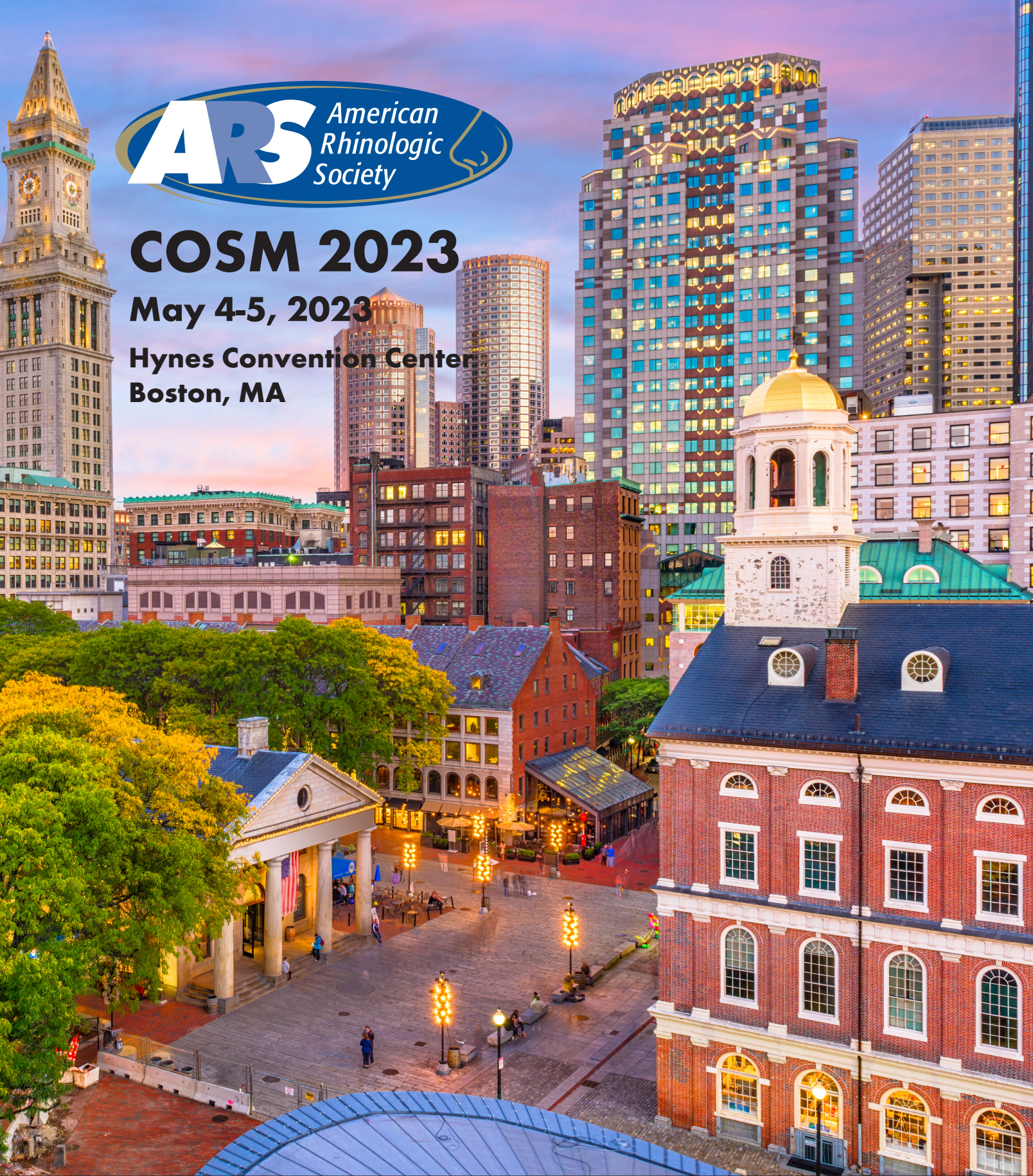

PROGRAM GUIDE

Sarah Wise, MD, FARS

Presidential Welcome
to the ARS at COSM 2023

As We are excited to gather in Boston for the 2023 American Rhinologic Society scientific meeting at COSM!

Each year, the Spring COSM meeting brings us together for outstanding scientific presentations, panels on interesting topics in rhinology, and discussions of the latest research and treatment modalities for sinonasal concerns. President-Elect and Program Chair Pete Batra has designed an exceptional program for this year's meeting in Boston. The program has an outstanding variety of panels, research presentations, and targeted conversations for anyone with an interest in rhinology – covering inflammatory sinonasal disease, skull base and rhinologic tumors, pathophysiology, systemic and environmental contributions, and much more! The Women in Rhinology breakfast session on Thursday morning, dedicated to allyship and gender partnership, should be a fantastic event as well.

Looking at the amazing things the ARS has accomplished over the last several years… and continuing to see the immense energy and thoughtful work of our members, committees, sections, and society … I am incredibly thankful to be part of this organization! The ARS is a leader in rhinologic education and discovery in the US and abroad. We continue to partner with other rhinologic societies around the world – increasing educational outreach and networking. Our humanitarian efforts continue to grow. ARS member sections are thriving – including the newly formed Rhinologists in Private Practice Section. Robust mentorship opportunities for residents, fellows, and practicing rhinologists exist within the ARS. And these are only a few highlights amongst many exciting things happening in the ARS as a whole.

We hope you maximize your time in Boston – taking advantage of the many educational and networking opportunities during this terrific ARS meeting. I look forward to reconnecting with ARS colleagues… and welcoming new ones!

Sarah K. Wise, MD, MSCR, FARS
President, American Rhinologic Society

Welcome from the President-Elect & Program Chair


Pete Batra, MD, FARS

We are incredibly excited to welcome you to the beautiful city of Boston which will host the 2023 COSM meeting! The ARS Spring Meeting will showcase the best in clinical and basic science in the ARS and highlight tremendous expertise on panels and targeted conversations. We greatly look forward to sharing this time with you at the Hynes Convention Center in Boston, MA on May 4-5.

The 2023 ARS Spring Meeting will share the latest in scientific discovery in our ever-growing field. The meeting will feature 65 scientific oral presentations and over 100 posters. I am grateful to the Abstract Review Committee for their diligent work to ensure the highest quality scientific content for the meeting. Thursday morning will highlight the top basic science and clinical oral presentations. Scientific oral presentations on Thursday and Friday afternoons will cover a variety of key topics, including CRS Diagnosis and Treatment, Nasal and Sinus Surgery, Nasal Polyps and Biologics, Olfaction, Pathophysiology and Mechanisms, Sinonasal and Skull Base Tumors, and Systemic Diseases, Environment, and the Sinuses. We look ahead to learning from the extraordinary research that continues to advance scientific knowledge in rhinology!

The meeting will also showcase panels from recognized experts in the field on several key topics, including Acute Invasive Fungal Sinusitis, Central Compartment Atopic Disease, Mentorship in Rhinology, Recurrent and Locally Advanced Sinonasal Malignancies, and Tissue Histopathology and Clinical Endotyping. There will be several short, high-yield sessions titled “Targeted Conversations on Important Topics” covering Biologics for Polyps, Diagnosing and Managing Odontogenic Sinusitis, Perioperative Antibiotics during Sinus Surgery, Skull Base Reconstruction: Beyond the Nasoseptal Flap, and Tips and Tricks for Endoscopic Pituitary Surgery. Women in Rhinology will host a session on Thursday 7am titled “The Power of Allyship and Gender Partnership” by David Smith, PhD, Associate Professor at the Johns Hopkins Carey Business School and co-author of Good Guys: How Men Can Be Better Allies for Women in the Workplace.

Friday’s scientific session will be capped off with the ARS President’s Welcome Reception. It promises to be a fantastic event to learn, network, and share ideas!

We sincerely appreciate your continued support and engagement with the American Rhinologic Society.

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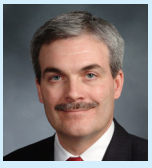

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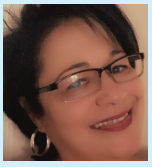

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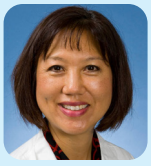
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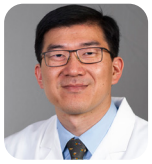

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ARS Mission Statement

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 10.25 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

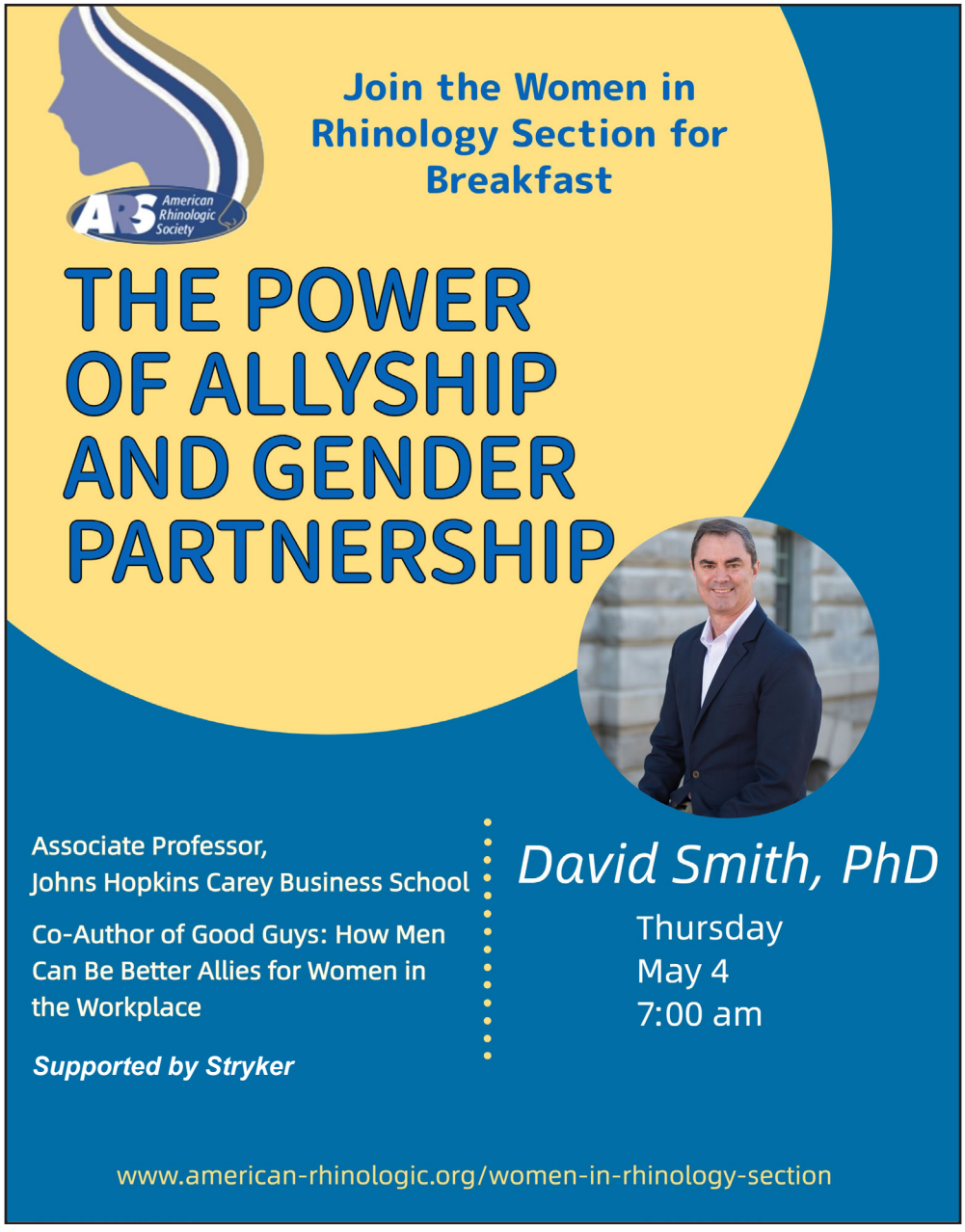
Learning Objectives from Practice Gaps

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:

At the conclusion of the meeting, you will be provided with a post-meeting link to claim your CME.



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As of 4/24/22

PRESENTATIONS - *PROGRAM AT-A-GLANCE*

Thursday, May 4, 2023
Morning Session – Ballroom C
8:00 am – 12:00 pm EST

7:00 am – 8:00 am
Women in Rhinology Breakfast Session
Title: "The Power of Allyship and Gender Partnership"
Guest Speaker: David Smith, PhD

8:00 am – 8:05 am
Welcome & Introduction
Sarah Wise, MD, FARS; Pete Batra, MD, FARS

Scientific Oral Presentations: Top Rated Clinical Abstracts – Session 1

Moderators: Amber Luong, MD, PhD, FARS; Nicholas Rowan, MD; Carol Yan, MD

8:05 am – 8:13 am
Preoperative particulate matter exposures are associated with increased type-2 cytokines in chronic rhinosinusitis
Rory Lubner, MD

8:14 am – 8:22 am
Inflammatory characteristics of central compartment atopic disease
Kolin Rubel, MD

8:23 am – 8:31 am
Incidence of hypocortisolism with long-term use of budesonide irrigations for chronic rhinosinusitis
Bruna Silva, MD

8:32 am – 8:40 am
Association of sinus mucus cytokine levels with SNOT-22 and UPSIT in patients with chronic rhinosinusitis
Stella Lee, MD

8:41 am - 8:49 am
Air pollution exposure is associated with rhinitis in older adults via specific immune mechanisms
Henrique Ochoa Scussiatto, MD

8:50 am - 8:55 am
Q&A

8:55 am - 9:05 am
Awards Ceremony
Jean Kim, MD, FARS

9:05 am - 9:45 am
PANEL: ABCs of Central Compartment Atopic Disease
Moderator: John Del Gaudio, MD, FARS
Panelists: Cecilia Damask, DO; Christine Franzese, MD, FARS; Jessica Grayson, MD; Patricia Loftus, MD, FARS
Sponsored by Section for Allergy/Immunology in Rhinology

9:45 am - 10:15 am
Break with Exhibitors

Scientific Oral Presentations: Top Rated Basic Science Abstracts – Session 2

Moderators: Do-Yeon Cho, MD; Michael Kohanski, MD, PhD; Elina Toskala, MD, PhD, FARS

10:15 am – 10:23
IL-13 associated epithelial remodeling correlates with increased tuft cells, prostaglandin E2 activation, and clinical severity in nasal polyps
Neil Patel, MD, MSc

10:24 am - 10:32 am
Long-term aspirin desensitization has mucosal cytokine features of immune tolerance
Michael Kohanski, MD, PhD

10:33 am – 10:41 am
Genome-wide epigenetic study shows significant DNA hypermethylation in ethmoidal tissue of chronic rhinosinusitis versus controls
Tripti Brar, MBBS, MD

10:42 am – 10:50 am
Effects of diesel exhaust particulates on sinonasal epithelia
Do-Yeon Cho, MD

10:51 am – 10:59 am
Dysregulated epithelial innate immune tolerance to P. aeruginosa-derived flagellin in chronic rhinosinusitis
Justin Turner, MD, PhD, FARS

11:00 am - 11:05 am
Q&A

11:05 am - 11:20 am
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Tips and Tricks in Endoscopic Pituitary Surgery
Moderator: Jean Anderson Eloy, MD, FARS
Panelists: Erin McKean, MD; Bradford Woodworth, MD, FARS

11:20 am – 12:00 pm
PANEL: Pearls to Maximize Mentorship From Leaders in Rhinology
Moderator: Stella Lee, MD
Panelists: Pete Batra, MD, FARS; Marvin Fried, MD, FARS; Stacey Gray, MD, FARS; Sandra Lin, MD, FARS
Sponsored by Mentorship Committee and Women in Rhinology Section

12:00 pm - 1:00 pm
Lunch with Exhibitors

Thursday, May 4, 2023
Afternoon Session – Ballroom C
1:00 pm – 5:00 pm EST

12:00 pm - 1:00 pm
Lunch with Exhibitors

Scientific Oral Presentations: Pathophysiology and Mechanisms

Moderators: Kara Detwiller, MD, FARS; Kristine Smith, MD; Abtin Tabaee, MD, FARS

1:00 pm - 1:06 pm
Fractional exhaled nitric oxide levels correlate with sinus mucus cytokines in patients with chronic rhinosinusitis
Stella Lee, MD

1:07 pm - 1:13 pm
Profiling the cytokines patterns in sinonasal tissues to distinguish between chronic rhinosinusitis endotypes
Liyona Kampel, MD, PhD

1:14 pm – 1:20 pm
Transcriptional differences in chronic rhinosinusitis with and without allergic rhinitis
Chengetai Mahomva, MD

1:21pm – 1:27 pm
Loss of gremlin-1 is associated with chronic rhinosinusitis subtypes and has a limited effect on bone morphogenetic proteins in sinonasal tissue
Andrew Hess, MD

1:27 pm - 1:32 pm
Q&A

1:32 pm - 1:38 pm
Variations in ciliary beat frequency across chronic rhinosinusitis endotypes and phenotypes
Asher Park, BS

1:39 pm – 1:45 pm
Tissue eosinophilia is an unreliable marker for type 2 inflammation in CRSsNP patients
Tara Wu, MD

1:46 pm – 1:52 pm
Levels of nasal nitric oxide and inducible nitric oxide synthase expression in chronic rhinosinusitis with nasal polyposis
Vincent Wu, MD

1:53 pm – 1:59 pm
Cadaveric histologic assessment of autonomic nerve fiber densities in different nasal nerves
Raven Dunn, MD

2:00 pm – 2:05 pm
Q&A

2:05 pm – 2:45pm
PANEL: Recurrent and Locally Advanced Sinonasal Malignancies: Modern Management Options
Moderator: Brian Thorp, MD, FARS
Panelists: Edward Kuan, MD, FARS; Kibwei McKinney, MD; Zara Patel, MD, FARS; Laura van Gerven, MD
Sponsored by: Skull Base and Orbital Surgery Section

2:45 pm - 3:15 pm
Break with Exhibitors

Scientific Oral Presentations: Sinonasal and Skull Base Tumors

Moderators: Kibwei McKinney, MD; Kenneth Rodriguez, MD

3:15 pm – 3:21 pm
Outcomes of immunotherapy treatment in sinonasal melanoma: A CORSICA multi-institutional study
Rijul Kshirsagar, MD

3:22 pm – 3:28 pm
Recurrence patterns among patients with sinonasal mucosal melanoma: A multi-institutional study
Vivek Pandrangi, MD

3:29 pm - 3:35 pm
The impact of focal hyperostosis and attachment point on recurrence rate of primary and revision sinonasal inverted papillomas
Vidit Talati, MD, MS

3:36 pm – 3:42 pm
The impact of neoadjuvant chemotherapy on resection margins in locoregionally advanced sinonasal squamous cell carcinoma: A NCDB cohort study
Mena Said, MD

3:43 pm - 3:49 pm
Racial and ethnic disparities in the presentation size and timing of pituitary adenomas resected via endoscopic endonasal approach
Jonathan Pang, BA

3:50pm – 3:56 pm
Decreased baseline quality of life outcomes in patients with sinonasal malignancies
Cara Maya Fleseriu, BS

3:57 pm - 4:05 pm
Q&A

4:05 pm - 4:20 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Diagnosing and Managing Odontogenic Sinusitis: Review of Multidisciplinary Consensus Guidelines
Moderator: John Craig, MD, FARS
Panelists: Jose Mattos, MD; David Poetker, MD, FARS

Scientific Oral Presentations: Systemic Diseases, Environment, and the Sinuses

Moderators: David Gudis, MD, FARS; Ashleigh Halderman, MD, FARS; Patricia Loftus, MD, FARS

4:20 pm – 4:26 pm
Does weather affect sinus symptoms? A SNOT-22 study
Sebastian Dobrow, MD, MPH

4:27 pm – 4:33 pm
Predictors of improvement in SNOT-22 scores after highly effective modulator therapy in people with Cystic Fibrosis: A multi-center analysis
Jessa E. Miller, MD

4:34 pm – 4:40 pm
Assessment of individual sinus characteristics and patient-reported outcomes in people with Cystic Fibrosis
Jessa E. Miller, MD

4:41 pm – 4:47 pm
Risk factors for invasive fungal sinusitis among immunosuppressed bone marrow transplant recipients
Marie-Ange Munyemana, BA

4:48 pm – 4:54 pm
Does air pollutant exposure impact disease severity or outcomes in chronic rhinosinusitis?
Amarbir Gill, MD

4:55 pm – 5:00 pm
Q&A

5:00 pm - 5:15 pm
Business Meeting

5:30 pm - 7:00 pm
ARS President's Welcome Reception
Sheraton Hotel – Republic Ballroom

Thursday, May 4, 2023
Afternoon Concurrent Session – Room 304/306
1:00 pm – 5:00 pm EST

12:00 pm - 1:00 pm
Lunch with Exhibitors

Scientific Oral Presentations: Nasal and Sinus Surgery

Moderators: Angela Donaldson, MD, FARS; Devyani Lal, MD, FARS; R. Peter Manes, MD, FARS

1:00 pm - 1:06 pm
Comparing outcomes of limited versus extensive sinus surgery for chronic rhinosinusitis: A systematic review and meta-analysis
Shreya Pusapadi Ramkumar, BS

1:07 pm - 1:13 pm
The benefits and risks of non-steroidal anti-inflammatory drugs for postoperative analgesia in sinonasal surgery: A systematic review and meta-analysis
Daniel Lee, MD

1:14 pm – 1:20 pm
Race in endoscopic sinus surgery: A matched cohort study
Firas Hentati, BS

1:21pm – 1:27 pm
Impact of dual electronic and conventional cigarette use on diagnosis and surgery for chronic rhinosinusitis: A multicenter study
Graham Pingree, BA

1:27 pm - 1:32 pm
Q&A

1:32 pm - 1:38 pm
Can the effect of oxymetazoline predict turbinate reduction surgical outcomes? A pilot computational fluid dynamic study
Kai Zhao, PhD

1:39 pm – 1:45 pm
The effect of surgical correction of nasal obstruction on eustachian tube dysfunction
Rachel Daum, BS

1:46 pm – 1:52 pm
Role of trigeminal sensation in subjective nasal obstruction
Craig Salvador, BS

1:53 pm – 1:59 pm
Nasal surgery for the treatment of medically refractory rhinitis medicamentosa
William Li, MD

2:00 pm – 2:05 pm
Q&A

2:05 pm – 2:45pm
PANEL: Acute Invasive Fungal Sinusitis: Management in the Current Era
Moderator: Jean Kim, MD, FARS
Panelists: Eliza Brozek-Madry, MD, PhD; Charles Ebert, MD, FARS; Lauren Roland, MD; Masayoshi Takashima, MD, FARS

2:45 pm - 3:15 pm
Break with Exhibitors

Scientific Oral Presentations: Rhinology Potpourri

Moderators: Charles Ebert, MD, FARS; Charles Tong, MD, FARS

3:15 pm – 3:21 pm
Letters of recommendation for rhinology fellowship: Sentiment and deep learning linguistic differences based on applicant training location and gender of applicant and letter writer
Vikram Vasan, BA

3:22 pm – 3:28 pm
What does it mean to have 'congestion?' A multi-institutional comparison of patients and clinicians
Jakob Fischer, MD

3:29 pm - 3:35 pm
Eustachian tube dysfunction symptoms after endonasal skull base surgery
David Grimm, MS

3:36 pm – 3:42 pm
Sinonasal disease severity influences patient perceived voice quality
Maria Espinosa, MD

3:43 pm - 3:49 pm
Inappropriate image duplications in rhinology research publications
Do-Yeon Cho, MD

3:50pm – 3:56 pm
Post-operative outcomes and cephalometric analysis following pediatric nasal septoplasty: A 5-year retrospective review
Abdullah Zeatoun, MD

3:57 pm - 4:05 pm
Q&A

4:05 pm - 4:20 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Perioperative antibiotics during sinus surgery: What is the Evidence?
Moderator: Eric Holbrook, MD, FARS
Panelists: Ashton Lehmann, MD; Troy Woodard, MD, FARS

Scientific Oral Presentations: Olfaction

Moderators: Elisa Illing, MD, FARS; Jessica Southwood, MD; Bobby Tajudeen, MD, FARS

4:20 pm – 4:26 pm
Inflammatory markers associated with persistent smell loss in COVID-19 long haulers characterized by mucus and epithelial cells from olfactory cleft
Sophie Jang, MD

4:27 pm – 4:33 pm
Persistent chemosensory loss is associated with cognitive performance in post-acute COVID-19 patients
David Cvancara, BS

4:34 pm – 4:40 pm
Depression, anxiety, and suicidal ideation in adults with COVID-induced olfactory distortion: A cross-sectional analysis
Firas Hentati, BS

4:41 pm – 4:47 pm
Reduction in olfactory dysfunction prevalence among patients taking metformin
Varun Vohra, BA

4:48 pm – 4:54 pm
The impact of race on olfaction
Sofia Khan, Ms.

