU

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Objectives:

To evaluate patient characteristics of intensive care unit (ICU) admissions for complications after transsphenoidal pituitary surgery (TSPS).

Study Design:

Retrospective database review.

Methods:

The Medical Information Mart for Intensive Care (MIMIC) database was used to query patients admitted to the ICU after TSPS from 2001-2012. Patients demographic, comorbidity, and hospital stay information were collected. Patients characteristics were analyzed to assess if they had any impact on ICU length of stay (LOS). Univariate and multivariate analyses were conducted.

Results:

A total of 11 patients were admitted to the ICU for complications post TSPS. Patients were majority female (6/11, 54.5%) and white (8/11, 72.7%). Patient age varied from 20.79 years to 87.55 years with an average age of 58.33 years. A total of 5/11 (45.5%) patients were admitted to the hospital under emergent circumstances with all remaining patients being admitted electively. A total of 9/11 (81.8%) patients had a chronic medical condition with hypothyroidism being the most common (4/11, 36.4%) followed by diabetes (3/11, 27.3%). There were no patient deaths. Patients had an average hospital length of stay (LOS) of 8.39 days (IQR: 4.47-7.19) and an average ICU LOS of 2.93 days (IQR: 1.07-5.94). We found no significant risk factors for prolonged length of stay in this cohort.

Conclusions:

The majority of patients admitted to the ICU for complications of TSPS had a comorbid condition. However, no specific relationship between comorbidity status and ICU LOS was found.

Poster C103

Treatment of skull base osteomyelitis

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Introduction:

Skull Base Osteomyelitis (SBO) is a rare but life-threatening infection of the bones comprising either the lateral and/or central skull base. Treatment consists of surgical debridement and culture directed anti-microbials. The recommended duration of treatment varies, with most sources recommending 6 weeks of IV antimicrobials followed by a varying length of oral antimicrobials, but clinical guidelines are lacking. The purpose of this study was to identify factors which may influence outcomes of SBO and formulate more clear recommendations on duration of antimicrobial therapy.

Methods:

A retrospective review of 31 patients with SBO was performed. Data including age, gender, race, medical comorbidities, presenting symptoms, laboratory evaluation, radiographic imaging, surgical treatment, culture results, length of follow up, and type, length, and number of antimicrobial therapy courses (AMT) was collected.

Results:

At the time of diagnosis, patients presented with an average duration of symptoms of 3.4 months. The average length of AMT was 21.5 weeks. The average length of IV AMT was 11.1 weeks with only 6 patients receiving <6 weeks of IV AMT. The average number of distinct antimicrobial courses was 2.67. 8 patients had positive fungal cultures. Positive fungal cultures were associated with both a longer total length of AMT (30 weeks vs 18 weeks, $p=0.03$) and a greater number of courses of AMT (4.88 vs 1.88, $p<0.0001$).

Conclusion:

In this review, the average length of IV AMT was 11.1 weeks, nearly twice the typically recommended 6 weeks. Fungal involvement significantly impacts the duration of therapy. Clinical guidelines are needed to better define the management of this complex disease process.

Poster C104

Understanding the pathophysiology of olfactory dysfunction in cleft lip nasal deformity

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Background:

Many patients with unilateral cleft lip nasal deformity (uCLND) experience olfactory loss, yet the etiology is poorly understood. Olfactory defects can be due to altered airflow (obstructive) or histologic changes in olfactory mucosa (sensorineural). This study investigates both possible etiologies in patients with uCLND. Preliminary data from a single subject is presented as a case study.

Method:

The subject was enrolled prior to septorhinoplasty and completed the nasal obstruction symptom evaluation (NOSE) survey; Smell Identification Test (SIT) and Snap & Sniff Threshold Test (SSTT). Intraoperatively, a biopsy of olfactory mucosa was collected. Preoperative radiographic images were used to create a patient-specific nasal model for computational fluid dynamics (CFD) simulations of airflow at 15L/min.

Result:

NOSE and SIT scores were 75 and 33, respectively. Unilateral SSTT scores (in log vol/vol) were -3.625 (cleft side) and -3.875 (noncleft side). CFD-computed unilateral nasal flow volumes were 4.22L/min (28%; cleft) and 10.78L/min (72%; noncleft). Airflow velocities and flow volumes at the anterior olfactory cleft region: 1.60m/s & 1.55L/min (cleft) and 1.25m/s & 1.07L/min (noncleft). Nasal resistance values: 0.376Pa.s/ml (cleft) and 0.148Pa.s/ml (noncleft). Mucosal biopsy obtained from the cleft side posterosuperior septum revealed intact olfactory neuroepithelium with TUJ1(+) olfactory sensory neurons and olfactory fascicles in the lamina propria.

Conclusion:

While the patient's SIT score was mild hyposmia, his SSTT scores were <40th percentile (smell-impaired). This hyposmia is likely due to airway obstruction as evidenced by increased airway resistance, decreased flow volume, and normal sensorineural histology.

Poster C105

WITHDRAWN

Poster C106

Variation in computed tomography opacification in sinus disease: A snapshot in time

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Objectives:

To determine the variability in paranasal sinus opacification on serial computed tomography (CT) in patients with chronic rhinosinusitis (CRS) or recurrent acute rhinosinusitis (RARS).