4:55 pm – 5:00 pm
Q&A

5:00 pm - 5:15 pm
Business Meeting

5:30 pm - 7:00 pm
ARS President's Welcome Reception
Sheraton Hotel – Republic Ballroom

Friday, May 5, 2023
Afternoon Session – Room 304/306
1:00 pm – 5:00 pm EST

7:00 am – 12:00 pm
ARS Board of Directors Meeting
Room: Liberty ABC, Sheraton Boston Hotel, Level 2

12:00 pm - 1:00 pm
Lunch with Exhibitors

Scientific Oral Presentations: CRS Diagnosis and Treatment

Moderators: Jose Gurrola, MD; Victoria Lee, MD, FARS; William Yao, MD, FARS

1:00 pm – 1:06 pm
Comparison of two commercially available corticosteroid-eluting frontal sinus stents
Tripti Brar, MBBS, MD

1:07 pm – 1:13 pm
Characterizing trends in diagnosis and management of sinusitis in a large health care system: From primary care to otolaryngology
Christopher Hornung, BS

1:14 pm – 1:20 pm
Cost analysis of culture-directed antibiotics for the treatment of acute exacerbations in chronic rhinosinusitis
Michael Yong, MD

1:21 pm – 1:27 pm
Feasibility of long-acting corticosteroid matrices (LYR-220) in patients with chronic rhinosinusitis and prior sinus surgery: Early data from Part 1 of the BEACON study
Stacey Silvers, MD, FARS

1:28 pm – 1:34 pm
Association between short term ambient temperature and diagnosis of chronic rhinosinusitis
Murugappan Ramanathan, Jr., MD, FARS

1:35 pm – 1:41 pm
Development of a novel solute for sinonasal irrigation in chronic rhinosinusitis
Raymond Kim, BHB, MBChB, FRACS, PhD

1:42 pm - 1:50 pm
Q&A

1:50 pm - 2:30 pm
PANEL: Tissue Histopathology and Clinical Endotyping: Implications for Patient Care
Moderator: Bobby Tajudeen, MD, FARS
Panelists: Eugene Chang, MD, FARS; Devyani Lal, MD, FARS; Bruce Tan, MD; Justin Turner, MD, PhD, FARS

2:30 pm - 2:45 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Skull Base Reconstruction: Beyond the Nasoseptal Flap
Moderator: Garret Choby, MD, FARS
Panelists: David Gudis, MD, FARS; Sanjeet Rangarajan, MD, FARS

2:45 pm - 3:15 pm
Break with Exhibitors

Scientific Oral Presentations: Skull Base Surgery Outcomes

Moderators: Mathew Geltzeiler, MD, FARS; Nyall London, MD, FARS

3:15 pm – 3:21 pm
Ten-year outcomes in pediatric midfacial growth following expanded endonasal skull base surgery
Jennifer Douglas, MD

3:22 pm – 3:28 pm
A multi-institutional and multidisciplinary algorithm in the management of idiopathic intracranial hypertension
Pedro Escobedo, BS

3:29 pm – 3:35 pm
Emergency department visits following endoscopic skull base surgery: An opportunity for improvement
Neal Godse, MD

3:36 pm – 3:42 pm
Does nasal packing affect endoscopic skull base surgery outcomes?
Arash Abiri, BS

3:43 pm – 3:49 pm
Long-term disease-specific and generalized quality of life after treatment in sinonasal malignancy: A prospective, multi-center study
Sabrina Maoz, BS

3:50 pm – 3:56 pm
Trends of skull base surgery Medicare reimbursements
Theodore Nguyen, BS

3:57 pm - 4:05 pm
Q&A

4:05 pm - 4:20 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Biologics for Polyps: Upfront or Postop?
Moderator: Amber Luong, MD, PhD, FARS
Panelists: Tanya Laidlaw, MD; Zachary Soler, MD, FARS

Scientific Oral Presentations: Nasal Polyps and Biologics

Moderators: Edward Kuan, MD, FARS; Joshua Levy, MD, FARS; Lauren Roland, MD

4:20 pm – 4:26 pm
Histopathologic features of biologic therapy nonresponders in chronic rhinosinusitis with nasal polyposis
Ali Baird, BS

4:27 pm – 4:33 pm
Mitochondrial dysfunction is associated with age-related glandular remodeling and nasal polyp formation
Jenna Bergman, MD

4:34 pm – 4:40 pm
Not just SNOT: Local inflammatory profiles in AERD patients differ from non-AERD CRS
Stella Lee, MD

4:41 pm – 4:47 pm
Optimizing the timing of biologic and surgical therapy for patients with refractory CRSwNP
Emily Garvey, BA

4:48 pm – 4:54 pm
Characterizing adverse events of biologic treatment of CRSwNP: An analysis of the FDA adverse event reporting system
Taylor Stack-Pyle, Medical Student

4:55 pm - 5:00 pm
Q&A

5:00 pm
Meeting Adjourns

ARS Poster Viewing

Wednesday, May 3, 2023, 1:00 pm - 7:00 pm
Thursday, May 4, 2023, 9:00 am - 7:00 pm
Hynes Convention Center - Hall D

ARS Combined Poster Reception
Wednesday, May 3, 2023, 5:30 pm - 7:00 pm
Hynes Convention Center - Hall D

Poster #B001
A 10-year comparative analysis of pediatric nasal foreign bodies on a national scale
Abdurrahman Al-Awady

Poster #B002
A new phenotype of immune-related chronic rhinosinusitis in the era of immune checkpoint inhibitors
Kelly McKenna, MD

Poster #B003
A novel method for improving compliance in patients using continuous positive airway pressure (CPAP) during sleep
Keith Matheny, MD

Poster #B004
A retrospective review of inverted papilloma attachment site distribution with a three-dimensional heat map
Jumah Ahmad, MD

Poster #B005
Access to biologic therapy in patients with chronic rhinosinusitis with polyps
Emily Garvey, BA

Poster #B006
Acute invasive fungal rhinosinusitis in the COVID era: An observational study
Kevin Grafmiller, MD

Poster #B007
WITHDRAWN

Poster #B008
Air flow and heat transfer among anatomical subsites within nasal passages
Ameer Ghodke, MD

Poster #B009
Anatomical predisposing factors for solitary sphenoid sinus fungal ball
Ahmed Alanazi, MD

Poster #B010
Anti-neutrophil cytoplasmic antibodies (ANCA) positive cocaine induced midline destructive lesions (CIMDL): A case report and systematic review
Danielle Morrison, MD

Poster # B011
WITHDRAWN

Poster #B012
Association between cocaine use and sinonasal symptoms among US adults
Matthew Lin, BS

Poster #B013
Association between loss of smell and disease burden and dupilumab efficacy in patients with chronic rhinosinusitis with nasal polyps
Zachary Soler, MD

Poster #B014
Association between prolonged operative time and surgical outcomes in transsphenoidal pituitary surgery
Imran Khawaja

Poster #B015
Association between rising temperature norms and Lund-Mackay score in determining mucosal disease burden
Brett Campbell, MD

Poster # B016
Association between rising temperature norms and trends in most common allergens
Abdurrahman Abdurrob, MS

Poster # B017
Association between smell and taste loss and sexual activity: A NHANES database study
Dennis Tang, MD

Poster # B018
Association of chronic rhinosinusitis with the incidence of head and neck cancer: A nationwide cohort study
Ki Il Lee, MD, PhD

Poster # B019
Smell and cognition in patients with persistent post-COVID olfactory dysfunction
Tiana Saak, BA

Poster #B020
Avoidance of posterior sinonasal epistaxis in endoscopic large sphenoidotomy: Endoscopic preservation of sphenopalatine artery-posterior nasal artery pedicle technique and outcomes
Chester Griffiths, MD

Poster #B021
Avoidance of postoperative epistaxis utilizing a sphenopalatine pedicle preserving technique in endonasal endoscopic skull base surgery: 11-year experience
Chester Griffiths, MD

Poster #B022
WITHDRAWN

Poster #B023
Bilateral antrochoanal polyp: A case report of an extremely rare entity managed conservatively with a review from the past 26 years
Firas Almarri, MBBS

Poster #B024
Biological sex is a significant modulator in rhinologic health and disease: A scoping review of the current state knowledge and gaps
Shreya Pusapadi Ramkumar, BS

Poster #B025
Biologics in the management of chronic rhinosinusitis with nasal polyposis: Two years real-life experience
Stefano Millarelli, Dr.

Poster #B026
BMI increases in individuals with COVID-19-associated persistent olfactory dysfunction
Brandon Vilarello, BA

Poster #B027
Cerebrospinal fluid rhinorrhea post routine Coronavirus disease 2019 nasopharyngeal swab
Keith Conti, MD

Poster #B028
Characterization of post-COVID-19 olfactory dysfunction treatment modalities and effect on quality of life
Bita Naimi, BA

Poster #B029
Chronic rhinosinusitis in primary ciliary dyskinesia: Impact of disease and sinus surgery
Sulgi Kim

Poster #B030
Cocaine induced midline destructive lesions vs. limited granulomatosis with polyangiitis: A diagnostic conundrum
Akaber Halawi, MD

Poster #B031
Comparing patient compliance with nasal sprays, irrigations, and medications in rhinology
Amanda Bastien, MD

Poster #B032
WITHDRAWN

Poster #B033
Cost and utilization of CT scans for acute rhinosinusitis between 2016 and 2018
Thomas Cyberski, Medical Student

Poster #B034
Cost comparison analysis of single-use and reusable rhinolaryngoscopes – A multi-center study
Emilie Dehlholm-Lambertsen, MSc

Poster #B035
COVID-19 infection and immune deficiencies in patients with new onset CRS
Amani Kais, MD

Poster #B036
Cranial nerve zero: What the rhinologist needs to know
Ibtisam Mohammad, MD

Poster #B037
CSF leak secondary to COVID-19 testing: A case series and systematic literature review
Shireen Samargandy, MBBS, MD

Poster #B037A
Current practice patterns among fellowship-trained rhinologists: A survey of past American Rhinologic Society fellows
Dennis Tang, MD, FARS

Poster #B038
Descriptive analysis of the management of 370 consecutive patients referred for chronic sinusitis: From primary care to specialty care
Isaac Obermyer, MD

Poster #B039
Differentiating rhinogenic vs non-rhinogenic facial pain: A qualitative study
Viraj Patel, MD

Poster #B040
Disparities among patients seeking care for olfactory and taste dysfunction: A population-based study
Daniel Gorelik, Clinical Research Fellow

Poster #B041
Disparities in telehealth usage in patients with chronic rhinosinusitis
De'Andre Warren, MD

Poster #B042
WITHDRAWN

Poster #B043
Drug delivery to anatomical subsites within the nasal passage
Sarah Russel, MD, MPH

Poster #B044
Dupilumab-related adverse events among patients with chronic rhinosinusitis with nasal polyposis
Daniel Lee, MD, FRCSC

Poster #B045
Economic evaluation of Dupilumab for the management of severe uncontrolled chronic rhinosinusitis with nasal polyposis
Antonella Loperfido, MD

Poster #B046
Efficacy of biologics on eosinophilic ear polyposis (EEP) associated with NSAID-exacerbated respiratory disease (N-ERD)
Ivanna Nebor, MD

Poster #B047
Elexacaftor/tezacaftor/ivacaftor therapy reduces rhinologic healthcare utilization in people with Cystic Fibrosis
Ethan Han, BS

Poster #B048
Endonasal odontoidectomy in pediatric and adult populations: A systematic review and meta-analysis
Nikitha Kosaraju, BA

Poster #B049
Endoscopic evaluation of nasal septal perforation: Assessment of a novel tool for grading nasal septal perforation inflammation
Amar Miglani, MD

Poster #B050
Endoscopic reconstructive techniques for high flow anterior skull base cerebrospinal fluid leaks: A systematic review of outcomes and complications
Kunjan Patel, MD

Poster #B051
Ergonomics of otolaryngology trainees in rhinology
Emily Montgomery, MS

Poster #B052
Errors in Beta-2 transferrin testing: A systematic review
Jacob Eide, MD

Poster #B053
Esthesioneuroblastoma with orbital involvement: Management and outcomes
Ehiremen Iyoha, MD

Poster #B054
Evaluating feasibility of a cooperative-control robotic assistant for endoscopic endonasal sinus surgery: A pre-clinical study
Manish Sahu, PhD

Poster #B055
Evaluating management and outcomes of juvenile nasopharyngeal angiofibroma (JNA) using public health information system (PHIS)
Tyler Merrill, MD

Poster #B056
WITHDRAWN

Poster #B057
Factors associated with postoperative complications following resection of sinonasal tumors
Raymond So, AB

Poster #B058
Financial costs of COVID-19 induced smell and taste loss
Esther Wang, MD

Poster #B059
Giant frontoethmoidal mucocele with orbital extension secondary to chronic intranasal cocaine abuse: A case report with fifteen year follow-up
Samantha Lau, BS

Poster #B060
Has COVID-19 changed pediatric acute sinusitis epidemiology during the first two pandemic years?
Elchanan Zloczower, MD, MHA

Poser #B061
HRCT-MRI fusion: A novel imaging protocol surpasses current modalities in identifying and localizing cerebrospinal fluid leaks
Sabrina Goyal, BS

Poster #B062
Identifying patients with chronic rhinosinusitis (CRS) in Medicare claims
Samuel E. Razmi, BS

Poster #B063
Impact of a novel nasal cleansing kit on relief of allergy symptoms
Arman Kalamkarian, MD

Poster #B064
Impact of corticosteroids on sinonasal wound healing
Jackson Vuncannon, MD

Poster #B065
Impact of Dupilumab prescribing on utilization of medical and surgical therapies for chronic rhinosinusitis with nasal polyps
Christopher Low, MD

Poster #B066
Impact of social determinants of health on chronic rhinosinusitis disease severity, treatment outcomes, and complications: A population-based database study
Bita Naimi, BA

Poster #B067
Impact of the inferomedial strut on diplopia after endoscopic orbital decompression for dysthyroid ophthalmopathy: A systematic review
Ari Stone, MD

Poster #B068
Implementation of an optimized preoperative checklist for endoscopic sinus surgery within a multi-institutional resident education curriculum
Stephen Leong, BA

Poster #B069
Insurance coverage and survival outcomes in patients with olfactory neuroblastoma
David Fenton, BS

Poster #B070
Interleukin 4 induces loss of smell in mice by altering olfactory signaling
Yannis Hara, PhD

Poster #B071
Intraosseous hemangioma of the nasal septum: A reported case
Lauren Strickland, Medical Student

Poster #B072
Leadership trends in otolaryngology rhinology fellowship
Mitesh Mehta, MD

Poster #B073
Long-term revision surgery rates of chronic rhinosinusitis treated with endoscopic sinus surgery and standard medical therapy
Shreya Pusapadi Ramkumar, BS

Poster #B074
WITHDRAWN

Poster #B075
Management paradigms for chronic rhinosinusitis in individuals with asthma: An evidence-based review with recommendations
Amarbir Gill, MD

Poster #B076
WITHDRAWN

Poster #B077
Murine model of minimally invasive nasal depot (MIND) technique for central nervous system drug delivery across the blood-brain barrier
Andy Chua, MBBS, MMed

Poster #B078
Mycotic aneurysm of the internal carotid artery associated with COVID and sphenoid sinusitis in a pediatric patient: A case report and review of the literature
Charles Ekwunwa, BS

Poster #B079
Nasal citology as a procedure to follow-up patients treated with biological drugs with type II inflammation
Rafael Hijano, MD PhD

Poster #B080
Negative sinus biopsy does not rule-out orbital invasive fungal sinusitis
Jeffrey Bernstein, MD

Poster #B081
Novel application of a self-assembling peptide hydrogel in endoscopic skull base surgery
Satyan Sreenath, MD

Poster #B082
Novel use of biliary stent in drainage of Potts Puffy Tumour
Shuhui Xu, MBBS,MRCS(Ireland), MMed(ORL)

Poster #B083
Olfaction in patients with long-haul COVID-19
Meredith Lamb, BS

Poster #B084
Olfactory and gustatory dysfunction: A comparison between omicron and previous variants in Turkey
Ibtisam Mohammad, MD

Poster #B085
Olfactory dysfunction secondary to COVID-19 infection is associated with diminished quality of life
Patricia Jacobson, BSN

Poster #B086
Oral corticosteroid burden and healthcare resource utilization (HCRU) in patients with chronic rhinosinusitis with nasal polyps (CRSwNP) undergoing functional endoscopic sinonasal surgery (FESS): A real-world retrospective cohort study
Danielle Isaman, PhD

Poster #B087
Outcomes of endoscopic endonasal transsphenoidal surgery in the pediatric population
Hector Perez, MD

Poster #B088
WITHDRAWN

Poster #B089
Pediatric functional endoscopic sinus surgery: Comparison of postoperative debridement in the office versus OR
Alice Huang, MD

Poster #B090
Pediatric nasal septal abscess: Case report and literature review
Edie Threlkeld, BS

Poster #B091
Penetrating orbital maxillary sinus trauma with a glass crack-cocaine pipe: A unique case report
Chase Kahn, MD

Poster #B092
Personal statements for rhinology fellowship: A sentiment and deep learning linguistic analysis based on gender and training location of applicant
Vikram Vasan, BA

Poster #B093
Post Covid parosmia demographics and treatment
Taciano Rocha, PhD

Poster #B094
Posterior extension of fusobacterium nucleatum sinusitis leading to posterior circulation cerebellar and pontine infarcts
Caitlin Haltiner, MD

Poster #B095
Posterior turbinate reduction and its impact on eustachian tube dysfunction
Michael Werner, MD, PhD

Poster #B096
Predicting adherence to topical medications in chronic rhinologic disease
Stylianos Monos, Medical Student

Poster #B097
Predicting sinonasal inverted papilloma attachment using machine learning
Sean Mckee, MD

Poster #B098
Prevalence and epidemiology of facial and nasal injuries in 2017-2021
Kue Lee, BS

Poster #B099
Primary lacrimal sac b-cell lymphoma, diagnosis and management: A case report
Quincy Simmons, MD

Poster #B100
Psychophysical testing outcomes in post-COVID-19 persistent olfactory dysfunction
Alexander Duffy, MD

Poster #B101
Pterygopalatine fossa schwannoma with orbital extension in a pregnant woman presenting as amaurosis: A case report
Danial Peñaranda Garcia, MD

Poster #B102
Quality-of-life metrics and correlation with psychophysical testing outcomes in post-COVID persistent olfactory dysfunction
Alexander Duffy, MD

Poster #B103
Quantification of the diseased sinonasal airspace in chronic rhinosinusitis patients relative to normative size
Katrina Hodges, BSW, BA

Poster #B104
Racial and socioeconomic differences amongst chronic rhinosinusitis subtypes
Sei Chung, MD

Poster #B105
Radiographic features of sinonasal malignancies: Multi-institutional evaluation
Arash Abiri

Poster #B106
Rates of discontinuity between the maxillary sinus natural ostia and the surgical antrostomy in revision sinus surgeries
Kevin Chacko

Poster #B107
Referrals for chronic rhinosinusitis in the age of telemedicine
Christopher Pool, MD

Poster #B108
Rhinolithiasis misdiagnosed as intranasal osteoma: Diagnostic challenges and literature review
Patrick Kiessling, MD

Poster #B109
Rhinoscleroma in a non-endemic area: Case report and review of the literature
Sana Siddiqui, MD

Poster #B110
Risk factors to recovery of subjective olfactory dysfunction after endoscopic transsphenoidal hypophysectomy
Bita Naimi, BA

Poster #B111
Role of corticosteroid in the treatment of acute orbital infections
Patrick Sullivan, BA, MSIV

Poster #B112
Seasonal variations and acute rhinosinusitis as risk factors for orbital complications in children
Amani Kais, MD

Poster #B113
Semi automated virtual endoscopy of the frontal recess
Ali Jafar, MD, MSc, FRCSC

Poster #B114
Semi-quantitative assessment of surgical navigation accuracy during endoscopic sinus surgery in a real-world environment
David Allen, MD

Poster #B115
Sinonasal angioleiomyoma: A case report and review of the literature
Hye Rhyn Chung

Poster #B116
Sinonasal inflammation manifestations and the role of autonomic nervous system
Kamlesh Kumar Dubey, MS

Poster #B117
Sinonasal intraosseous hemangioma: A literature review and case presentation
Yuki Kawahara, BS

Poster #B118
Sinonasal quality of life in primary ciliary dyskinesia and Cystic Fibrosis patients
Taylor Stack-Pyle

Poster #B119
Sinonasal tumors masquerading as invasive fungal sinusitis (IFS)
Kaitlynne Pak, MD

Poster #B120
Smell disturbances after endoscopy olfactory groove meningioma resection
Estephania Candelo, MD, MSc

Poster #B121
Sociodemographic factors and perceived financial insecurity among acute and chronic rhinosinusitis patients
Somtochi Okafor, MD

Poster #B122
Sphenopalatine ganglion interventions for intractable headaches and facial pain: A scoping review
Yi-Tsen Lin, MD, PhD

Poster #B123
Survey of in-office rhinology and skull base questionnaires
Auddie Sweis, MD

Poster #B124
Synergistic effect of electronic and conventional cigarette use on sinonasal symptomatology
Graham Pingree, BA

Poster #B125
Taste and smell dysfunction after endoscopic endonasal resection of olfactory groove meningioma: A pilot study
Adeline Fecker, BS

Poster #B126
The effect of anticoagulants and antiplatelets on the outcomes of acute epistaxis: A case-control study
Elchanan Zloczower, MD, MHA

Poster #B127
The effects of oxymetazoline on nasal aerodynamics and symptomatology in patients with chronic nasal obstruction
Zachary Root, BS

Poster #B128
The evolution of outcomes in hematologic malignancy patients with acute invasive fungal rhinosinusitis (AIFRS): Systematic review
Estephania Candelo, MD, MSc

Poster #B129
The impact of diabetes and immunosuppression on post operative healing following Lothrop
Jared Johnson, MD

Poster #B130
The impact of digital inequities on nose and paranasal sinus cancer disparities in the United States
David Fei-Zhang, BA

Poster #B131
The organizational impact of implementing single-use rhinolaryngoscopes in the UK and Ireland compared with reusable rhinolaryngoscopes
Emilie Dehlholm-Lambertsen, MSc

Poster #B132
The relationship between eosinophilic chronic rhinosinusitis and IgG-4 related disease
Galit Almosnino, MD

Poster #B133
Toasted: Burnout in otolaryngology residents and fellows affecting career choices
Victoria Fischman, MD

Poster #B134
Traumatic ear avulsion repaired successfully without microsurgery
Humra Shamim, MBBS, MS (ENT)

Poster #B135
Treatment outcome of endoscopic sinus surgery for visual acuity deterioration related to sphenoid sinus diseases
Ching Yuan Huang, MD

Poster #B136
Trends in electronic cigarette use among patients with sinusitis in the U.S.
Neelima Panth, MD, MPH

Poster #B137
Trends in telehealth utilization for acute and chronic rhinosinusitis: A population based study
Claudia Cabrera Aviles, MD, MS

Poster #B138
Trends of odontogenic sinusitis rates during the COVID-19 pandemic
Barak Ringel, MD

Poster #B139
Unique radiological findings from inverted papillomas of the frontal sinus – A case series
Abdurrahman Al-Awady

Poster #B140
Use of dual biologics in patients with chronic rhinosinusitis with nasal polyposis
Zachary Warren, MD

Poster #B141
Utility of sinonasal outcome test (SNOT-22) in rhinological disorders
Hassan Ramadan, MD, MSc

Poster #B142
Utilization of concurrent adenoidectomy with balloon catheter dilation in pediatric chronic rhinosinusitis
Alison Yu, MD

Poster #B143
Variations in research impact and productivity in academic rhinologists
Victoria Vought, BA

Poster #B144
Washing illness away: A systematic review of nasal irrigation to prevent and treat viral upper respiratory tract infections during the COVID-19 pandemic
Karan Gandhi, MD

Poster #B145
What questions do patients ask about posterior nasal nerve ablation for chronic rhinitis: An online search analysis
Daniel Gorelik, BS

ORAL PRESENTATIONS

Thursday, May 4, 2023
Morning Session – Ballroom C
8:00 am – 12:00 pm EST

7:00 am – 8:00 am
Women in Rhinology Breakfast Session
Guest Speaker: David Smith, PhD
"The Power of Allyship and Gender Partnership"
Supported by Stryker

8:00 am – 8:05 am
Welcome & Introduction
Sarah Wise, MD, FARS; Pete Batra, MD, FARS

Scientific Oral Presentations: Top Rated Clinical Abstracts – Session 1

Moderators: Amber Luong, MD, PhD, FARS; Nicholas Rowan, MD; Carol Yan, MD

8:05 am – 8:13 am
Preoperative particulate matter exposures are associated with increased type-2 cytokines in chronic rhinosinusitis
Rory Lubner, MD
Kolin Rubel, MD
Rakesh Chandra, MD, FARS
Justin Turner, MD, FARS
Naweed Chowdhury, MD, MPH
Vanderbilt University Medical Center

Background/Aims:
Chronic rhinosinusitis (CRS) is thought to result from complex interactions between the host immune system, microbiota, and environmental exposures. Currently, there is limited data regarding the impact of ambient particulate matter □2.5 μm in diameter (PM2.5) in the pathogenesis of CRS, despite evidence linking PM2.5 to other respiratory diseases. We hypothesized that PM2.5 exposures may result in differential cytokine patterns that could inform our mechanistic understanding of the effect of environmental factors on CRS.

Methods:
We performed a cross sectional analysis of 308 CRS patients undergoing endoscopic sinus surgery. Cytokines were quantified in intraoperative mucus specimens using a multiplex flow cytometric bead assay. Clinical and demographic data including zip codes were extracted and used to obtain tract-level income and rurality measures. A spatiotemporal machine learning model was used to estimate daily PM2.5 levels for the year prior to each patient's surgery date. Spearman correlations and regression analysis were performed to characterize the relationship between mucus cytokines and PM2.5.

Results:
Type 2 cytokines including IL-5/IL-13 as well as IL-2, 12, and 21 were significantly correlated with estimated average 12-month preoperative PM2.5 levels. These relationships were maintained for each cytokine after adjusting for age, income, body mass index, rurality, polyps, asthma, and allergic rhinitis (AR) ($p < 0.05$). There were also higher odds of asthma (OR=1.5, p=0.01) and AR (OR=1.48, p=0.03) with increasing 12-month PM2.5 exposure.

Conclusions:
Preoperative PM2.5 exposure may be an independent risk factor for development of a type 2 CRS endotype.

8:14 am – 8:22 am
Inflammatory characteristics of central compartment atopic disease
Kolin Rubel, MD
Naweed Chowdhury, MD, MPH
Justin Turner, MD, PhD, FARS
Rakesh Chandra, MD, FARS
Rory Lubner, MD
Sarah Wise, MD, FARS
John DelGaudio, MD, FARS
Vanderbilt

Background:
Central compartment atopic disease (CCAD) is an emerging phenotype of chronic rhinosinusitis with nasal polyposis (CRSwNP) characterized by prominent central nasal inflammatory changes. This study compares the cytokine profile of CCAD relative to aspirin-exacerbated respiratory disease (AERD), allergic fungal rhinosinusitis (AFRS), and non-typeable CRSwNP.

Methods:
A cross sectional analysis of data from a prospective clinical study was performed on patients undergoing endoscopic sinus surgery (ESS) at Vanderbilt from 2015 to 2022. Patients were separated by primary diagnosis into groups consistent with CCAD, AERD, CRSwNP, and AFRS. Mucus cytokine levels and demographic data were analyzed for each group. Chi-squared/Mann-Whitney U tests and partial least squares discriminant analysis (PLS-DA) were performed for comparison and classification.

Results:
Two hundred and fifty-three patients met inclusion criteria (n = 137 CRSwNP, n = 24 CCAD, n = 50 AFRS, and n = 42 AERD). The CCAD group had a lower prevalence of asthma (p = 0.0004) and a rate of allergic rhinitis on par with AERD/AFRS, but higher than CRSwNP (p = 0.04). CCAD patients had significantly fewer prior surgeries compared to the other groups. On univariate analysis, CCAD was characterized by reduced inflammatory burden, with

lower IL-6, 8, INF-y, and eotaxin relative to all other groups and significantly lower type 2 cytokines (IL-5, IL-13) relative to both AERD and AFRS. These findings were supported by multivariate PLS-DA, which clustered CCAD patients into a relatively homogenous low-inflammatory cytokine profile.

Conclusions:
CCAD appears to have a distinct cytokine profile reflective of lower inflammatory burden compared to other endotypes of CRSwNP

8:23 am – 8:31 am
Incidence of hypocortisolism with long-term use of budesonide irrigations for chronic rhinosinusitis
Bruna Silva, MD
Matthew Tyler, MD
Zara Patel, MD, FARS
Jane Wang, NP
Jayakar Nayak, MD, PhD
Peter Hwang, MD, FARS
Stanford University

Background:
High-volume saline irrigations with supplemental budesonide are a broadly adopted treatment for chronic rhinosinusitis (CRS). In 2016 we reported a safety analysis of long-term budesonide irrigation with regard to hypothalamic-pituitary-adrenal axis. We present a follow-up analysis of a larger cohort of patients with longer term follow-up.

Methods:
CRS patients were candidates for stimulated cortisol testing after performing at least daily budesonide irrigation (0.5mg/treatment) for a minimum of 6 months. We retrospectively evaluated all patients who received stimulated cortisol testing at our center between 2012-22.

Results:
We analyzed 334 stimulated cortisol test results in 290 patients, with duration of use between 6-120 months. In patients using budesonide irrigations only (n=135), the rate of hypocortisolemia (<18 ug/dL) was 11.1%. In contrast, patients who used inhaled corticosteroids in addition to budesonide irrigations had a significantly higher risk of hypocortisolemia, at 22.5% ($p<0.01$). Men were at greater risk of lower cortisol levels than women ($p<0.001$). Multiple regression analysis revealed that lowered cortisol levels were not significantly associated with duration of budesonide irrigation use ($p=0.2$), nor with greater dosing frequency ($p=0.5$).

Conclusion:
Prolonged use (> 6 months) of budesonide irrigations is associated with a small risk of hypocortisolemia. Concomitant use of inhaled corticosteroids and male gender may be additionally associated with lower stimulated cortisol levels. Surveillance of cortisol levels should be considered in patients receiving budesonide irrigations on an extended basis.

8:32 am – 8:40 am
Association of sinus mucus cytokine levels with SNOT-22 and UPSIT in patients with chronic rhinosinusitis
Stella Lee, MD
Sophie Yu, Medical Student
Simon Chiang, Research Assistant
Kathleen Buccheit
Marie Lundberg, MD
Alice Maxfield, MD, FARS
Rachel Roditi, MD, FARS

Brigham and Women's Hospital, Harvard Medical School

Introduction:
Chronic rhinosinusitis (CRS) is an inflammatory disease of the paranasal sinuses. The local overexpression of pro-inflammatory cytokines has been linked to olfactory dysfunction in CRS patients. This study aims to correlate inflammatory cytokine values with validated outcome measures that assess olfaction and quality of life.

Methods:
The University of Pennsylvania Smell Identification Test (UPSIT) and 22-item Sino-Nasal Outcome Test (SNOT-22) were administered to 143 participants (CRSsNP=23, CRSwNP=108, AERD=12). Ethmoid sinus mucus secretions were also collected and the concentrations of interferon (IFN)-γ, tumor necrosis factor (TNF)-α, IL-4, IL-5, IL-13, IL-18, chemokine ligand 2/monocyte attractant protein-1 (CCL2/MCP1), CCL5/regulated-upon-activation normal T-cell expressed (RANTES), and C-X-C motif chemokine ligand 8 (CXCL8)/IL-8 in the nasal secretions were assayed by enzyme-linked immunoassay. Cytokine values were correlated with UPSIT and SNOT-22 scores.

Results:
Increased local IL-5 ($r=-0.395$), IL-13 ($r=-0.387$), IL-33 ($r=-0.584$), and CCL2 ($r=-0.358$) levels correlated with worsening UPSIT scores whereas IL-4, IL-8, IL-18, CCL5, IFN-γ, and TNF-α levels did not. IL-5 ($r=0.437$), CCL2 ($r=0.482$), and TNF-α ($r=0.502$) significantly correlated with worsening SNOT-22 scores while IL-4, IL-8, IL-13, IL-18, IL-33, CCL5, and IFN-γ did not.

Conclusions:
Elevated sinus mucous IL-5, IL-13, IL-33, and CCL2 associated with worsened olfaction and IL-5, CCL2, and TNF-α correlated with worsening sinonasal quality of life. Additional investigation is needed to discern the role of the local inflammatory milieu on clinical outcome measures.

8:41 am - 8:49 am
Air pollution exposure is associated with rhinitis in older adults via specific immune mechanisms
Henrique Ochoa Scussiatto, MD
Kristen E. Wroblewski, MS
Kristina L. Pagel, PhD
Phillip Schumm, MS
Martha K. McClintock, PhD
Helen H. Suh, PhD
Jayant Pinto, MD
University of Chicago

Introduction:
Mechanisms underlying rhinitis in older adults are largely unknown. We tested whether air pollution affects this condition and whether immune mechanisms play a role.

Methods:
We analyzed cross-sectional data from the National Social Life, Health, and Aging Project, a nationally representative study of older adults age 57 to 85 years. PM2.5 air pollution exposure estimates were generated using validated spatiotemporal models. Presence of rhinitis was defined based on medication use (≥1: intranasal steroids, antihistamines, and/or decongestants). K-means cluster analysis (Jaccard method) was used to group the 22 assayed peripheral blood cytokines into 9 clusters to facilitate functional determination. We fitted multivariate linear regressions to correlate PM2.5 exposure with presence of allergic rhinitis, controlling for age, sex, race, education, smoking/alcohol use, and comorbidity and then determined the role of cytokines in this relationship.

Results:
Long (but not short) term exposure to PM2.5 was associated with presence of rhinitis: 5 year window, β=0.005, 95% CI 0.0001, 0.009. The TGF-α, TNF-α, IL5 and IL12 cytokine cluster was associated with rhinitis across all pollution exposure windows (e.g., 30 days, β=0.072, 95% CI 0.009, 0.136; 5 years, β=0.071, 95% CI 0.007, 0.134). This cluster completely mediated the relationship between PM2.5 exposure and rhinitis.

Conclusion:
We show for the first time that TGF-α, TNF-α, IL5 and IL12 play a role in mediating the effect of PM2.5 on rhinitis in older US adults. These immune pathways may offer promise as therapeutic targets for this prevalent, age-related upper airway disorder.

8:50 am - 8:55 am
Q&A

8:55 am - 9:05 am
Awards Ceremony
Jean Kim, MD, FARS

9:05 am - 9:45 am
PANEL: ABCs of Central Compartment Atopic Disease
Moderator: John Del Gaudio, MD, FARS
Panelists: Cecilia Damask, DO; Christine Franzese, MD, FARS; Jessica Grayson; Patricia Loftus, MD, FARS
Sponsored by Section for Allergy/Immunology in Rhinology

9:45 am - 10:15 am
Break with Exhibitors

Scientific Oral Presentations: Top Rated Basic Science Abstracts – Session 2

Moderators: Do-Yeon Cho, MD; Michael Kohanski, MD, PhD; Elina Toskala, MD, PhD, FARS

10:15 am – 10:23
IL-13 associated epithelial remodeling correlates with increased tuft cells, prostaglandin E2 activation, and clinical severity in nasal polyps
Neil Patel, MD, MSc
Maya E. Kotas
Steven D. Pletcher, Professor
Jose G. Gurrola, MD
Andrew N. Goldberg, MD, FARS
Max A. Seibold
Camille M. Moore
Erin D. Gordon
University of California San Francisco

Background:
Prior studies demonstrate IL-13 mediates epithelial remodeling in sinonasal mucosa in patients with chronic rhinosinusitis with nasal polyps (CRSwNP). However, precise definitions of epithelial cell type shifts and differential expression of transcriptional markers are not well described. Of particular interest are tuft cells, a rare epithelial cell type implicated as an upstream trigger of type-2 inflammation.

Purpose:
To understand epithelial remodeling, including tuft cell activation, on a transcriptional level in patients with CRSwNP.

Methods:
Using cell type transcriptional signatures derived from epithelial single cell sequencing, we analyzed bulk RNA sequencing data from ethmoid epithelial brushes obtained from patients with CRS with (n = 24) and without nasal polyps (n = 7) in comparison to healthy

controls (n = 8). Using linear regression, we analyzed correlation between normalized gene expression scores and clinical endpoints, including SNOT-22 and Lund-McKay scores.

Results:
Normalized gene scores for IL-13 activation were associated with increased tuft cell, goblet cell, mast cell gene scores, and decreased ciliated cell scores. Furthermore, the IL-13 score was strongly associated with a transcriptional activation of tuft cells and a prostaglandin E2 (PGE2) activation signature. Lund-McKay scores correlated positively with activated tuft cell, mast cell, PGE2, and IL-13 and negatively with ciliated cell transcriptional signatures.

Conclusion:
IL-13-associated epithelial remodeling, including increased tuft cells and decreased ciliated cells and a novel epithelial PGE2 activation score, correlate with a radiographic metric of disease severity in CRSwNP.

10:24 am - 10:32 am
Long-term aspirin desensitization has mucosal cytokine features of immune tolerance
Michael Kohanski, MD, PhD
Anas Qatanani, BS
Cailu Lin, Research Associate
Li Hui Tan
Jeremy Chang
Sabrina Herzberg
Nithin Adappa, MD, FARS
James Palmer, MD, FARS
Danielle Reed, Associate Director
John Bosso, MD
Noam Cohen, MD, FARS
University of Pennsylvania

Background:
Aspirin desensitization for patients with aspirin exacerbated respiratory disease (AERD) is performed over 1-2 days and it can take 6-12 months for the full clinical benefits to manifest. It is unclear if desensitization is dependent solely on aspirin-mediated inhibition of COX pathways or if there are also COX-independent mechanisms.
Objective: To determine if there are inflammatory shifts in the sinus mucosa at least 6-months after aspirin desensitization.

Methods:
Samples were acquired from the ethmoid mucosa of AERD patients pre-sinus surgery and pre-aspirin desensitization (pre-ASA, N=28), and from patients who had undergone complete sinus surgery and were at least 6-months post-aspirin desensitization (post-ASA, N=45). We quantified 8 cytokines/chemokines (IFN-g, IL-10, IL-6, CCL20, IL-13, IL-5, IL-33, TNFa) using the Luminex platform.

Results:
Baseline comparisons between the 2 groups showed no clinically significant differences. The post-ASA group had well controlled asthma and chronic rhinosinusitis with a median aspirin dose of 700mg a day and a mean time since desensitization of 29.5 months. Among the measured cytokines, IFN-g, IL-10, CCL20 and IL-13 were all significantly elevated in the post-ASA cohort compared to the pre-ASA cohort. IL-33 and IL-6 were significantly decreased in the post-ASA cohort and there were no significant changes in IL-5 or TNFa.

Conclusion:
Increased IL-10 and IFN-g and decreased IL-6 in sinus mucosa in the post-ASA group suggests that long-term aspirin desensitization may lead to development of immune tolerance. Further studies are indicated to understand the cellular context and mechanisms associated with the observed shift in cytokine levels.

10:33 am – 10:41 am
Genome-wide epigenetic study shows significant DNA hypermethylation in ethmoidal tissue of chronic rhinosinusitis versus controls
Tripti Brar, MBBS, MD
Saurabh Baheti, MS
Hirohito Kita, MD
Michael Marino, MD, FARS
Devyani Lal, MD, FARS
Mayo Clinic in Arizona

Background:
Epigenetics, the study of environmental impact on gene expression through mechanisms such as DNA methylation, is crucial in understanding chronic rhinosinusitis (CRS) pathogenesis. Worldwide, limited genome-wide DNA methylation studies have been conducted in CRS, and all (including ours) have used inferior turbinate tissue (ITT) for control. In this study, we compared ethmoidal tissue of CRS and controls to elucidate significant differences that may have been masked by use of ITT controls.

Methods:
With IRB approval, ethmoidal tissue of CRS and non-CRS control subjects was harvested at surgery. Reduced Representation Bisulfite Sequencing was performed to identify differential methylation. Differentially methylated CpGs (DMCs) were selected based on a combination of nominal P value ≤0.05 and mean methylation difference, delta ≥ 5%. Ingenuity Pathway analysis of differentially methylated regions (DMRs) was performed.
Results: Between CRS and control ethmoidal tissue (18 CRS,4 controls), 928 DMRs were significantly different, with more hypermethylated DMRs in CRS. Top upstream regulators were: TGFB1, TNF, LPS, SS18, SMAD3. Top canonical pathways were: Th1 and Th2 activation pathways, human embryonic stem cell pluripotency, axonal guidance signaling,

epithelial-mesenchymal transition pathway. Significant differences were also identified between CRSwNP and CRSsNP vs. controls.