Study Design:

Longitudinal study

Methods:

In this retrospective study, adult (≥ 18 years of age) patients were included who underwent functional endoscopic sinus surgery (ESS) for CRS or RARS and had at least two preoperative CT scans involving the paranasal sinuses. Patients with prior ESS or who underwent ESS between scans were excluded. The first (CT1) and second CT (CT2) images were graded using the Zinreich modified Lund-Mackay staging system (ZLMS). Overall scores and individual sinuses scores were assessed for changes between time points.

Results:

79 patients were included in the study. The mean (SD) overall ZLMS were 19.85 (15.99) and 19.82 (15.23) for the CT1 and CT2, respectively. While there was a significant correlation between overall CT1 and CT2 scores ($R=.72$, $p<.001$), there was a large subset of patients with variability in overall and individual sinus opacification. 23 (29.1%) patients had a change in overall score (median, 9; IQR, 7). When looking at individual sinus scores, 60 (75.9%) patients had changes in any sinus with 26 (43.0%) of these patients having a change in any given sinus to a value of 0 or from a value of 0.

Conclusions:

The degree of sinus opacification on CT imaging is variable and is likely influenced by many factors and simply represents a snapshot in time. This variability is independent of the natural course of CRS and RARS. Radiographic evidence of sinus disease should not be used as the sole indicator for recommending ESS or the extent of sinus surgery in patients with sinonasal disease.

Poster C107

Virtual care versus in-person assessment: patient satisfaction at the otolaryngology clinic

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Introduction:

Synchronous virtual care rapidly expanded worldwide amid the COVID-19 pandemic to provide remote medical assessment, minimizing contact and disease transmission risk. Despite its benefits, such an abrupt expansion has shed light on the need to address patients' level of satisfaction with this medical service delivery.

Methods:

Our study assessed adult patients' satisfaction questionnaire scores (PSQ-18) managed via virtual care, or in-person clinic visit at St. Joseph Hospital, London, Canada, from December/2020 to April/2021, with rhinology pathologies or sleep apnea. The overall score of respondents (PSQ-18 as an online survey) was recorded and decoded into seven domains, general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with the doctor, and accessibility and convenience. Diagnosis, age, and sex were also recorded.

Results:

From 329 patients invited, 28.5% responded (n=93). 33 virtual care (age 48 ± 16), and 60 in-person (age 51 ± 19). Independent samples T-test analysis showed no differences in PSQ-18 scores between groups. However, under a diagnosis-based subgroup analysis, allergic rhinitis patients on virtual care presented a significantly lower PSQ-18 score on the general satisfaction domain than the in-person group (p=0.049). In addition, time spent with the doctor was directly correlated with age for patients seen in-person.

Conclusions:

Overall patients' satisfaction in the Otolaryngology clinics did not depend on assessment methods (virtual or in-person). Nonetheless, allergic rhinitis patients seemed less satisfied with the virtual care option. Moreover, time spent with the doctor was especially relevant for older patients seen in person.

Poster C108

YouTube rhinosinusitis video characteristics vary based on the search term used

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Introduction:

We assessed YouTube video reliability, quality, and understandability between three rhinosinusitis-related search terms: Sinus Infection (SI), sinusitis (SS), and rhinosinusitis (RS).

Methods:

Reliability, quality, and understandability were assessed using the JAMA score, Surgical Pathology Education Quality Score (SPEQS), and PEMAT-A/V, respectively. Video statistics, source, and content type were also analyzed.

Results:

124 videos were included. There were significant differences in video duration, views, likes, and dislikes between search terms. SS had the highest mean views (48305) and likes per video (417), whereas RS had the fewest (1407; 14). The major source of each search term was Physician (61%) for RS, an equal split between Physician (42.2%) and Other (42.2%) for SI, and Medical Website (44.7%) for SS. Medical professional education was the major content type for RS (73.2%), while patient education was the primary content type for SI (80.0%), and SS (55.3%). There were significant differences between mean scores of RS, SI, and SS for reliability (p=0.008), quality (p<0.001), and understandability (p=0.004). RS showed higher reliability, quality, and understandability than SS and higher quality than SI. Moreover, SI had higher reliability scores than SS whereas SI had higher understandability than SS.

Conclusion:

Sinusitis videos appear to be more popular than other search terms for RS despite RS videos showing higher quality. SPEQS may be a useful measure for assessing patient education content quality in otolaryngology. RS videos may be more suitable for patient education, and as such, otolaryngologists should consider recommending RS searches for patient education.



SAVE THE DATE 2022



SSS Registration: <https://cvent.me/eO4rIV>

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Guest Speaker: Ron Kuppersmith, MD, MBA
Texas ENT & Allergy, College Station, Texas
- Inflammatory Sinus Surgical Case Presentations with ARS Past-Presidents
- Women in Rhinology Networking Event
- Cadaver Prosections
- Allergy Program
- Signature Event
- Symposia Sessions



ARS 68th Annual Meeting September 9-10, 2022 Philadelphia, PA

Registration opens: April 2022

Highlights:

- President's Welcome & Poster Reception
- 18th David Kennedy Lectureship;
Guest Speaker Claire Hopkins, MBChB, PhD
- Women in Rhinology, Mentorship, Residents & Fellows, and Diversity Programs
- Symposia Sessions
- Fall Film FESSival
- Guest Countries: Mexico, United Kingdom

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