Conclusion:
In the first genome-wide DNA methylation study on ethmoidal tissue of CRS vs. controls, significantly more hypermethylation in CRS was identified in several immunologically active and homeostatic pathways. As hypermethylation suppresses gene transcription, disruption of immune regulation through environmental impact is present in CRS.

10:42 am – 10:50 am
Effects of diesel exhaust particulates on sinonasal epithelia
Do-Yeon Cho, MD
Daniel Skinner, BS
Jaime Pena-Garcia, MD
Graham Norwood, Resident
Shaoyan Zhang, PhD
Dong Jin Lim, PhD
Jessica Grayson, MD
Bradford Woodworth, MD, FARS
University of Alabama at Birmingham

Introduction:
An increased prevalence of rhinosinusitis (RS) with air pollution has been well demonstrated. Exposure to diesel exhaust particulates (DEPs), a component of air pollution, surges susceptibility to allergic rhinitis, but the impact on the development of RS has not been elucidated. Previous studies implicate environmental perturbations (eg, smoke) diminished sinonasal chloride (Cl-) secretion and mucociliary transport (MCT). This study aims to assess the effects of DEPs on sinonasal epithelial Cl- secretion and IL-8 production as surrogates for reduced MCT and increased neutrophilic inflammation using in vitro and in vivo models.

Methods:
Murine nasoseptal epithelial cultures were exposed to DEPs (0.1/0.25/0.5/1mg/ml) for 24hrs followed by ion transport measurements in Ussing chambers. Basolateral culture media was measured with ELISA to determine CXCL1 (human IL-8 analog) levels. Rabbit maxillary sinuses were injected 3 times/week for 2 weeks with 1mg (n=3, each). Sinus potential difference (SPD) assays determined Cl- transport across the sinus epithelia.

Results:
CFTR-mediated Cl- transport [ΔISC(μA/cm2)], measured by response to the cAMP agonist, was reduced at concentrations ≥ 250μg/ml (ΔISC; control=13.83+/-0.56, 0.5mg=10.86+/-0.50*, 1mg=5.23+/-0.9*, n=6, *p<0.01 compared to control). DEP significantly increased CXCL1 at concentrations ≥500 μg/ml (p<0.05). SPD measurements demonstrated markedly diminished transepithelial Cl- transport (-8.3+/-1.8 vs. -20.1+/-2.4mV, p<0.05).

Conclusion:
CFTR-mediated Cl- secretion was markedly reduced, and IL-8 levels increased at physiologically relevant DEP exposures suggesting a mean by which environmental exposure decreases MCT and stimulates neutrophilic inflammation.

10:51 am – 10:59
Dysregulated epithelial innate immune tolerance to P. aeruginosa-derived flagellin in chronic rhinosinusitis
Justin Turner, MD, PhD, FARS
Ping Li, Researcher
Li-Ching Huang
Quanhu Sheng
Vanderbilt University Medical Center

Background:
P. aeruginosa is a common colonizing pathogen in the upper respiratory tract and is associated with recalcitrant chronic rhinosinusitis (CRS). Here we sought to characterize the effect of P. aeruginosa-derived flagellin on human sinonasal epithelial cell (HSNEC) immune responses and determine whether these pathways are disrupted in CRS.

Methods:
Air-liquid interface cultures were established from CRS and healthy control donors. Cells were incubated with P. aeruginosa-derived flagellin for 24 hours and transcriptional changes were assessed using whole transcriptome RNA-sequencing. Apical and basolateral secretion of the pro-inflammatory cytokines IL-1beta, TNF-alpha, and IL-6 were measured after stimulation by LPS or flagellin and responses were compared between CRS and healthy control patients.

Results:
HSNECs were weakly responsive to LPS while flagellin stimulated a profound innate immune response dominated by TNF-alpha, IL-1beta, and IL-17 signaling and activation of the IL-17C/IL-23 axis. CRS-derived HNSECs showed a loss of innate immune tolerance to flagellin characterized by a profound increase in TNF-alpha secretion coupled with reduced IL-6 secretion.

Conclusions:
Flagellin activates a potent innate immune response in HSNECs characterized by pro-inflammatory mediators and cytokines/chemokines associated with neutrophilic inflammation. HSNECs from CRS patients have a dysregulated innate immune response to flagellin characterized by an imbalance between IL-6 and TNF-alpha secretion.

11:00 am - 11:05 am
Q&A

11:05 am - 11:20 am
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Tips and Tricks in Endoscopic Pituitary Surgery
Moderator: Jean Anderson Eloy, MD, FARS
Panelists: Erin McKean, MD; Bradford Woodworth, MD, FARS

11:20 am – 12:00 pm
PANEL: Pearls to Maximize Mentorship From Leaders in Rhinology
Moderator: Stella Lee, MD
Panelists: Pete Batra, MD, FARS; Marvin Fried, MD, FARS; Stacey Gray, MD, FARS; Sandra Lin, MD, FARS
Sponsored by Mentorship Committee and Women in Rhinology

12:00 pm - 1:00 pm
Lunch with Exhibitors

Thursday, May 4, 2023 Afternoon Session – Ballroom C 1:00 pm – 5:00 pm EST

12:00 pm - 1:00 pm
Lunch with Exhibitors

Scientific Oral Presentations: Pathophysiology and Mechanisms

Moderators: Kara Detwiller, MD, FARS; Kristine Smith, MD; Abtin Tabaee, MD, FARS

1:00 pm - 1:06 pm
Fractional exhaled nitric oxide levels correlate with sinus mucus cytokines in patients with chronic rhinosinusitis
Stella Lee, MD
Sophie Yu, Student
Simon Chiang, Research Assistant
Kathleen Buccheit
Marie Lundberg, MD, PhD
Regan Bergmark, MD, FARS
Alice Maxfield, MD, FARS
Rachel Roditi, MD, FARS
Brigham and Women's Hospital, Harvard Medical School

Introduction:
Fractional exhaled nitric oxide (FeNO) is a cost effective, non-invasive point-of-care test that has been associated with increased Type 2 sinonasal inflammation and symptom severity in CRS patients. This study aims to correlate local inflammatory cytokine values with FeNO measurements.

Methods:
FeNO was obtained using a nitric oxide analyzer (NIOX VERO) for 143 participants (CRSsNP=23, CRSwNP=108, AERD=12). Ethmoid mucus secretions were also collected and the concentrations of interferon (IFN)-γ, tumor necrosis factor (TNF)-α, IL-4, IL-5, IL-13, IL-18, chemokine ligand 2/monocyte attractant protein-1 (CCL2/MCP1), CCL5/regulated-upon-activation normal T-cell expressed (RANTES), and C-X-C motif chemokine ligand 8 (CXCL8)/IL-8 in the nasal secretions were assayed by enzyme-linked immunoassay. Cytokine values and Sinonasal Outcome Test (SNOT)-22 values were correlated with FeNO values with Pearson's correlation test.

Results:
Sinus mucus IL-18 (r=0.414, p=0.013) and IL-33 (r=0.508, p=0.011) levels positively correlated with FeNO. IL-4, IL-5, IL-8, IL-13, CCL2, CCL5, IFN-γ, and TNF-α did not correlate with FeNO levels. Cytokine levels were also tested for interactions with diagnosis (CRSsNP, CRSwNP, and AERD) and were not significant. FeNO levels were not found to be significantly associated with SNOT-22 or UPSIT scores in our cohort.

Conclusions:
Local sinus mucous IL-18 and IL-33 levels correlate with increased FeNO levels. Additional investigation of local biomarkers and their associations with FeNO or other point-of-care test results will help characterize endotypes of CRS.

1:07 pm - 1:13 pm
Profiling the cytokines patterns in sinonasal tissues to distinguish between chronic rhinosinusitis endotypes
Liyona Kampel, MD, PhD
Tel Aviv Sourasky Medical Center

Background:
Chronic rhinosinusitis (CRS) encompasses a heterogenous group of clinical syndromes which are classified into several endotypes according to the predominant T helper (Th) inflammatory response. Each pattern of inflammation has relevant interventions, however, differentiating between CRS endotypes may be challenging due to overlapping clinical and pathological manifestations.

Objectives:
To evaluate the utility and accuracy of profiling cytokine patterns in sinonasal tissues to distinguish between CRS endotypes. In addition, to determine distinctive inflammatory patterns that may correlate with clinical responses to readily available biologic drugs.

Methods:
Nasal polyps (NP) or uncinate process (UP) were collected from 24 patients undergoing endoscopic sinus surgery (ESS) for CRS with nasal polyposis (CRSwNP) or CRS without NP (CRSsNP) and 6 patients with mechanical nasal obstruction (controls). Expression levels of Th1, Th2, and Th17 proinflammatory cytokines were determined in homogenates of sinonasal tissues by a multiplex immunoassay.

Results:
Elevated levels of IL-13 detected in CRSwNP compared to CRSsNP and controls (P=0.0247 and P=0.0346, respectively) demonstrates its applicability for discriminating between CRS endotypes. An overlap between CRSsNP and non-eosinophilic NP in terms of elevated levels of IL-6 and CXCL-8, compared to lower levels in eosinophilic NP, was observed.

Conclusion:
Profiling cytokines associated with various CRS endotypes in sinonasal tissues may facilitate an accurate diagnosis and potentially guide the choice of targeted biologic therapy, especially in light of the shifting paradigms of CRS treatments.

1:14 pm – 1:20 pm
Transcriptional differences in chronic rhinosinusitis with and without allergic rhinitis
Chengetai Mahomva, MD
Kristine Smith, MD
Jeremiah Alt, MD, PhD, FARS
Abigail Pulsipher, Dr.
University of Utah

Background:
The pathophysiologic relationship between chronic rhinosinusitis (CRS) and allergic rhinitis (AR) is not well understood. This study sought to define gene transcriptional changes and correlations with objective disease severity measures in CRS patients with (CRSwAR) and without (CRSsAR) AR.

Methods:
An established tissue, gene expression, and clinical database was examined for patients with CRSw/sAR. Exclusion criteria comprised of patients with asthma, history of immunotherapy and/or use of biologics. Using ethmoid tissue, mRNA was extracted and subjected to multiplex gene expression analysis of 594 adaptive and innate immunity genes. Enrollment Lund-Kennedy (LK) and Lund-Mackay (LM) were extracted. Gene expression was compared between CRSw/sAR and correlated to objective disease measures using Spearman analysis.

Result:
A total of 13 patients met inclusion criteria (n=7, CRSwAR; n=6, CRSsAR). Five genes (CD44, CTSG, LILRB5, TAPBP, and TGFBR1) were significantly upregulated ($p<0.05$), whereas CD55 was significantly downregulated ($p<0.05$) in CRSwAR compared to CRSsAR. Significant positive correlations between TGFBR1 levels and LK scores ($rs(12)=0.596$ $p=0.032$) and LILRB5 levels and LK scores ($rs(12)=0.648$ $p=0.017$) were determined.

Conclusion:
TGFBR1 has been previously linked to atopy and AR and was significantly upregulated and positively correlated with a worse CRS-disease severity in CRSwAR compared to CRSsAR. LILRB5 has been implicated in mast cell regulation and was also significantly upregulated and positively correlated with a worse CRS-disease severity in CRSwAR compared to CRSsAR, suggesting a potential role in AR.

1:21pm – 1:27 pm
Loss of gremlin-1 is associated with chronic rhinosinusitis subtypes and has a limited effect on bone morphogenetic proteins in sinonasal tissue
Andrew Hess, MD
Carl Atkinson, PhD
Maria Villanueva, Lab Technician
Jeb Justice, MD, FARS
Brian Lobo, MD, FARS
Rodney Schlosser, MD, FARS
Jennifer Mulligan, PhD

Background:
Gremlin 1 (Grem1) is a glycoprotein that plays a role in a variety of disease states, including colon polyp formation. A primary role of Grem1 is to serve as an antagonist of bone morphogenetic proteins (BMP). Although BMP's have been shown to contribute to disease severity in patients with chronic rhinosinusitis with nasal polyps (CRSwNP), to date no studies have assessed the role of Grem1's regulation of BMP's in CRSwNP. Here we investigated Grem1 and its downstream targets BMP-2, -4, -7 in sinonasal tissue of patients with chronic rhinosinusitis (CRS).

Methods:
Patients undergoing endoscopic sinus surgery (ESS) for CRS were prospectively enrolled. Control subjects included patients undergoing ESS for non-inflammatory conditions. Sinonasal tissue biopsies were taken during surgery and processed. RT-PCR and ELISA studies were used to determine gene and protein levels. ELISA data was corrected by BCA for total protein.

Results:
A total of 61 patients were enrolled including: control, CRS without nasal polyps (CRSsNP), CRSwNP, and allergic fungal rhinosinusitis (AFRS). CRSwNP was found to have a 6-fold decrease of GREM1 gene expression compared to controls. Protein

confirmation analysis of Grem1 proved to be significantly lower in tissue samples from CRSsNP, CRSwNP, and AFRS compared to controls. Only BMP-2 was found to be significantly down regulated in all groups compared to controls. Furthermore, there was a strong correlation between BMP-2 and Grem1 tissue expression.

Conclusions:
GREM1 gene and Grem1 protein levels are decreased in all subsets of CRS, including AFRS. Given the correlation between GREM1 and BMP, a loss of GREM1 may contribute to regulating disease recurrence and severity in CRSwNP and AFRS.

1:27 pm - 1:32 pm
Q&A

1:32 pm - 1:38 pm
Variations in ciliary beat frequency across chronic rhinosinusitis endotypes and phenotypes
Asher Park, BS
Lidek Chou
Zhikai Zhou
Katelyn Dilley, BS
Akarsh Lal
Theodore Nguyen, BS
Pranav Nair
Zhongping Chen
Edward Kuan, MD, FARS
Brian Wong

Background:
Chronic rhinosinusitis (CRS) is a complex heterogeneous disease with distinct phenotypes and endotypes. Historically, CRS subtypes have been classified phenotypically into CRS with (CRSwNP) and without nasal polyps (CRSswNP). Recently, there has been new classification of CRS into eosinophilic (eCRS) and non-eosinophilic endotypes (neCRS). Despite evolutions in disease classification, there is currently a paucity of literature on the correlation between CRS subtypes and objective mucociliary function. In this study, we compare ciliary beat frequency (CBF) across CRS endotypes and phenotypes with spectrally encoded interferometric microscopy (SEIM), a novel method of imaging cilia.

Methods:
Sinonasal mucosa from primary or revision endoscopic sinus and skull base surgery cases were imaged ex vivo at physiologic temperature with phase contrast microscopy (PCM) and SEIM. We compared CBF measurements between PCM vs SEIM methods, as well as between disease states (control vs CRSwNP vs CRSswNP and control vs eCRS vs neCRS).

Results:
There was no significant difference between PCM (7.65 ± 0.60 Hz) and SEIM (7.64 ± 0.51 Hz) as a means of evaluating CBF (p=0.36). CRSwNP mucosa (5.77 ± 0.12 Hz) had significantly lower CBF compared to control (6.23 ± 0.11 Hz; p=0.001). Both eCRS (5.74 ± 0.16 Hz; p=0.005) and CRS mucosa (6.00 ± 0.08 Hz; p=0.03) had significantly lower CBF compared to control (6.28 ± 0.11 Hz).

Conclusion:
CBF as a means to quantify mucociliary function among CRS patients has been relatively overlooked. This study suggests that, among CRS subtypes, eCRS, neCRS, and CRSwNP subtypes are associated with lower CBF.

1:39 pm – 1:45 pm
Tissue eosinophilia is an unreliable marker for type 2 inflammation in CRSsNP patients
Tara Wu, MD
Stephanie Smith, MD
Atsushi Kato, PhD
Robert Schleimer, Professor
Anju Peters, MD
Whitney Stevens, MD
David Conley, MD, FARS
Robert Kern, MD, FARS
Bruce Tan, MD
Borislav Alexiev
Kevin Welch, MD, FARS
Northwestern University Feinberg School of Medicine

Background:
Among chronic rhinosinusitis without nasal polyps (CRSsNP) patients in Western countries, studies indicate the prevalence of type 2 inflammation is higher than that of type 1 or 3 inflammation. T2 inflammation is characterized by elevated Charcot-Leyden crystal galectin (CLC) and eosinophil cationic protein (ECP). High tissue eosinophilia (>10/hpf) is thought to correlate with T2 inflammation.

Methods:
CRSsNP patients undergoing surgery between 2011 and 2015 were enrolled. Tissue samples were evaluated for the presence of IFN-g (T1 endotype), CLC mRNA and ECP (T2 endotype), and IL-17A (T3 endotype). All specimens were examined for structured histopathology. High tissue eosinophilia was defined as >10/hpf, while low tissue eosinophilia was defined as <=10/hpf.

Results:
36 CRSsNP patients had T2 endotype; 10 patients had T3 endotype; and 47 patients had no identifiable endotype (i.e., untypeable or Tun). No patients had T1 endotype. Among T2 patients, 28 (78%) had high tissue eosinophilia, while 8 (22%) had low tissue eosinophilia. Among T3 patients, 3 (30%) had high tissue eosinophilia, while 7 (70%) had low tissue eosinophilia. Among Tun patients, 17 (36%) had high tissue eosinophilia, while 30 (64%) had low tissue eosinophilia. Although high tissue eosinophilia was

statistically significantly (p<0.001) correlated with T2 endotype, sensitivity was 77.8%, specificity was 64.9%, positive predictive value (PPV) was 58.3%, and negative predictive value (NPV) was 82.2%.

Conclusions:
High tissue eosinophilia as a marker for T2 inflammation among CRSsNP patients has moderate sensitivity and NPV and poor specificity and PPV. Future studies should not define T2 inflammation in CRSsNP patients based on tissue eosinophilia alone.

1:46 pm – 1:52 pm
Levels of nasal nitric oxide and inducible nitric oxide synthase expression in chronic rhinosinusitis with nasal polyposis
Vincent Wu, MD
John Lee, MD
Michael Cusimano
Philip Marsden
University of Toronto

Background:
Nasal NO (nNO) is lowered in chronic rhinosinusitis with nasal polyposis (CRSwNP), but the mechanism remains largely unknown. We aimed to correlate levels of nNO and inducible nitric oxide synthase (iNOS) expression in CRSwNP, and elicit differences in the activation of inflammatory genes in CRSwNP.

Methods:
CRSwNP patients and controls without CRSwNP undergoing sinonasal surgery were recruited. SNOT-22, endoscopy, CT scores, and nNO were captured preoperatively. mRNA extraction and quantification were performed from sinonasal mucosal biopsies. NanoString nCOUNTER was used to detect mRNAs levels as marker of gene activation. Western Blots were performed to quantify iNOS protein. Statistical analyses correlated nNO levels, SNOT-22, endoscopy, and CT scores between groups.

Results:
20 patients (10 CRSwNP, 10 control) were recruited and completed the study. CRSwNP had lowered nNO (136.6 +/- 106.2) vs. control (260.7 +/- 100.7), p<0.05. SNOT-22 was statistically higher in CRSwNP (57.9 +/- 18.5) vs. control (19.4 +/- 15.9), p<0.05. Endoscopy and CT scores were significantly higher for CRSwNP vs. control, p<0.05. Endothelial cell NOS (eNOS) mRNA was significantly higher in control as compared to cases (p<0.05), with decreased iNOS levels in CRSwNP trending towards significance (p<0.1). Qualitative analysis of preliminary Western blots confirmed the presence of iNOS in the control group only.

Conclusion:
We re-demonstrated CRSwNP patients had decreased nNO and increased SNOT-22, endoscopy, and CT scores. iNOS was only found in control mucosal samples on preliminary analysis. While we noted a significant decrease of eNOS in CRSwNP, iNOS levels were decreased but trending towards significance.

1:53 pm – 1:59 pm
Cadaveric histologic assessment of autonomic nerve fiber densities in different nasal nerves
Raven Dunn, MD
John Craig, MD, FARS
Amrita Ray, MD
Jacob Eide, MD
Christian Keller
Henry Ford Health

Background:
When medical therapies fail to alleviate rhinitis-related rhinorrhea, surgical interventions aim to decrease cholinergic innervation to serous nasal mucosal glands. Published techniques have been directed at pre-synaptic parasympathetic fibers in the vidian nerve, or post-synaptic fibers in posterior nasal nerves. This cadaveric study investigated the relative densities of parasympathetic and sympathetic nerve fibers in different nasal nerves.

Materials and Methods:
Ten fresh cadaver heads were dissected and 1 cm sections were harvested unilaterally from the posterior nasal nerve (PNN), sphenopalatine nerve (SPN), and anterior ethmoid nerve (AEN). Specimens were processed and stained for parasympathetic (choline acetyltransferase) and sympathetic (tyrosine hydroxylase) nerve fibers, then reviewed by a pathologist. When nerve tissue was identifiable, nerve fiber density was determined by hand counting the number of stain dots per 0.0025 mm2 on high-powered histologic view. Density measurements were taken from 3 regions of each nerve specimen and averaged. Autonomic nerve fiber densities were then compared between PNN, SPN, and AEN specimens.

Results:
In total, 10 SPN, 5 PNN, and 5 AEN specimens were available for analysis. Parasympathetic and sympathetic nerve fibers were identified in every PNN, SPN, and AEN specimen, and autonomic nerve fiber densities were similar between the PNN, SPN, and AEN (p>0.05).

Conclusion:
Parasympathetic and sympathetic nerve fiber densities were equivalent between PNN, SPN, and AEN specimens. For rhinitis-related rhinorrhea, future studies should explore whether SPN plus PNN transection outperforms PNN transection alone, and whether AEN transection could be beneficial in select cases.

2:00 pm – 2:05 pm
Q&A

2:05 pm – 2:45 pm
PANEL: Recurrent and Locally Advanced Sinonasal Malignancies: Modern Management Options
Moderator: Brian Thorp, MD, FARS
Panelists: Edward Kuan, MD, FARS; Kibwei McKinney, MD; Zara Patel, MD, FARS; Laura Van Gerven, MD
Sponsored by Skull Base and Orbital Surgery Section

2:45 pm - 3:15 pm
Break

Scientific Oral Presentations: Sinonasal and Skull Base Tumors

Moderators: Kibwei McKinney, MD; Kenneth Rodriguez, MD

3:15 pm – 3:21 pm
Outcomes of immunotherapy treatment in sinonasal melanoma: A CORSICA multi-institutional study
Rijul Kshirsagar, MD
Jacob Eide, MD
Arash Abiri, BS
Michelle Hong
Christopher Le, MD, FARS
Garret Choby, MD, FARS
Mathew Geltzeiler, MD, FARS
Eric Wang, MD, FARS
Edward Kuan, MD, FARS
James Palmer, MD, FARS
Nithin Adappa, MD, FARS
Kaiser Permanente

Background:
Sinonasal mucosal melanoma (SNMM) has poor survival despite multi-modality treatment. While the impact of Immunotherapy (IT) on metastatic cutaneous melanoma is well-defined, there is relatively little data in SNMM. We sought to use the CORSICA network – a multi-institutional collaborative approach to sinonasal malignancy – to define IT outcomes in this patient population.

Methods:
A retrospective cohort study evaluated patients treated with IT during their overall treatment strategy for SNMM. Patient demographic, treatment, and survival outcomes were recorded in a retrospective fashion. The primary outcome measure was overall survival with disease specific survival being a secondary outcome.

Results:
Of 196 SNMM patients, 52 had IT treatment, with an average age at diagnosis of 69.1 +- 11.9 years. There were 27 females (51.9%). Most patients were white (n=40, 76.9%). 10 patients (21.2%) had metastatic disease on presentation. Patients were most commonly AJCC Stage IVa (n=17, 32.7%). Most common treatment strategy included surgery with radiation and IT (n=26, 50%). Most regimens consisted of a combination of Nivolumab and Ipilimumab (n=15, 28.8%) or pembrolizumab (n=14, 26.9%), with an average treatment duration of 9.8 +- 11.8 months. Two patients (3.8%) underwent induction IT. Overall survival at 1-, 2-, and 5-years was 86.9%, 74.1%, and 39.1%, respectively. Twenty-five patients (48.1%) had a local treatment response while only 4 patients (7.7%) responded at a metastatic site.

Discussion:
Treatment outcomes in SNMM remain challenging despite the adoption of IT. Further research within our group will aim to look at optimal timing of IT and pathologic markers that are predictive of response to IT.

3:22 pm – 3:28 pm
Recurrent patterns for patients with sinonasal mucosal melanoma: A multi-institutional study
Vivek Pandrangi, MD
Jess Mace, MPH
Jacob Eide, MD
Nicholas Fung, MD
Michelle Hong
Brian Johnson
Rijul Kshirsagar, MD
Edward Kuan, MD, FARS
Christopher Le, MD, FARS
James Palmer, MD, FARS
Mathew Geltzeiler, MD, FARS
Oregon Health & Science University

Objective:
To evaluate recurrence patterns and survival after recurrence among patients with sinonasal mucosal melanoma (SNMM).

Methods:
Multi-institutional retrospective review from 7 institutions in the US of patients with SNMM from 1991-2022. Recurrence was categorized as local, regional or distant. Kaplan-Meier tests were used to evaluate disease-free survival (DFS) and overall survival (OS), with log-rank tests used for comparisons.

Results:
Among 196 patients identified, age at diagnosis was 69.7±12.5 years, 54.6% were female, 60-month DFS was 20.8% and 60-month OS was 44.7%. Patients with recurrence (n=146, 74.5%) had worse 60-month OS than patients without recurrence (40.3% vs. 65.7%, p=0.018). The most common treatments for

recurrence were immunotherapy (67.7%), surgery (51.5%), and radiation therapy (50.0%). Among patients with local recurrence (24.2%), median recurrence time was 21.0 months (range: 0-140). Among patients with regional recurrence (15.2%), median recurrence time was 11.0 months (range: 1-52). Among patients with distant recurrence (60.7%), median recurrence time was 9.5 months (range: 0-163). Distant recurrence was associated with worse 60-month OS (local: 53.3%, regional: 55%, distant: 31.3%; p=0.032). The most common sites of distant recurrence were bone (n=26), liver (n=25), lung (n=24), and brain (n=14), with differences in 24-month OS (bone: 50.0%, liver: 80.0%, lung: 87.5%, brain: 33.3%; p=0.049), but not 60-month OS (p>0.05) based upon recurrence site.

Conclusion:
SNMM is associated with a high recurrence rate and poor 60-month OS across all recurrence subgroups. Distant recurrence to the brain and bone were associated with reduced 24-month OS, but not 60-month OS.

3:29 pm - 3:35 pm
The impact of focal hyperostosis and attachment point on recurrence rate of primary and revision sinonasal inverted papillomas
Vidit Talati, MD, MS
Katie Holland, MD
Shehbaz Ansari, MD
Peter Filip, MD
Sarah Khalife, MD
Pedro Escobedo, Medical Student
Miral Jhaveri, MD, MBA
Bobby Tajudeen, MD, FARS
Peter Papagiannopoulos, MD
Pete Batra, MD, FARS
Rush University Medical Center

Background:
Focal hyperostosis on computed tomography (CT) often correlates with the attachment point of sinonasal inverted papillomas (IP). There is limited data on how IP location or recurrence affects CT features or if discordance between hyperostosis and surgical attachment point impacts recurrence.

Methods:
A retrospective review of primary and recurrent IPs resected from 2006-2022 was performed. CTs were reviewed by a neuroradiologist blinded to operative details. IP with malignancy was excluded. Operative reports and long-term follow-up data were also evaluated.

Results:
There were 92 IPs total including 19 previously treated cases. 60.1% had focal hyperostosis and 25% had no bony changes on CT. Hyperostosis rates for maxillary, ethmoid, and nasal cavity IPs were 77.1%, 80.9%, and 42.9%, respectively (p = 0.028). Hyperostosis rates for 4 frontal and 5 sphenoid IPs were 60% and 100%, respectively. Primary and recurrent IPs had similar rates of agreement between hyperostosis and attachment point (65.2% vs. 70%; p = 0.23). Overall, 16 (17.4%) IPs recurred. Recurrence rate did not differ based on primary versus recurrent IP (7.3% vs. 18.8%; p = 0.21), presence of hyperostosis (21.4% vs. 11.1%; p = 0.20), or hyperostosis-attachment point agreement (27% if agreed vs. 10% if not; p = 0.26). There was increased recurrence with multiple attachment points (33.3% vs. 11.4%; p = 0.024).

Conclusion:
Primary and recurrent IPs have a similar rate of hyperostosis and agreement between hyperostosis and attachment point. Nasal cavity IPs are less likely to have focal hyperostosis. Higher recurrence was associated with multiple attachments but not revision surgery, absence of hyperostosis, or hyperostosis-attachment point discordance.

3:36 pm – 3:42 pm
The impact of neoadjuvant chemotherapy on resection margins in locoregionally advanced sinonasal squamous cell carcinoma: A NCDB cohort study
Mena Said, MD
Shady Soliman
Farhoud Faraji, Resident Physician
Leo Meller
Carol Yan, MD
Adam DeConde, MD

Background:
Neoadjuvant chemotherapy (NC) has been associated with improved overall survival (OS) in locoregionally advanced sinonasal squamous cell carcinoma (SNSCC). The impact of NC on surgical resection margin status is unknown. This study investigates the impact of NC on resection margin status and OS in T3 and T4 SNSCC treated with either upfront surgery or with NC followed by definitive surgery (NC+S).

Methods:
A retrospective cohort study using the National Cancer Database (NCDB) was performed. All adult patients with T3 and T4 SNSCC from 2004 to 2017 without distant metastasis who underwent treatment with curative intent were included. Data was extracted to assess the primary outcome of resection margin status and secondary outcome of OS. Unadjusted and adjusted logistic regression and cox proportional hazards models were performed to evaluate predictors of positive margins. Univariate Kaplan-Meier analyses were compared by log-rank test to evaluate OS.

Results:
Of 3,671 subjects with T3 and T4 SNSCC, 2.9% received NC+S, 71% underwent upfront surgery, 26.1% received definitive chemoradiotherapy (XRT). The NC+S group was more likely to have clinically positive nodes and T4 disease (p<0.01). Positive margins were less likely associated with the NC+S (n=33/106) versus upfront surgery cohort (n=873/2589) based on adjusted logistic regression (OR: 0.64, 95%CI[0.43-0.97). NC+S conferred improved survival in T4 tumors (HR=0.69, 95%CI[0.50-0.96]). OS was significantly associated with T4 category, N2 category, and positive margins. NC+S and upfront surgery were associated with improved OS compared to XRT (p<0.01).

Conclusion:
The use of NC+S in locoregionally advanced SNCC may improve resection margin status and prognosis.

3:43 pm - 3:49 pm
Racial and ethnic disparities in the presentation size and timing of pituitary adenomas resected via endoscopic endonasal approach
Jonathan Pang, BA
Theodore Nguyen, BS
Katelyn Dilley, BS
Zena Del Mundo, BS
Arash Abiri, BS
Frank Hsu, MD, PhD
Edward Kuan, MD, FARS
University of California, Irvine

Background:
Understanding of socioeconomic factors has revealed disproportionate disease burdens and outcome disparities in pituitary adenomas (PAs). We examine presentation size and timing of surgically resected PAs through the lens of race and ethnicity.

Methods:
Retrospective chart review was conducted at a single-center, tertiary academic skull base surgery program including consecutive PA patients who underwent endoscopic endonasal surgery between August 2018 and June 2022. Primary outcomes were tertiles of tumor size at diagnosis (mm) and diagnosis to surgery time (DTS) (days).

Results:
127 patients were included. Pituitary apoplexy incidence was associated with uninsurance (50.0% vs. 13.3%, P=0.014) and Cushing's disease with white race (29.2% vs. 11.4%, P=0.012). Increasing size tertile was associated with nonwhite race (52.3% vs. 57.1% vs. 80.0%, P=0.017), Hispanic/Latinx ethnicity (43.2% vs. 26.2% vs. 65.0%, P=0.002), and shorter DTS (381.0±479.7 vs. 168.6±218.3 vs. 69.2±95.6 days, P<0.001). Both race (P=0.026) and ethnicity (P=0.001) maintained association with size tertile upon multivariable regression. Within the largest size tertile, nonwhite race was associated with larger PAs (36.6±8.9 vs. 29.9±2.5, P=0.043), shorter DTS (53.6±73.1 vs. 131.6±147.5, P=0.037), and lower rates of private insurance (25.0% vs. 62.5%, P = 0.043); Hispanic/Latinx ethnicity also associated with larger PAs (37.5±9.1 vs. 30.9±4.8, P=0.016) and lower private insurance (19.2% vs. 57.1%, P=0.015).

Conclusion:
In this practice setting, nonwhite race and Hispanic/Latinx ethnicity were associated with larger PA size at diagnosis and shorter DTS, likely due to advanced disease. Such findings warrant attention for disparities in PA management.

3:50pm – 3:56 pm
Decreased baseline quality of life outcomes in patients with sinonasal malignancies
Cara Maya Fleseriu, BS
Daniel Beswick, MD, FARS
Peter Hwang, MD, FARS
Garret Choby, MD, FARS
Edward Kuan, MD, FARS
Nithin Adappa, MD, FARS
Mathew Geltzeiler, MD, FARS
Anne Getz, MD, FARS
Ian Humphreys, DO, FARS
Christopher Le, MD, FARS
Eric Wang, MD, FARS

Background:
The impact of sinonasal malignancies(SNM) on quality of life(QOL) is poorly understood at presentation. The Sinonasal Outcome Test(SNOT-22) and University of Washington Quality of Life(UWQOL) are validated QOL instruments with distinctive subdomains. This study aims to identify factors impacting pretreatment QOL in SNM patients to personalize multidisciplinary management and counseling.

Methods:
Patients with previously untreated SNM were prospectively enrolled (2015-2022) in a multicenter observational study. Baseline pre-treatment QOL instruments (SNOT-22, UWQOL) were obtained along with demographics, comorbidities, histopathology/staging, tumor involvement and symptoms. Multivariate linear and logistic regression models identified factors associated with reduced baseline QOL.

Results:
Among 204 patients, presenting baseline QOL was significantly reduced. Multivariate regression showed significantly worse total SNOT-22 QOL in patients with skull base erosion(p=0.02). SNOT-Rhinologic QOL was significantly worse in women(p=0.008), patients with epistaxis(p=0.021), and nasal

obstruction(p=0.04). Patients were less likely to report high QOL in the presence of PNI on UW-Health(p=0.019) and orbital erosion on UW-Overall(p=0.03). UW-Social QOL was significantly worse in patients with palate involvement(p=0.023) and perineural invasion(PNI) (p=0.005).

Conclusions: Our
findings demonstrate a negative impact on baseline QOL in patients with SNM and suggest sex specific and symptom related lower QOL scores, with no histopathology association. Anatomical tumor involvement may be more reflective of QOL than T-staging, as orbital involvement, PNI and skull base erosion are significantly associated with reduced baseline QOL.

3:57 pm - 4:05 pm
Q&A

4:05 pm - 4:20 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Diagnosing and Managing Odontogenic Sinusitis: Review of Multidisciplinary Consensus Guidelines
Moderator: John Craig, MD, FARS
Panelists: Jose Mattos, MD; David Poetker, MD, FARS

Scientific Oral Presentations: Systemic Diseases, Environment, and the Sinuses

Moderators: David Gudis, MD, FARS; Ashleigh Halderman, MD, FARS; Patricia Loftus, MD, FARS

4:20 pm – 4:26 pm
Does weather affect sinus symptoms? A SNOT-22 study
Sebastian Dobrow, MD, MPH
Katherine Franklin, Medical Student
Julian De La Chapa, Post-Graduate Research Fellow
Andrew Strumpf, Research Specialist Senior
Robert Davis, Professor
Jose Mattos, MD

Background:
Previous studies have correlated environmental pollutant exposures with sinonasal (SN) symptoms, however little work has been done investigating weather effects. The purpose of this study is to assess the association between environmental factors, such as weather measures, and SNOT-22 scores.

Methods:
SNOT-22 scores were recorded at time of clinic visit for patients being seen at a tertiary center rhinology practice from 1/2010 - 3/2020 and lived within zip codes included by proximity to environmental monitors. Spatial synoptic classification (SSC), a nominal, multivariate weather classification based on temperature, dew point, wind, pressure, and cloud cover, was calculated for each day of the year. Chi squared tests were used to compare rates of high (>50) mean SNOT-22 scores between the 7 SSC categories. Analysis included same-day and up to 3-day lag SNOT-22 scores.

Results:
A total of 1145 SNOT-22 scores were recorded. Patients were mostly male (54.2%) with a mean age of 51.8 ± 18.0 years and a median SNOT-22 score of 27 (IQR = 13-45). Diagnoses included acute sinusitis (46.6%), allergic rhinitis (55.0%), nonallergic rhinitis (40.2%), chronic rhinosinusitis (CRS) with nasal polyposis (NP) (29.2%), CRS without NP (79.3%), and mechanical issues such as deviated septum (29%). High mean SNOT-22 scores were twice as likely on cold, dry days or days with significant weather changes (frontal passage) (OR = 2.0 [1.4, 2.8]). High SNOT-22 scores were least likely on warm, humid days.

Conclusions:
This study offers evidence supporting an effect of weather on SN symptoms, a common patient observation with little support in existing literature. Future studies should investigate different climates and possible mechanisms.

4:27 pm – 4:33 pm
Predictors of improvement in SNOT-22 scores after highly effective modulator therapy in people with Cystic Fibrosis: A multi-center analysis
Jessa E. Miller, MD
Daniel Beswick, MD, FARS
Jonathan Overdevest, MD
Anna Zemke, Assistant Professor
Aastha Khatiwada, Assistant Professor
David Gudis, MD, FARS
Adam Kimple, MD, FARS
Jeremy Tervo, Medical Student
Brent Senior, MD, FARS
Amanda Stapleton, Associate Professor
Jennifer Taylor-Cousar, Professor
University of California, Los Angeles

Introduction:
Chronic rhinosinusitis (CRS) in people with cystic fibrosis (PwCF) improves after elexacaftor/tezacaftor/ivacaftor (ETI). Prior work found a minimal clinically important difference (MCID) of 7.2 points for the 22-item SinoNasal Outcome Test (SNOT-22) in PwCF. This study aimed to identify factors associated with clinically meaningful improvement in SNOT-22 scores after ETI.

Methods:
This study utilized data from three prior prospective studies conducted at four centers. PwCF completed the SNOT-22 questionnaire at baseline and 3-6 months after ETI initiation. Demographics and clinical history were collected. Multivariable regression was performed to identify factors that predicted improvement in SNOT-22 using two outcomes: 1) a binary outcome depicting whether participant responses exceeded the MCID from baseline to follow-up and 2) a continuous outcome depicting change in SNOT-22 from baseline to follow-up.

Results:
101 PwCF were included. In the binary outcome model, worse baseline SNOT-22 scores were associated with greater improvement in SNOT-22 scores after ETI; for every point increase in baseline SNOT-22, the odds of exceeding the MCID increased by 5.0% ($p<0.001$, 95% CI 1.02-1.08). Compared to F508del heterozygotes, F508del homozygotes were 7.6x more likely to demonstrate improvement exceeding the SNOT-22 MCID ($p=0.008$, 95% CI 1.84-39.2). PwCF with no prior modulator therapy were 5.6x more likely to demonstrate improvement exceeding the SNOT-22 MCID ($p=0.014$, 95% CI 1.51-24.3). These results were consistent when SNOT-22 scores were treated as a continuous variable.

Conclusion:
Worse baseline SNOT-22 scores, F508del homozygosity, and absence of prior modulator therapy predicted SNOT-22 improvement after ETI.

4:34 pm – 4:40 pm
Assessment of individual sinus characteristics and patient-reported outcomes in people with Cystic Fibrosis
Jessa E. Miller, MD
Jennifer Taylor-Cousar, Professor
Stephen Humphries
Aastha Khatiwada
David Lynch, Professor
Douglas Li
Daniel Beswick, MD, FARS
University of California, Los Angeles

Introduction:
Oral elexacaftor/tezacaftor/ivacaftor (ETI) improves multiple health outcomes including chronic rhinosinusitis (CRS) in people with cystic fibrosis (PwCF). Prior studies have failed to demonstrate a consistent correlation between subjective and objective measures of CRS; however, these studies focused on overall disease severity rather than the contribution of individual sinuses. This study aimed to evaluate opacification of individual sinuses and identify correlations between sinus characteristics and 22-item SinoNasal Outcome Test (SNOT-22) scores before and after ETI.

Methods:
PwCF/CRS were enrolled in a prospective study at an accredited CF care center. SNOT-22 scores and sinus computed tomography (CT) scans were obtained at baseline and after 6 and 24 months of ETI. Individual sinus volumes and opacification were measured on CT using a deep learning algorithm. Correlations between sinus characteristics and SNOT-22 scores were evaluated.

Results:
Thirty PwCF completed the study (mean age: 35.6 years). Opacification of all sinuses decreased ($p<0.001$) while frontal volume increased ($p<0.01$) after 6 and 24 months of ETI. After 24 months of ETI, greater sphenoid opacification was correlated with worse SNOT-22 rhinologic and extranasal rhinologic domain scores ($p<0.05$). Larger sphenoid volumes were associated with worse SNOT-22 total scores at all time points ($p<0.05$). Total SNOT-22 scores remained positively correlated with sphenoid volumes in longitudinal analysis ($p<0.05$).

Conclusion:
Opacification of all sinuses decreased after ETI. Sphenoid size and opacification appear to play a prominent role in the symptomatology of CF/CRS. Increased frontal sinus volume after ETI is unanticipated and merits further study.

4:41 pm – 4:47 pm
Risk factors for invasive fungal sinusitis among immunosuppressed bone marrow transplant recipients
Marie-Ange Munyemana, BA
Apunam Pandey
Nyssa Farrell, MD
John Schneider, MD
Lauren Roland, MD
Washington University in St. Louis

Introduction:
Invasive fungal sinusitis (IFS) is a highly fatal infection that predominately affects immunocompromised individuals. Although rare, improved survival rates for hematologic malignancies coupled with expanding use of immunosuppressive therapies continue to increase the population most susceptible for developing this aggressive infection.

Methods:
This study explored hematopoietic cell transplantation (HCT) factors associated with development of IFS. A cohort of 3,557 HCT recipients were identified and followed prospectively. HCT recipients who developed IFS were compared to unaffected patients to identify HCT factors that predispose to IFS. Statistical analysis was conducted using Chi-square (X2) test and odds ratio (OR). Effect sizes were reported using proportion difference with 95% confidence intervals.

Results:
Twenty-one patients with pathology proven IFS were identified. Compared to unaffected HCT recipients, patients with IFS more frequently received allogenic vs autologous transplantation (OR=5.6(1.9-16.6), X2=12.0, diff=0.4(0.2-0.6), p<0.001). Type of conditioning regimen prior to HCT was found to impact IFS development, a greater proportion of affected patients underwent total body irradiation (TBI) (OR=3.5(1.3-9.2), X2=7.2, diff=0.2(0.01-0.5), p=0.007). Affected individuals more frequently had history of multiple transplants (OR=4.0(1.7-9.6), X2=8.6, diff=0.2(0.01-0.4), p=0.003) or graft-versus-host disease (OR=3.6(1.4-9.0), X2=11.6, diff=0.3(0.1-0.5), p<0.001).

Conclusion:
Among HCT recipients, allogenic transplants, TBI conditioning, history of multiple transplants or graft-vs-host disease confer higher risk for IFS. This highly vulnerable population should be carefully surveilled.

4:48 pm – 4:54 pm
Does air pollutant exposure impact disease severity or outcomes in chronic rhinosinusitis?
Amarbir Gill, MD
Jeremiah Alt, MD, PhD, FARS
Robert Hagedorn, Medical Student
Benton Tullis
Cassidy Nguyen
Jess Mace, MPH
Zachary Soler, MD, FARS
Timothy Smith, MD, FARS
Vijay Ramakrishnan, MD, FARS
Daniel Beswick, MD, FARS
Ryan Stockard

Background:
Poor air quality increases the risk of developing chronic rhinosinusitis (CRS) and other airway diseases. However, there are limited data on air pollutants and CRS-specific disease severity. We assessed the impact of air pollutants on sinonasal-specific and general quality-of-life (QOL) measures in a multi-institutional cohort of patients with CRS.

Methods:
Participants with CRS were prospectively enrolled in a cross-sectional study and self-selected continued appropriate medical therapy or endoscopic sinus surgery (ESS). The 22-item SinoNasal Outcome Test (SNOT-22) and Medical Outcomes Study Questionnaire Short-Form 6-D (SF-6D) health utility value scores were recorded. Patient exposure to air pollutants was determined using residence zip codes. Mann-Whitney U testing was performed and correlation coefficients, as well as 95% confidence intervals (CIs), were calculated.

Results:
486 patients were enrolled and followed for a mean of 6.9 months. Prior sinus surgery was associated with higher levels of fine particulate matter (PM2.5) (Δ= 0.12, (95% CI: 0.003, 0.234); p=0.006). Pollutant exposure was not significantly correlated with baseline SNOT-22 or SF-6D scores. PM2.5, PM10 and nitrogen dioxide concentrations did not correlate with change in total SNOT-22 or SF-6D scores after treatment. Nevertheless, sulfur dioxide (SNOT-22: ρ= -0.121 (95% CI: -0.210, -0.030); p=0.007; SF-6D: ρ=0.095 (95% CI: 0.002, 0.186); p=0.04) and carbon monoxide (SNOT-22: ρ= -0.141 (95% CI: -0.230, 0.050); p=0.002) exposure did correlate with the outcome measures.

Conclusion:
Air pollutants may contribute, at least partially, to disease severity in CRS; future investigation is needed to further elucidate the nature of this relationship.

4:55 pm – 5:00 pm
Q&A

5:00 pm - 5:15 pm
Business Meeting

5:30 pm - 7:00 pm
ARS President's Welcome Reception
Sheraton Hotel – Republic Ballroom

Thursday, May 4, 2023
Afternoon Concurrent Session – Room 304/306
1:00 pm – 5:00 pm EST

12:00 pm - 1:00 pm
Lunch with Exhibitors

Scientific Oral Presentations: Nasal and Sinus Surgery

Moderators: Angela Donaldson, MD, FARS; Devyani Lal, MD, FARS; R. Peter Manes, MD, FARS

1:00 pm - 1:06 pm
Comparing outcomes of limited versus extensive sinus surgery for chronic rhinosinusitis: A systematic review and meta-analysis
Shreya Pusapadi Ramkumar, BS
Lisa Marks
Devyani Lal, MD, FARS
Michael Marino, MD, FARS
Mayo Clinic Hospital, Phoenix, AZ

Background:
Although endoscopic sinus surgery (ESS) is critical to

management of medically recalcitrant chronic rhinosinusitis (CRS), literature related to the impact of surgical extent for patients is limited. This systematic review and meta-analysis was conducted to synthesize the published data.

Methods:
A systematic search of electronic databases was performed to identify English language studies published between 2010 and 2022. Comparative studies that explored extent of ESS in CRS patients with nasal polyps (CRSwNP) and without (CRSsNP) were included. Outcomes studied included rates of polyp recurrence, revision surgery, and improvement in patient reported outcomes.

Results:
The search generated 334 unique references. Seven articles met inclusion and exclusion criteria. Definition of limited and extensive ESS was heterogeneous in these studies. CRSwNP patients who underwent Draf3 had lower revision surgery rates than patients who underwent more limited procedures (OR=0.19, 95%CI 0.09,0.40). Patients who underwent Draf3 also had lower polyp recurrence rates compared to more limited procedures, but this was not statistically significant (OR=0.59, 95%CI 0.33,1.07). Extensive surgery was more frequently performed in CRSwNP than CRSsNP patients, but was not significant (OR=3.17, 95% CI 0.43,23.41). Postoperative SNOT-22 scores were not significantly different in subjects undergoing limited versus extensive surgery (OR=4.17, 95% CI -1.60,9.94).

Conclusions:
Based on a limited number of studies, the performance of more extensive procedures, such as Draf3, may be associated with decreased revision surgery in CRSwNP. However, there was no difference in postoperative Snot-22 scores or polyp recurrence rates based on surgical extent.

1:07 pm - 1:13 pm
The benefits and risks of non-steroidal anti-inflammatory drugs for postoperative analgesia in sinonasal surgery: A systematic review and meta-analysis
Daniel Lee, MD
Elysia Grose
Connor Brenna
Justine Philteos
David Lightfoot
Keshinisuthan Kirubalingam
Yvonne Chan, MD, FARS
John Lee, MD
University of Pennsylvania

Background:
Non-steroidal anti-inflammatory drugs (NSAIDs) have emerged as an alternative to opioids for optimal postoperative analgesia. However, the adoption of NSAIDs in sinonasal surgery has been due to a theoretical concern for postoperative bleeding. Our objective is to systematically review the efficacy and safety of NSAIDs for patients undergoing sinonasal surgery.

Methods:
MEDLINE, EMBASE, the Cochrane Central of Controlled Trials, CINAHL and WHO ICTRP were searched from inception to January 27, 2022. Randomized controlled trials (RCT) and comparative observational studies were included. The outcomes of interest were post-operative pain scores, requirement for rescue analgesia and post-operative adverse events (epistaxis, nausea, and vomiting).

Results:
Out of 4,661 screened records, 15 RCTs (enrolling 1,210 patients) and 2 observational studies were included. Following endoscopic sinus surgery, there was no difference in pain scores between NSAIDs and non-NSAIDs groups (Standardized mean differences [SMD] 0.44 units, 95%CI -1.05-0.18). Following septorhinoplasty, NSAIDs decreased pain scores compared to non-NSAIDs analgesic regimens (SMD 1.14 units better, 95%CI 0.61-1.67 units better). The NSAIDs reduced the needs for rescue medication with a relative risk (RR) of 0.45 (95%CI 0.24-0.84). In addition, the administration of NSAIDs decreased risk of nausea with a RR of 0.62 (95%CI 0.42-0.91) but did not increase the risk of epistaxis (RR 0.72, 95%CI 0.23-2.22). Two observational studies were not informative due to high risk of bias.

Conclusion:
Among patients undergoing sinonasal surgery, NSAIDs are beneficial in postoperative analgesia and reduction of nausea without elevating the risk of postoperative epistaxis.

1:14 pm – 1:20 pm
Race in endoscopic sinus surgery: A matched cohort study
Firas Hentati, BS
Jaehee Kim, Ms.
David Hoying, Mr.
Brian D'Anza, MD
Kenneth Rodriguez, MD

Background:
Endoscopic sinus surgery (ESS) is often successful in providing long-term relief for patients suffering from chronic rhinosinusitis (CRS), but revision surgery may be needed. Literature regarding the impact of race in studies assessing chronic rhinosinusitis is limited.

Methods:
A retrospective matched cohort study of patients that underwent ESS for CRS between 1/1/2015 and 6/1/2021 at a single tertiary care academic center

was conducted. Patients were stratified by race (White and Non-White) and matched 1 to 1 by sex and age (+/- 5 years). Socioeconomic status was evaluated using the Area of Deprivation Index (ADI).

Results:
Of the 298 patients included in the study, 149 are White and 149 are Non-White, 111 (37.2%) have chronic sinusitis with nasal polyposis (CRSwNP), 141 (47.3%) had allergic rhinitis, 90 (30.2%) had asthma and 22 (7.4%) required revision ESS. Non-White patients were 3.62 times more likely to present with CRSwNP (95% CI 2.2-5.96) and had 2.87 times increased risk for requiring revision ESS than age and sex matched White patients (95% CI 1.090-7.545). The median ADI for Non-White (6.00) was significantly higher than for White patients (3.00) ($p<0.001$) and 21.5% more Non-White patients presented with Medicaid ($p<0.001$). There was no difference among the groups in rates of asthma or allergic rhinitis.

Conclusion:
Non-White patients undergoing ESS for CRS are more likely present from areas with fewer resources, be underinsured, and require revision surgery than sex and age matched White patients. Further research is needed to determine if these social and socioeconomic factors may lead to an increased burden of revision sinus surgery.

1:21pm – 1:27 pm
Impact of dual electronic and conventional cigarette use on diagnosis and surgery for chronic rhinosinusitis: A multicenter study
Graham Pingree, BA
Johnathan DeShazo, Associate Professor
Theodore Schuman, MD, FARS
VCU School of Medicine

Introduction:
Dual use of electronic (EC) and conventional cigarettes (CC) is increasing, although the long-term health outcomes of EC remain unclear. Both CC and EC are associated with sinonasal disease, but the impact of dual dependence is not established.

Methods:
The TriNetX Analytics Research Network, comprised of 114 million global de-identified electronic medical records, was queried from 2012-2022 for subjects aged >12 years in the following cohorts: dual CC/EC dependence (n=107,834), solo CC dependence (n=2,362,967), solo EC dependence (n=176,070), and never-smokers (n=85,876,982). The prevalence of diagnoses of chronic sinusitis or nasal polyposis and use of endoscopic sinus surgery (ESS) were compared among groups. Cohorts were balanced using propensity score matching for age, sex, BMI, and comorbid vasomotor/allergic rhinitis or asthma. Diagnoses of CRS or ESS were included if occurring >3 months after diagnosis of EC and/or CC dependence.

Results:
CC/EC subjects showed significantly higher risk ratios (RR=1.22;1.24), risk difference (RD=0.92%, $p<0.0001$; 0.41%,$p<0.0001$), and odds ratios (OR=1.23;1.25) for diagnosis of CRS compared to solo CC or EC users. Solo CC demonstrated higher RR (1.12), RD (0.18%,$p<0.0001$), and OR (1.13) for CRS than subjects with EC dependence alone. CC/EC had a higher RR (1.23;1.21), RD (0.09%,$p=0.001$; 0.08%,$p=0.005$), and OR (1.23;1.21) for ESS compared to solo CC or EC.

Conclusions:
In this large, global database, EC/CC dependence imparts an increased risk of CRS diagnosis and ESS compared to solo CC or EC use. Dual EC/CC use may have a synergistic effect on sinonasal inflammation, and given its increasing incidence, further study is warranted.

1:27 pm - 1:32 pm
Q&A

1:32 pm - 1:38 pm
Can the effect of oxymetazoline predict turbinate reduction surgical outcomes? A pilot computational fluid dynamic study
Kai Zhao, PhD
Thomas Lepley, Medical Student
Zach Root, Clinical Research Assistant
Zhenxing Wu, Postdoc
Robbie Chapman, Undergraduate Research Assistant
Aspen Schneller, Undergraduate Research Assistant
Kathleen Kelly, MD
Bradley Otto, MD
The Ohio State University

Background:
Turbinate hypertrophy is a frequent cause of nasal obstruction that often requires surgical reduction. A patient's responsiveness to oxymetazoline, a topical nasal decongestant, is often used clinically to decide whether the patient is a suitable surgical candidate. However, there have been limited studies that objectively compare the effects of oxymetazoline vs surgery on nasal morphology and aerodynamics, and whether such approach is valid to predict outcomes.

Methods:
3D computational fluid dynamic model was build based on one patient's CT scans at baseline, 30 minutes after topical oxymetazoline spray, and 8 weeks after bilateral turbinate reduction surgery, to compare nasal airflow patterns and resistance changes. A sham treatment of topical saline spray was performed prior to oxymetazoline to rule out placebo effect.

Results:
The effect of oxymetazoline is different and perhaps stronger than that of surgery, with 56% reduction in nasal resistance vs. 17% reduction post-surgery, and with greater increase in average air velocity of 128% vs 21% post-surgery. Morphologically, oxymetazoline affected the full length of inferior, middle, and even superior turbinates, whereas surgery only affected the site of operation. Interestingly, the patient's outcome is equally favorable after both: NOSE score dropped from 80 at baseline and after sham to 35 post-oxymetazoline, and to 30 post-surgery.

Conclusion:
Oxymetazoline and inferior turbinate reduction surgery have comparable clinical outcomes. Yet, they appear to impact nasal morphology and aerodynamics differently. Additional studies are warranted to rigorously test whether the responsiveness to oxymetazoline is a reliable predictor of satisfactory surgical outcomes.

1:39 pm – 1:45 pm
The effect of surgical correction of nasal obstruction on eustachian tube dysfunction
Rachel Daum, BS
David Grimm, BS
Jennifer Lee, MD
Jayakar Nayak, MD, PhD
Zara Patel, MD, FARS
Peter Hwang, MD, FARS
Michael Chang, MD

Background:
Nasal obstruction is often accompanied by eustachian tube dysfunction (ETD). The impact of nasal airway surgery on ETD is unknown.

Methods:
We conducted a retrospective study of adults undergoing surgery of the septum and/or turbinates for nasal obstruction. ETD was quantified using ETDQ7 score, collected at preop visit and each postop visit (1 week, 1 month, 3 month). ETDQ7>14.5 was deemed clinically significant disease, and ΔETDQ7>3.5 was deemed minimal clinically important difference (MCID). Those with prior ear surgery were excluded. Preop and postop scores were compared with t-test. Logistic regression analysis identified factors associated with achieving MCID.

Results:
96 patients were studied. 5 underwent septoplasty + inferior turbinate reduction (ITR) + concha bullosa resection (CBR), 62 septoplasty + ITR, 4 ITR + CBR, 22 ITR only, and 3 septoplasty only. 39 (40.6%) had ETD at baseline (mean 26.1±8.8). This cohort had significant postop improvement at 1 week (19.5±8.8, p=0.002), 1 month (18.1±7.3, p=0.0005), and 3 months (18.2±8.4, p=0.002). 30 (76.9%) achieved MCID. ETDQ7 items with significant improvement were pressure (p=0.002), pain (p=0.008), clogged sensation (p=0.02), symptoms during colds (p=0.002), and muffled hearing (p=0.002). Ear ringing (p=0.11) and crackling (p=0.17) did not improve. When controlling for baseline SNOT22 and concurrent medications, higher baseline ETDQ7 was associated with achieving MCID (OR 1.02, 95%CI 1.01-1.04), and comorbid asthma was negatively associated (OR 0.22, 95%CI 0.09-0.57). Of note, patients without baseline ETD (59.4%, mean 10.4±6.9) did not have significant postop change in ETDQ7.

Conclusion:
Surgical correction of nasal obstruction improves many ETD symptoms.

1:46 pm – 1:52 pm
Role of trigeminal sensation in subjective nasal obstruction
Craig Salvador, BS
Freddy Durrant
Tiffany Chen, Clinical Research Fellow
Tina Lapointe, Research Associate
Rodney Schlosser, MD, FARS

Objective:
Examine the effects of intranasal agents including a trigeminal antagonist lidocaine, a trigeminally active odorant eucalyptol, a decongestant oxymetazoline, and a control saline on subjective and objective nasal obstruction.

Study design:
Crossover study

Setting:
Tertiary medical center

Patients:
11 healthy, asymptomatic subjects were enrolled

Interventions/Main outcome measures:
Assessments included Nasal Obstruction and Septoplasty Effectiveness (NOSE) scale, Total Nasal Symptom Score (TNSS), visual analog scales (VAS), and objective peak nasal inspiratory flow (PNIF) test. Assessments were collected at the start of each intranasal assessment visit, and then repeated 10 minutes after exposure to each of the intranasal agents over a period of at least five consecutive days.

Results:
Saline did not change any subjective or objective metrics. Lidocaine worsened all subjective nasal obstruction assessments by 105-355% compared to baseline (P<0.05). When compared to saline

outcomes, lidocaine worsened all subjective nasal obstruction assessments, with scores ranging from 3-12 times worse than with saline (P<0.05). Oxymetazoline and eucalyptol did not result in a significant difference in subjective scores compared to baseline. Oxymetazoline significantly improved TNSS compared to saline. Eucalyptol did not affect subjective measures compared to control. None of the treatment agents significantly changed PNIF compared to control.

Conclusion:
Trigeminal nerve blockade using intranasal lidocaine spray significantly increased subjective nasal obstruction independent of objective airflow. Trigeminal nerve dysfunction may play a role in patients who suffer from refractory nasal congestion.

1:53 pm – 1:59 pm
Nasal surgery for the treatment of medically refractory rhinitis medicamentosa
William Li, MD
Richard Harvey, Professor
Larry Kalish, A/Prof

Background:
Limited treatment options exist for refractory Rhinitis Medicamentosa (RM). The role of surgery for RM, after failed medical management is not well defined. Mucosal contact points and restricted airflow often perpetuate decongestant use. This study assessed the long-term outcomes of nasal surgery in patients with refractory RM.

Methods:
A case-series study was performed. Consecutive adults (≥18 years) with RM who failed medical treatment and proceeded to turbinate/septal surgery were followed-up for ≥12mth. RM was defined as continuous nasal decongestant use once/day for ≥4 weeks. Patients with concomitant sinus disease and non-rhinitic conditions were excluded. Outcomes were current decongestant use, Sino-nasal Outcome Test (SNOT22), Nasal Symptom Score (NSS). Comparison was made between patients who ceased decongestants and those with ongoing use.

Results:
56 patients (age 48.4±5.0 years, 50% female) were assessed. Median follow-up was 3.4[4.6] years. 83.9% had history of ≥12mth decongestant use. Cessation of decongestants was achieved in 91.1%. Symptoms improved in 82.9% by MCID (mean ΔSNOT22: -24.4±18.6). In ongoing users, no difference was seen in allergy status (OR, 0.7[0.1-7.1]), previous surgery (OR, 1.0[0.1-10.2]), GORD (OR 1.0[0.1-10.2] or anxiety/depression (OR 6.1[0.8-45.9]) compared to those who ceased. Ongoing users had less symptom improvement (ΔSNOT22, -4.6±15.7 v 27.1±17.0, p=0.009; ΔNSS, -1.0±4.2 v -6.6±5.1, p=0.025) and used more nasal corticosteroid (60.0% v 5.9%; OR 24.0[2.8-203.1]) and saline sprays (40% v 3.9%; OR 16.3[1.7-159.8]).

Conclusion:
Surgically re-establishing a nasal airway was associated with long-term decongestant cessation and symptom improvement in medically refractory RM.

2:00 pm – 2:05 pm
Q&A

2:05 pm – 2:45pm
PANEL: Acute Invasive Fungal Sinusitis: Management in the Current Era
Moderator: Jean Kim, MD, FARS
Panelists: Eliza Brozek-Madry, MD, PhD; Charles Ebert, MD, FARS; Lauren Roland, MD, FARS; Masayoshi Takashima, MD, FARS

2:45 pm - 3:15 pm
Break with Exhibitors

Scientific Oral Presentations: Rhinology Potpourri

Moderators: Charles Ebert, MD, FARS; Charles Tong, MD, FARS

3:15 pm – 3:21 pm
Letters of recommendation for rhinology fellowship: Sentiment and deep learning linguistic differences based on applicant training location and gender of applicant and letter writer
Vikram Vasan, BA
Christopher Cheng, Mr.
David Lerner, MD
Alfred Marc Iloreta, MD

Background:
Rhinology fellowship directors place immense value on letters of recommendation (LORs) for applicants. This study evaluated general, sentiment, and linguistic differences between genders of the applicant and writer, and between IMGs and US-trained candidates.

Methods:
LORs for 2021 and 2022 applicants to a single rhinology fellowship program were reviewed. A natural language processing package generated sentiment scores for each LOR. A peer-reviewed tool, Empath, categorized words and phrases through a deep learning method of neural embedding over 1.8 billion words of modern fiction. T-tests compared between all groups.

Results:
168 LORs from 56 applicants (17.8% female; 44.6%

IMGs) were analyzed, and 82.1% of letter writers were male. Female (535.6vs.371.8; p<0.001) and US-trained (443.7vs.348.2; p=0.002) applicants had higher word counts. Additionally, female (0.998vs.0.994; p=0.02) and US-trained (0.997vs.0.993; p=0.001) applicants had higher sentiment scores. There were no differences in word count or sentiment score between genders of letter writers. Male applicants had more words of achievement (p=0.011), positive emotion (p=0.004), and masculinity (p=0.022), and IMGs had more work-related words (p=0.012).

Conclusion:
Though few females applied to rhinology fellowship, they had more words written about them and a more positive overall sentiment. However, linguistic content favors male applicants. IMGs had lower sentiment scores and were described more by their work and scholarly efforts. These findings may reflect biases in surgery, such as against female and IMG-applicants as has been previously described, and influence evaluation of Rhinology applicants.

3:22 pm – 3:28 pm
What does it mean to have 'congestion?' A multi-institutional comparison of patients and clinicians
Jakob Fischer, MD
Charles Riley, MD
Edward McCoul, MD, FARS
Walter Reed National Military Medical Center

Background:
Patients and clinicians differ in how they characterize common otolaryngology-related complaints, which can lead to miscommunication that impacts timeliness of care, patient satisfaction, and outcomes.

Methods:
Attending otolaryngologists and consecutive patients at five academic institutions in New Orleans, New York City, Seattle, St. Louis, and Washington D.C. were provided a questionnaire containing 16 common descriptors of the term 'congestion'. Responses were classified as obstructive, pressure, mucus or other symptoms. The primary outcome was frequency difference between patient and clinician perceptions of symptoms interpreted as congestion.

Results:
In total, 299 patients and 23 clinicians participated. Most patients (95%) selected from more than 1 symptom domain, and 31% of patients selected symptoms from all 4 domains. Clinicians had a narrower interpretation of congestion, selecting an average of 3.9±1.7 symptoms compared to 6.6±2.9 for patients. Clinicians were more likely to define congestion in terms of obstructive symptoms (difference, 7%; 95%CI, 4.1%-9.9%). Patients were more likely to define congestion in terms of pressure (difference, 40.5%; 95%CI, 20.4%-60.5%), mucus (difference, 48.5%; 95%CI, 28.2%-68.8%), and other symptom (difference, 38.5%; 95%CI, 28.4%-48.5%) domains. There were no differences in patient interpretation of symptoms related to 'congestion' across geographic regions.

Conclusion:
Although both patients and otolaryngologists define congestion using terms related to obstructive symptoms, patients across geographic regions frequently interpret non-obstructive symptoms as congestion, which may create barriers to communication.

3:29 pm - 3:35 pm
Eustachian tube dysfunction symptoms after endonasal skull base surgery
David Grimm, MS
Rachel Daum, BS
Christine Lee, Dr.
Juan Fernandez-Miranda, Dr.
Jayakar Nayak, MD, PhD
Zara Patel, MD, FARS
Peter Hwang, MD, FARS
Michael Chang, MD

Background:
The impact of endoscopic skull base surgery (ESBS) on eustachian tube function is unknown. We assess eustachian tube dysfunction (ETD) symptoms following ESBS.

Methods:
This was a retrospective study of adults undergoing ESBS. ETD was quantified using ETDQ7 questionnaire, collected at the preoperative visit and each postoperative visit at 2 and 6 weeks. Other recorded data included SNOT22, comorbidities, surgical site, reconstruction, and postoperative rinse use. Preoperative and postoperative ETDQ7 scores were compared using t-test. Linear regression analysis identified factors associated with change in ETDQ7.

Results:
99 patients were studied (22 anterior skull base, 54 central skull base, 5 posterior skull base, 19 multiple sites). Patients began with a mean preop ETDQ7 of 10.9 ± 7.0, had statistically significant worsening of ETDQ7 at 2 weeks (12.2 ± 7.2, p=0.023), and normalization of ETDQ7 at 6 weeks (11.6 ± 7.5, p=0.49). Postoperative ETDQ7 elevation at 2 weeks was primarily driven by ETDQ7 item of ear pressure (p=0.049). Postop ETDQ7 increase was significantly associated with comorbid asthma (β=6.80, 95%CI 0.78-12.82) and tobacco use (β=6.96, 95%CI 0.34-13.59). Higher baseline ETDQ7 was negatively associated with postop ETDQ7 increase (β=-0.35, 95%CI -0.71- -0.001). SNOT22 total and SNOT22 ear/facial subdomain were not predictive of ETDQ7

increase. ETDQ7 increase was not associated with surgical site (anterior vs central vs posterior skull base), nasoseptal flap use, septoplasty, or saline rinses.

Conclusion:
Patients may experience a temporary increase in ETD symptoms following ESBS, particularly those with asthma or tobacco use. Further study is needed to validate and understand these associations.

3:36 pm – 3:42 pm
Sinonasal disease severity influences patient perceived voice quality
Maria Espinosa, MD
Lauren Brewster, BS
Sylvia Adu-Gyamfi, MPH
Sarah Blumhardt, MS, CCC-SLP
K. Kelly Gallagher, MD
Meha Fox, MD
Julina Ongkasuwan, MD
Tran Locke, MD

Introduction:
There is scant literature regarding the effect of perceived sinonasal disease burden on perceived vocal quality. The purpose of this study is to examine the relationship between subjective voice and sinus-related quality-of-life measures using validated patient-reported outcome measures.

Methods:
From September 2021 to August 2022, 229 consecutive adult patients at a tertiary academic institution presenting for the diagnosis of nasal obstruction, allergic rhinitis, or chronic sinusitis were administered the 10-Item Voice Handicap Index (VHI-10) and the 22-Item Sinonasal Outcome Test (SNOT-22). SNOT-22 scores were stratified into none (0-8), mild (8-19), moderate (20-49) and severe (50-110) while VHI-10 score ≥ 11 was considered abnormal. VHI-10 and SNOT-22 scores were compared using Fischer's exact test, with an alpha value of 0.05 for significance. Based on previous literature, logistical regression analysis evaluated SNOT-22 scores ≥30 with abnormal VHI-10 scores.

Results:
There is a statically significant correlation between SNOT-22 and VHI-10 scores (p=0.0019). When stratified into none, mild, moderate, and severe SNOT-22 categories, individuals with moderate SNOT-22 scores have 77% decreased odds (OR 0.23, CI 0.099-0.541) of having an abnormal VHI-10 score compared to individuals with severe SNOT-22 scores. Moreover, individuals with SNOT-22 scores ≥30 have 5.6 times the odds of having an abnormal VHI-10, compared to individuals with SNOT-22 scores lower than 30 (OR 5.6, CI 1.66-19.18).

Conclusion:
There is a correlation between patient-perceived abnormal voice quality and increased patient-reported sinonasal disease severity. Future directions will further evaluate the effects of sinonasal surgery on voice.

3:43 pm - 3:49 pm
Inappropriate image duplications in rhinology research publications
Do-Yeon Cho, MD
Jessica Bishop, MD
Jessica Grayson, MD
Bradford Woodworth, MD, FARS
University of Alabama at Birmingham

Introduction:
Duplicated images in published articles are a major concern as it reduces the integrity and credibility of biomedical science. Of published papers, 3.8% have been identified to contain such figures, with at least half of those suggestive of deliberate manipulation commonly observed in immunofluorescent (IF) images. This study aims to assess the prevalence of duplicated images in rhinology research articles using artificial intelligence (AI) powered software.

Methods:
The PubMed/Medline database was queried for English-language studies published up to 10/2022 (search terms: "immunofluorescence" plus "sinus" or "nasal"). Studies without IF images were excluded. Articles were then uploaded to the "ImageTwin (imagetwin.ai)" AI-based software to detect integrity issues. Articles were categorized as simple (category (CAT)-1), shifted (CAT-2), or altered (CAT-3) [CAT-1: human error vs. CAT-2/CAT-3: falsification or fabrication].

Results:
Initial search identified 71 articles through database query, and 2 articles were excluded due to lack of IF images. Of 69 articles, ImageTwin flagged 20 articles (29%) with duplicated images. Of those 20 articles, 10 articles (14.5%) were found to contain definite duplicated images and the majority were CAT-3 (n=6) [CAT-1 (n=1), CAT-2 (n=3)]. The mean impact factor of the 10 different journals was 6.16+/-3.3 (range 2.3-14.29). All corresponding authors were affiliated with institutions in Asia-Pacific. 3 articles have already been discussed in the post-publication peer-review website (PubPeer).

Conclusions:
This pilot analysis provides new insights into a pervasive (nearly 15% of articles with IF experiments) and serious problem with inappropriate image duplication in rhinology field.

3:50pm – 3:56
Post-operative outcomes and cephalometric analysis following pediatric nasal septoplasty: A 5-year retrospective review
Abdullah Zeatoun, MD
Joy Gerasco
Taylor Stack-Pyle, Student
Adam Kimple, MD, FARS
Brent Senior, MD, FARS
Austin Rose, MD, FARS
University of North Carolina-Chapel Hill

Background:
Historically, pediatric septoplasty was uncommon due to concern about the potential impairment of normal nasal growth and midfacial development. In this retrospective review, we assess children's nasofacial development after nasal septoplasty.

Methods:
A cohort of 65 children who underwent nasal septoplasty at our hospital from 2017 to 2022 were identified. 11 children were identified with pre- and post-septoplasty CT scans. This subset was evaluated via cephalometric analysis using the sella-nasion-A point angle (SNA) metric pre- and post-surgery. In addition, their demographic data and facial development complaints were noted. Children with craniofacial syndromes were excluded. Statistical paired t-test analysis was also performed to assess the cephalometric data before and after surgery. SNA metrics were compared to their age, sex, and ethnicity.

Results:
The average age before surgery was 13.7 years, the average time between surgery and the second CT scan was 24 months, and the mean pre- and post-surgery SNA values were 84 for both. There was no statistical significance between the SNA metric values of the pre- and post-surgery CT scans with a (p=0.476). Most of the postop SNA values were as predicted for normal nasofacial growth. Also, One male child self-referred to a facial plastic surgeon complaining of asymmetry in his nose, and the surgeon concluded that it was symmetrical.

Conclusion:
Our study showed no evidence that nasal septoplasty in children significantly affected facial growth. We recommend increasing the cohort by doing multi-institutional research on nasal septoplasty cephalometrics in children due to our study's limited number of children with CT scans.

3:57 pm - 4:05 pm
Q&A

4:05 pm - 4:20 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Perioperative Antibiotics During Sinus Surgery: What is the Evidence?
Moderator: Eric Holbrook, MD, FARS
Panelists: Ashton Lehmann, MD; Troy Woodard, MD, FARS

Scientific Oral Presentations: Olfaction

Moderators: Elisa Illing, MD, FARS; Jessica Southwood, MD; Bobby Tajudeen, MD, FARS

4:20 pm – 4:26 pm
Inflammatory markers associated with persistent smell loss in COVID-19 long haulers characterized by mucus and epithelial cells from olfactory cleft
Sophie Jang, MD
Kwang Pak
Taylor Doherty
Adam DeConde, MD
Allen Ryan
Carol Yan, MD
UC San Diego

Introduction:
Persistent COVID-19 olfactory dysfunction (OD) remains poorly understood with limited therapeutics. Localized inflammation has been implicated in the pathophysiology of acute COVID-19 OD but few studies have evaluated mechanisms of persistent OD. Our study evaluated olfactory cleft (OC) biomarkers as predictors of persistent OD, comparing two collection methods mucus vs. epithelial cell (EC) swabs.

Methods:
COVID-19 subjects with persistent OD >3months were compared to COVID-19 subjects with no OD and to those with no prior infection. Subjective and objective smell function with UPSIT were recorded. OC mucus and ECs were collected and separately evaluated for 13 biomarkers that were compared between groups using Mann-Whitney tests. The two techniques were compared using Spearman correlation.

Results:
35 samples were collected (20 COVID OD, 8 COVID no OD, 7 non-COVID). Mean IFN-α2 levels for COVID persistent OD vs. no OD were 16.8pg/ml vs. 6.7pg/ml with mucus collection (p=0.03) and 3.6pg/ml vs. 2.8pg/ml with EC collection (p=0.28). Mean IFN-γ levels for COVID persistent OD vs. no OD were 72.6pg/ml vs. 41.5pg/ml with mucus collection (p=0.07) and 29.7pg/ml vs. 14.9pg/ml with EC collection (p=0.15). Inflammatory cytokines levels in the non-COVID group were lower than the COVID

groups. There were no differences between IL6 and TNFα levels in persistent OD and no OD using either collection method. OC cytokine levels are moderate to strongly correlated between mucus and epithelial swab collection techniques.

Conclusion:
IFN pathway cytokines in the olfactory epithelial microenvironment tend to be elevated in COVID-19 persistent OD compared to those with no OD and no prior history of COVID-19 infection.

4:27 pm – 4:33 pm
Persistent chemosensory loss is associated with cognitive performance in post-acute COVID-19 patients
David Cvancara, BS
Ashton Lehmann, MD
Yoshiko Kojima, PhD
Janna Friedly, MD
Nikki Gentile, PhD
Rachel Geyer, MPH
Ian Humphreys, DO, FARS
Waleed Abuzeid, MD, FARS
Aria Jafari, MD
University of Washington

Background:
Chemosensory loss (CL) and cognitive dysfunction (CD) are commonly reported neurological symptoms in post-acute COVID-19 (long-COVID). The neuro-inflammatory response of neurons and supporting cells to SARS-CoV-2 has been hypothesized to underlie both symptoms. We sought to determine (1) the prevalence of CD in patients with acute and persistent CL and (2) whether cognitive performance is influenced by the duration of CL within a large cohort of long-COVID patients.

Methods:
Patients with long-COVID were consecutively enrolled at the UW Post-COVID Clinic. Clinical and demographic data were collected. Cognitive performance was measured using the PROMIS Short Form, with CD defined as >1.5SD below the normalized mean. CL was self-reported and categorized as occurring at the time of COVID-19 infection (acute) or at subsequent presentation to the clinic (persistent). The groups were compared using ANOVA and Chi-Square tests.

Results:
For the 1013 patients with long-COVID included. The prevalence of CD was 64% overall, 69% in acute CL, and 74% in persistent CL. The rates of CD in patients with acute and persistent CL were higher compared to patients without CL ($p<0.05$). The PROMIS score for cognitive performance was significantly lower in the persistent CT group compared to the no CL group (31vs34,p=.01) and trended toward significance in the acute CL group (32.9,p=.07).

Conclusion:
Cognitive and chemosensory dysfunctions are highly prevalent in patients with long-COVID. Cognitive performance decreased with increasing duration of chemosensory loss. Further study is needed to determine (1) the precise relationship between these neurological symptoms and (2) the potential for cognitive and chemosensory rehabilitation.

4:34 pm – 4:40 pm
Depression, anxiety, and suicidal ideation in adults with COVID-induced olfactory distortion: A cross-sectional analysis
Nyssa Farrell, MD
Emily Stoller
Firas Hentati, BS
Dorina Kallogieri, MD, MPH
Jay Piccirillo, MD
Eric Lenze
Washington University in St. Louis

Background:
COVID-19 can result in persistent olfactory distortion, both parosmia and phantosmia. Olfactory distortion negatively impacts quality of life, but little is known about its association with mental health. Here, we explore the relationship between COVID-induced olfactory distortion, depression, anxiety, and suicidal ideation (SI).

Methods:
A cross-sectional survey was conducted between February and October 2022 on adults with history of COVID-19 infection at least 6 months prior to enrollment. Demographics, comorbidities, long-hauler symptoms, hyposmia, and smell distortion were evaluated. The Hospital Anxiety and Depression Scale (HADS) was used to screen for depression and anxiety. The Columbia-Suicide Severity Rating Scale (C-SSRS) was utilized to evaluate overall SI and non-specific active SI.

Results:
Of the 183 respondents that completed the survey, persistent moderate to severe smell distortion was reported by 119 (59.5%), of which 88 (73.9%) also endorsed moderate or severe hyposmia. One hundred twenty-five (67.9%) screened positive for anxiety, and 112 (60.9%) screened positive for depression; 37 (20.2%) reported SI and 10 (5.5%) reported non-specific active SI. Subjects with smell distortion had 2.13 times increased risk for anxiety (95% CI 1.129 to 4.024), 1.86 times increased risk for depression (95% CI 1.009 to 3.433) and 2.05 times increased risk for overall SI (95% CI 0.902 to 4.65). Anxiety and overall SI were also associated with the presence of persistent respiratory, cardiac, neurologic, and systemic symptoms of COVID-19.

Conclusion:
Given the high prevalence of COVID-induced olfactory distortion, clinicians should be aware of its potential association with anxiety, depression, and SI.

4:41 pm – 4:47 pm
Reduction in olfactory dysfunction prevalence among patients taking metformin
Varun Vohra, BA
Anirudh Saraswathula, MD
Vidya Kamath, Dr.
Andrew P. Lane, MD, FARS
Nicholas Rowan, MD

Background:
Despite increasing recognition of the association of olfactory dysfunction (OD) with health span and lifespan, treatments for OD are lacking. Recent evidence suggests that metformin use is associated with a reduced incidence of age-associated morbidities, frailty, and overall mortality even in non-diabetic populations. The aim of this study was to assess the association between OD prevalence and metformin use in a nationally-representative sample.

Methods:
Cross-sectional study of participants who participated in the chemosensory examination from the 2013-2014 National Health and Nutrition Examination Survey (NHANES) with active medications for type 2 diabetes mellitus (DM). Survey-weighted logistic regression was used to assess the association between metformin use and OD prevalence, and was propensity score matched using age, gender, race, education, BMI, A1c score, and years since DM diagnosis.

Results:
After propensity-score matching, 119 paired samples with complete olfaction and diabetes data were included. Average age was 63.2±7.3 years and 46% of participants were female. Bivariable analysis indicated that those using metformin had significantly lower odds of OD (34.4% vs 65.6%, p = 0.0067) relative to controls. Multivariable analysis controlling for socio-demographics, BMI, smoking, and confounders of OD indicated that metformin use was independently associated with significantly lower odds of OD (OR 0.3 [95% CI 0.12-0.73], p = 0.018).

Conclusion:
Metformin use was associated with a lower prevalence of OD in this nationally-representative, cross-sectional study. This intriguing observation raises the possibility of an unexpected protective effect, warranting validation and future mechanistic investigation.

4:48 pm – 4:54 pm
The impact of race on olfaction
Sofia Khan, Ms.
Jorge Gutierrez, Clinical Research Fellow
Shaun Nguyen, Professor
Zachary Soler, MD, FARS
Rodney Schlosser, MD, FARS
Medical University of South Carolina

Background:
Racial/ethnic variations in olfactory function can impact quality of life; however, these variations have not been systematically studied.

Methods:
A systematic review (CINAHL, PubMed, Scopus) of English-language articles published from conception to September 2022 was conducted to document olfactory dysfunction (OD) stratified by race/ethnicity. Meta-analysis of proportions, single means, and difference of proportions was performed.

Results:
Forty-four studies were meta-analyzed with age range of 18-95 years. OD was assessed in various populations including elderly subjects (eleven studies), Coronavirus (six studies), and chronic rhinosinusitis (five studies). Eight studies utilized data from large epidemiological studies while the remaining articles did not fit into the aforementioned categories. Subjective OD in Hispanic, Black, and White subjects was 32.97% (95% CI [15.72% – 53.01%]), 20.45% [14.90% – 26.62%], and 19.33% [13.70% – 25.67%], respectively. Differences between all three groups were statistically significant ($p < 0.012$). The prevalence of psychophysical OD in Black, White, and Hispanic subjects was 32.26% [25.82% – 39.05%], 29.17% [23.27% – 35.45%], and 22.12% [15.58% – 29.45%], respectively. Differences between all three groups were statistically significant ($p < 0.0001$).

Conclusions:
Hispanic subjects had the highest rate of self-reported OD; however, they had lowest rate of OD on psychophysical testing. Black subjects had higher rates of OD than White subjects on both subjective and objective testing. Future studies should determine if these variations are due to testing differences or true olfactory dysfunction.

4:55 pm – 5:00 pm
Q&A

5:00 pm - 5:15 pm
Business Meeting – Ballroom C

5:30 pm - 7:00 pm
ARS President's Welcome Reception
Sheraton Hotel – Republic Ballroom

Friday, May 5, 2023
Afternoon Session – Room 304/306
1:00 pm – 5:00 pm EST

7:00 am – 12:00 pm
ARS Board of Directors Meeting
Room: Liberty ABC, Sheraton Hotel, Level 2

12:00 pm - 1:00 pm
Lunch with Exhibitors

Scientific Oral Presentations: CRS Diagnosis and Treatment

Moderators: Jose Gurrola, MD; Victoria Lee, MD, FARS; William Yao, MD, FARS

1:00 pm – 1:06 pm
Comparison of two commercially available corticosteroid-eluting frontal sinus stents
Tripti Brar, MBBS, MD
Adam Brown, Medical Student
Amar Miglani, MD
Devyani Lal, MD, FARS
Michael Marino, MD, FARS
Mayo Clinic in Arizona

Background:
Mometasone-eluting poly-L-lactide-coglycolide (MPLG) and triamcinolone impregnated chitosan polymer (TICP) stents have been introduced to maintain frontal sinus ostium (FSO) patency. The cost per unit is approximately 9 times higher for MPLG versus TICP stents. The aim of this study was to compare surgical outcomes for these devices. Methods: Patients who underwent ESS from December 2018 to February 2022 were reviewed to identify those with intraoperative placement of TICP or MPLG stent in the FSO. FSO patency was evaluated by endoscopy at follow-up, SNOT-22 recorded, and complications noted.

Results:
Sixty-eight subjects (20 TICP; 48 MPLG) and 96 FSO (35 TICP; 61 MPLG) were treated. TICP was first used in August 2021 and MPLG in December 2018. MPLG placement in a Draf 3 (12 subjects) was excluded for our primary analysis, since no TICP had been used in Draf 3. Both cohorts analyzed (TICP 20 subjects and 35 FSO; MPLG 26 subjects and 39 FSO) were statistically similar in demographics, co-morbidities and SNOT-22 scores. The mean (SD) total follow-up was 189.9 days(97.2) for TICP and 443.8(252.0) for MPLG, at which time FSO patency was 88.5% and 89.7% respectively(p=0.871). FSO patency at an equivalent mean follow-up of 130.6 days in TICP and 154.0 days in MPLG was 94.3% and 89.7% respectively(p=0.475). MPLG showed significant crusting within the FSO at one month follow-up(12.8% versus none in TICP) reducing to 2.5% at last follow-up. Both cohorts showed similar significant reductions in SNOT-22 scores.

Conclusion:
Rates of FSO patency for TICP and MPLG stents were similar, although TICP had significantly lower costs per unit. TICP stents were not used for Draf 3, and this may be a unique indication for MPLG stents.

1:07 pm – 1:13 pm
Characterizing trends in diagnosis and management of sinusitis in a large health care system: From primary care to otolaryngology
Christopher Hornung, BS
Matthew Tyler, MD
Ashwin Ganti, MD
Scott Lunos

Introduction:
Sinusitis is among the most common diagnoses made in the primary care setting. Variations in management of sinusitis can be associated with inappropriate antibiotic prescriptions and delays in treatment. The objective of this study was to identify patient and provider characteristics associated with possible inaccurate diagnosis and management of sinusitis.

Methods:
We performed a retrospective analysis using an established regional healthcare database of patients who received a diagnosis of sinusitis between the dates of 2011-2022 and were seen by a non-ENT. Patient's comorbidities, insurance status, chronicity of sinusitis, and prescriptions were included. We noted if patients were referred to an ENT and if they maintained a diagnosis of sinusitis after seeing an ENT.

Results:
There were 99,581 unique patients and 168,137 unique encounters. The mean age was 41.5 years and 35.7% were male. Most patients had private insurance (88.5%), acute sinusitis (81.2%), and were seen at a primary care office (97.8%). Approximately 30% of patients were referred to an ENT. Of referred patients, 50.6% saw an ENT and did not maintain a diagnosis of sinusitis. These patients were more likely to have public insurance, chronic sinusitis, and more comorbidities (all p-values<0.0001). They also received significantly more mean courses of antibiotics (5.04 vs 2.39, p<0.0001) and oral steroids (3.53 vs 2.08, p<0.0001) per patient.

Conclusion:
Over half of patients referred to an ENT by a primary care provider do not maintain a diagnosis of sinusitis after seeing an ENT. Further research should investigate implications for increased healthcare costs and inappropriate prescription of antibiotics for sinusitis in the primary care setting.

1:14 pm – 1:20 pm
Cost analysis of culture-directed antibiotics for the treatment of acute exacerbations in chronic rhinosinusitis
Michael Yong, MD
Veeral Desai
David Grimm, BS
Zara Patel, MD, FARS
Stanford University

Background:
Acute exacerbations of chronic rhinosinusitis (AECRS) are frequently experienced by patients with CRS. Recent research has demonstrated that empirically treating patients with uncomplicated AECRS without performing cultures results in similar outcomes. In this study, we perform a cost analysis of culture-directed antibiotics in AECRS.

Methods:
A cost analysis of adults with uncomplicated AECRS was performed to determine a yearly cost associated with treatment. A Markov decision tree was constructed to compare several treatment scenarios, and subsequent deterministic and probabilistic sensitivity analyses was performed using Monte Carlo simulations.

Results:
The total cost of AECRS when using culture-directed antibiotics was $4,792.28, with $267.35 coming from treatment-related costs and $4,524.93 coming from productivity-related costs. Eliminating culture prior to antibiotic treatment resulted in reduction of costs by $165.56 and eliminating an office visit reduced the costs by a further $63.86. Over 5 years, omitting a culture resulted in $485.05 cost savings per patient, increasing to $970.10 over 10 years. Extrapolating these savings to a population level for CRS patients treated with empiric antibiotics without an office visit resulted in a potential 2-4 billion dollars total cost savings per year.

Conclusion:
Empiric antibiotic treatment of AECRS without a prior culture reduces treatment-related costs, with significant potential cost-savings overall when extrapolating to population-level costs. Consideration of empiric antibiotic treatment for uncomplicated AECRS may result in a reduction of costs of care for patients suffering from CRS.

1:21 pm – 1:27 pm
Feasibility of long-acting corticosteroid matrices (LYR-220) in patients with chronic rhinosinusitis and prior sinus surgery: Early date from Part 1 of the BEACON study
Stacey Silvers, MD, FARS
Allison Gartung
Lindsay Brayton, Clinical Project Manager
James Shao
Brent Senior, MD, FARS

Background:
Surgical interventions do not directly address the underlying inflammation in chronic rhinosinusitis (CRS). There is a need for long-acting, local, anti-inflammatory treatments for post-surgical CRS patients. LYR-220 is an implantable drug matrix being developed to provide up to 24 weeks of local treatment with mometasone furoate for CRS patients who have had a prior sinus surgery. This presentation reports week 6 data from the uncontrolled first phase (Part 1) of the BEACON study.

Methods:
The two-part Phase 2 BEACON study evaluates LYR-220 for 24 weeks in symptomatic adult CRS patients who had a prior bilateral ethmoidectomy. Six patients were enrolled in the initial open-label, uncontrolled Part 1 phase, designed primarily to assess feasibility and tolerability of 2 matrix designs. SNOT-22 and 3 cardinal symptom composite scores (3CS; nasal blockage, nasal discharge, and facial pain) were also evaluated.

Results:
Bilateral LYR-220 matrix placement was achieved in each patient. No serious or unexpected treatment-related adverse events were reported through week 6. Although efficacy was not the objective in Part 1, a mean improvement of 21.3 points from baseline in SNOT-22 total score was reported at week 6, greater than twice the MCID of 8.9 points. A mean improvement of 1.68 points from baseline in 3CS at week 6 was also observed.

Conclusions:
LYR-220 was safe, well tolerated, and demonstrated promising early symptom improvement at week 6 in the BEACON Part 1 study. Up to 40 patients will be enrolled in the randomized, blinded, controlled Part 2 study evaluating 1 matrix design.

1:28 pm – 1:34 pm
Association between short term ambient temperature and diagnosis of chronic rhinosinusitis
Murugappan Ramanathan, Jr., MD, FARS
Zhenyu Zhang
Omar G. Ahmed, MD, FARS
Jayant Pinto, MD
Nicholas Rowan, MD

Ruming Du
Shengzhi Sun
Johns Hopkins University School of Medicine

Background:
Chronic exposure to particulate matter air pollution (PM2.5) is associated with Chronic Rhinosinusitis (CRS). Elevated ambient temperatures may increase PM2.5 levels and thereby exacerbate sinonasal symptoms. This study investigates the association between high ambient temperature and the risk of CRS diagnosis.

Methods:
Cases of CRS were diagnosed at a large, urban, tertiary care academic center during May – October compared to healthy controls. The effect of maximum ambient temperature on symptoms was estimated with a distributed lag nonlinear model (DLNM). Extreme heat was defined as 34.4□ (>95th percentile of the maximum temperature distribution. Conditional logistic regression models estimated the association between extreme heat and the risk of CRS diagnosis.

Results:
967 cases and 967 controls (Total of 1,934 patients) were identified (mean [SD] age of 50.7 [16.5] years, 58% women). Exposure to extreme heat was associated with increased odds of CRS diagnosis two weeks later (OR 1.08, 95% CI 1.02-1.15). This overall cumulative effect increased when extreme heat extended over 21 days prior (OR 2.24, 95% CI 1.23-4.07). Associations were more pronounced among women and younger subjects (18-64 years).

Conclusion:
We demonstrate for the first time that short-term exposure to high ambient temperatures is associated with increased CRS diagnosis, suggesting a cascading effect of meteorological phenomena. These results highlight the potentially deleterious health effects of climate change on upper airway disease which could have a large public health impact.

1:35 pm – 1:41 pm
Development of a novel solute for sinonasal irrigation in chronic rhinosinusitis
Grace Tawhai, MBChB candidate, BMedSc(Hon)
Raymond Kim, Dr.
Kristi Biswas, Dr.
Brett Wagner, Dr.
Richard Douglas, Professor
University of Auckland

Nasal irrigation (NI) is a well-established and effective symptomatic treatment for sinonasal inflammatory conditions. Previous studies have suggested that the addition of complex ions and antimicrobial additives in NI may potentiate symptom improvement. Novel NI solutes were formulated and investigated.

Methods:
pH and osmolarity of six commercial solutes were determined in laboratory distilled, tap, or bottled water. Using Ringer's solution as a base, magnesium sulfate and xylitol were added to formulate two novel solutes. Antibiofilm effects of two commercial and two novel solutions were evaluated in vitro against Staphylococcus aureus and Pseudomonas aeruginosa biofilms, using the Calgary Biofilm Device. Tolerability of the novel solutions was assessed in 24 blinded healthy participants (>18 years), using the Meltzer Clinical Trial Patient Preference Questionnaire.

Results:
There was a large osmolarity range among the commercial solutes (NeilMed Isotonic 284 mmol/L ± 9.20, FESS Hypertonic 757 mmol/L ± 9.60), and choice of water source significantly altered the pH of the solutions. Minor antibiofilm effects were observed from both commercial and novel solutions. However, potential for a significant biofilm dispersal effect was seen in xylitol-containing test solutions, particularly against P. aeruginosa. The tolerability trial showed participants consistently reporting one of the novel solutions to be the most tolerable when compared with the market-leading commercial solution.

Conclusions:
Two novel solutes were developed and their antibiofilm effect and tolerability tested. One of these was found to be the most tolerable compared to the market standards. These developments will improve both efficacy and compliance of NI.

1:42 pm - 1:50 pm
Q&A

1:50 pm - 2:30 pm
PANEL: Tissue Histopathology and Clinical Endotyping: Implications for Patient Care
Moderator: Bobby Tajudeen, MD, FARS
Panelists: Eugene Chang, MD, FARS; Devyani Lal, MD, FARS; Bruce Tan, MD; Justin Turner, MD, PhD, FARS

2:30 pm - 2:45 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Skull Base Reconstruction: Beyond the Nasoseptal Flap
Moderator: Garret Choby, MD, FARS
Panelists: David Gudis, MD, FARS; Sanjeet Rangarajan, MD, FARS

2:45 pm - 3:15 pm
Break with Exhibitors

Scientific Oral Presentations: Skull Base Surgery Outcomes

Moderators: Mathew Geltzeiler, MD, FARS; Nyall London, MD, FARS

3:15 pm – 3:21 pm
Ten-year outcomes in pediatric midfacial growth following expanded endonasal skull base surgery
Jennifer Douglas, MD
Daniel Lee, MD
Elizabeth Sell, Medical Student
Arjun Parasher, MD
David Lerner, MD
Michael Kohanski, MD, PhD
John Lee, MD
Phillip Storm
James Palmer, MD, FARS
Nithin Adappa, MD, FARS
University of Pennsylvania

Objective:
Expanded endonasal approaches (EEA) to the skull base have become the standard of care in management of skull base lesions. We sought to evaluate the long-term effects of endoscopic endonasal skull base surgery on pediatric mid-facial growth by updating our prior publication with longitudinal outcomes.

Methods:
A retrospective case control study of children undergoing craniopharyngioma resection via EEA or open transcranial approach was performed. Pre and postoperative magnetic resonance imaging (MRI) was evaluated for growth in four midfacial measurements: anterior and posterior midface height, palatal length, and sella–nasion distance. Unpaired t-tests were performed.

Results:
Twenty-two patients were included in the original study (EEA n=12, open n=10). One EEA and two open transcranial patients did not have updated imaging with 19 patients remaining (EEA n=11, open n=8). There was no significant difference in midfacial growth between the groups. Compared with the open group, the EEA cohort demonstrated relative growth of anterior midface height -1.4mm (p=0.4869), posterior midface height -1.0mm (p=0.7034), palatal length -2.6mm (p=0.2696), and sella–nasion distance 0.3mm (p=0.8826). Average length of follow-up was 10.3 years (EEA 9.4, open 11.6 years).

Conclusion:
No significant difference in mid-facial growth between pediatric patients undergoing EEA and open transcranial approach for craniopharyngioma resection was seen in both early and ten-year outcomes. We suggest that EEA is a safe, effective approach for resection of pediatric skull base lesions without concerns for long-term craniofacial growth. Further investigation into the global outcomes of pediatric endoscopic skull base approaches is necessary.

3:22 pm – 3:28 pm
A multi-institutional and multidisciplinary algorithm in the management of idiopathic intracranial hypertension
Pedro Escobedo, BS
Peter Filip, MD
Krishna Joshi, MD
Ali Baird, Medical Student
Sarah Khalife, MD
Raj Shrivastava, MD
Satish Govindaraj, MD, FARS
Peter Papagiannopoulos, MD
Bobby Tajudeen, MD, FARS
Stephan Munich, MD
Pete Batra, MD, FARS
Rush University Medical Center

Introduction:
Optimizing intracranial pressures (ICP) is pivotal in managing idiopathic intracranial hypertension (IIH) to prevent disease sequalae. While treatments for IIH have been previously explored, evidence and recommendations on recurrent CSF leak prevention is lacking. We present a novel algorithm for elevated ICP management.

Methods:
A multi-institutional retrospective review of IIH patients with and without spontaneous CSF leaks was conducted over a 10-year period. With Chi square analysis, we evaluated for alterations in spontaneous CSF leak incidence with respect to ICP lowering interventions.

Results:
193 patients with 85 spontaneous CSF IIH cases and 108 non-leak IIH controls were included. Mean follow-up was 2.8+3.1 years for CSF leaks and 3.2+3 years for non-leak controls. 17.6% CSF leak cases developed recurrent CSF leaks. 45.9% were treated with acetazolamide, 2.4% received transverse sinus stents (TSS), and 1.2% had a VP shunt in the spontaneous CSF leak cohort. 54.6% were treated with acetazolamide, 13.9% had a VP shunt placed, and 41.7% received stents in the IIH controls. Controls had a higher use of ICP lowering interventions including acetazolamide [p<0.001], TSS [p<0.001], and VP shunting [p<0.004] compared to CSF leak cases. 1 patient's VP shunt occluded, and 2 other cases' stents clogged, resulting in CSF leaks.

Conclusions:
Patients undergoing TSS, VP shunting, or acetazolamide management have a lower frequency of spontaneous CSF leak compared to those without intervention. Patients with a CSF leak or recurrent

leaks following repair represent a challenging population that require a graduated approach to ICP management (Figure 1). Prospective trials are warranted for further clarification.

3:29 pm – 3:35 pm
Emergency department visits following endoscopic skull base surgery: An opportunity for improvement
Neal Godse, MD
Jakub Jarmula
Varun Kshettry
Troy Woodard, MD, FARS
Pablo Recinos
Raj Sindwani, MD, FARS
Cleveland Clinic Foundation

Background:
Readmissions are a major healthcare expenditure and a key metric of hospital performance. They are often preceded by an evaluation in the emergency department (ED) after which patients are either readmitted or discharged. To date, there are no studies that evaluate the natural history of and risk factors for ED visits following ESBS.

Purpose:
Analyze ED visits within 30 days of ESBS and identify risk factors for presentation to the ED and course the evaluation.

Methods:
Retrospective review from 1/2017-6/2022 at a high-volume center of all ESBS cases in which the patient presented to the ED within 30 days of surgery.

Results:
Of 559 ESBS cases, 61 patients (10.9%) presented to the ED following surgery. The median post-operative day of presentation to the ED was 6 (IQR=3-14). 14 (23.0%) patients missed their first post-operative appointment. 38 (62.3%) patients were discharged while 23 (37.7%) were readmitted. The most common discharge diagnoses were headache (n=9, 23.7%) and epistaxis (n=6, 15.8%); the most common readmitting diagnoses were adrenal insufficiency (n=3, 13.0%) and hyponatremia (n=3, 13.0%). Patients had a median of 4 (IQR=3-6) blood tests, median of 1 (IQR=0-2) imaging studies, and a median of 1 (IQR=0-2) consultation. There was no significant difference in median total number of tests between patients that were discharged vs. readmitted (6 versus 7 total tests, p=0.52).

Conclusions:
Over 60% of patients who present to the ED following ESBS are discharged but undergo significant work up. While less costly than readmission, these visits are an important avenue for improvement. Patients may benefit from early post-operative visits and better pre-operative counseling.

3:36 pm – 3:42 pm
Does nasal packing affect endoscopic skull base surgery outcomes?
Arash Abiri, BS
Theodore Nguyen, BS
Ji Li, BS
David Shan, BS
Timothy Hsu, BS
Khodayar Goshtasbi, MD
Frank Hsu, MD, PhD
Edward Kuan, MD, FARS
University of California, Irvine

Objective:
We evaluated the influence of nasal packing type (dissolvable vs. non dissolvable) on reconstructive and quality of life (QOL) outcomes after endoscopic skull base surgery (ESBS).

Methods:
A chart review was conducted on ESBS patients who received nasal packing at a tertiary academic skull base program between July 2018 and June 2022. Patients received short-term (ST, <1 month post-op), moderate-term (MT, 1-3 months post-op), and long-term (LT, >6 months post-op) Sinonasal Outcome Tests (SNOT-22). Primary outcome variables included postoperative cerebrospinal fluid (CSF) leaks, sinonasal infections, and QOL scores.

Results:
Of 201 patients, 108 (49.2%) were female with a mean age of 52.7±17.4 years. Overall, 27.4% of patients received non-dissolvable packing and 72.6% received dissolvable packing. Of 128 (63.6%) patients with intraoperative CSF leaks, 57.8% had high-flow leaks, and 2.3% had postoperative leaks. There was no significant difference in postoperative CSF leak rates between the non-dissolvable and dissolvable packing cohorts (p=0.126). Non dissolvable packing was associated with a higher rate of sinonasal infections (21.8% vs. 10.3%, p=0.034). Among all ESBS patients, LT SNOT-22 scores were significantly lower than preoperative scores (16.3 vs. 24.3, p=0.007). However, there were no significant differences in SNOT-22 scores between non dissolvable and dissolvable packing patients across all surveyed time points (all p>0.05).

Conclusions:
This is the first study to evaluate nasal packing type and its impact on ESBS outcomes. Nasal packing type was not associated with differences in postoperative CSF leak rates or QOL metrics. Patients with non-dissolvable packing exhibited a higher rate of sinonasal infections.

3:43 pm – 3:49 pm
Long-term disease-specific and generalized quality of life after treatment in sinonasal malignancy: A prospective, multi-center study
Sabrina Maoz, BS
Eric Wang, MD, FARS
Peter Hwang, MD, FARS
Garret Choby, MD, FARS
Edward Kuan, MD, FARS
Nithin Adappa, MD, FARS
Mathew Geltzeiler, MD, FARS
Anne Getz, MD, FARS
Ian Humphreys, DO, FARS
Christopher Le, MD, FARS
Daniel Beswick, MD, FARS

Purpose:
Quality-of-life (QOL) for individuals with sinonasal malignancy (SNM) is significantly understudied. This study evaluated the impact of patient, treatment, and disease factors on sinonasal-specific and generalized QOL using validated metrics in a large cohort over a 5-year post-treatment timeframe.

Methods:
Patients with SNM undergoing definitive treatment with curative intent were enrolled into a prospective, multi-site, longitudinal observational study. Sinonasal Outcome Test-22 (SNOT-22) and University of Washington Quality of Life Questionnaire (UWQOL) were used to assess QOL at pre-treatment baseline and at follow up time points up to 5 years. Demographic, disease, and treatment characteristics were collected. Multivariable models were used to determine factors associated with QOL.

Results:
194 patients with SNM were analyzed. All QOL indices were impaired at pre-treatment baseline. QOL improved post-treatment: SNOT-22 scores improved by 3 months and UWQOL scores by 6-9 months. After adjusting for other factors, patients who underwent open compared to endoscopic tumor resection had worse generalized QOL. Pterygopalatine fossa (PPF) involvement was associated with worse QOL across indices. Adjuvant radiation was associated with worse disease specific QOL. Neck dissection was associated with worse generalized physical function QOL. Positive margins were associated with worse generalized social/ emotional function QOL.

Conclusions:
Disease-specific and generalized QOL is impaired at baseline in patients with SNM and improves after treatment. Endoscopic resection is associated with improved QOL. PPF involvement, adjuvant radiation, neck dissection, and positive margins were associated with worse QOL after treatment.

3:50 pm – 3:56 pm
Trends of skull base surgery Medicare reimbursements
Theodore Nguyen, BS
Sina Torabi, MD
Jonathan Pang, Medical Student
Katelyn Dilley, BS
Arash Abiri, BS
Frank Hsu, MD, PhD
Edward Kuan, MD, FARS
University of California, Irvine

Background:
Medicare reimbursements for otolaryngology procedures have generally declined since 2000. We explore Medicare reimbursement trends for anterior (ACF), middle (MCF), and posterior cranial fossa (PCF) skull base surgery from 2000-2022.

Methods:
A retrospective analysis of the Centers for Medicare and Medicaid Services (CMS) Physician Fee Schedule was performed from 2000-2022 on approach, resection, and repair of the skull base (CPT codes 61575-61619). Reimbursement data was adjusted for inflation to 2022 US dollars, and annual and total changes calculated. The CMS Part B National Summary Data File was analyzed for trends in Medicare procedure volume and total payment.

Results:
Adjusted for inflation, reimbursements for skull base approach, resection, and secondary repair codes decreased since 2000 by 1.57%, 1.47%, and 1.96% annually and 30.57%, 28.87%, and 35.97%, overall, respectively. Grouped by location, ACF, MCF, and PCF codes had average annual decreases of 1.04%, 1.70%, and 1.41% and overall decreases of 22.30%, 32.44%, and 28.09%, respectively, since 2000. Nevertheless, nominal compensation increased during this period for all groupings (approach:19.42%; resection:22.34%; secondary repair:10.13%; ACF:33.65%; MCF:16.15%; PCF:23.68%). Simultaneously, procedure volume increased at an average annual rate of 2.04% (r2=0.63) from 138 in 2000 to 200 in 2020 along with a concurrent rise in average payments of all skull base codes from $167,305 to $327,159 (95.55% increase).

Conclusions:
While nominal per-service Medicare reimbursement has increased for skull base surgery codes, there has been a downward trend in inflation-adjusted procedural reimbursement. This parallels findings in other otolaryngology procedures.

3:57 pm - 4:05 pm
Q&A

4:05 pm - 4:20 pm
TARGETED CONVERSATIONS ON IMPORTANT TOPICS: Biologics for Polyps: Upfront or Postop?
Moderator: Amber Luong, MD, PhD, FARS
Panelists: Tanya Laidlaw, MD; Zachary Soler, MD, FARS

Scientific Oral Presentations: Nasal Polyps and Biologics

Moderators: Edward Kuan, MD, FARS; Joshua Levy, MD, FARS; Lauren Roland, MD

4:20 pm – 4:26 pm
Histopathologic features of biologic therapy nonresponders in chronic rhinosinusitis with nasal polyposis
Ali Baird, BS
Peter Filip, MD
Hannah Brown, MD
Pedro Escobedo, Medical Student
Sarah Khalife, MD
Peter Papagiannopoulos, MD
Paolo Gattuso, MD
Pete Batra, MD, FARS
Bobby Tajudeen, MD, FARS
Rush Medical College, Rush University Medical Center

Introduction:
Biologics are effective for chronic rhinosinusitis with nasal polyposis (CRSwNP) by reducing type 2 inflammation. Nonresponders often require functional endoscopic sinus surgery (FESS) and represent a challenging population with a likely discordant, non-type 2 pathophysiology. Our aim is to characterize the histopathologic features of biologic nonresponders.

Methods:
A retrospective review of CRSwNP patients undergoing FESS was conducted. The biologic nonresponders included patients with prior biologic therapy, persistent symptoms and polyp burden. Those with CRSwNP without biologics were histopathologic controls. Demographics, comorbidities and structured histopathology consisting of 13 variables were collected.

Results:
Of 232 CRSwNP patients, 20 were on biologics prior to FESS. 70% (n=14) received dupilumab, 10% (n=2) received mepolizumab, 5% (n=1) received omalizumab and 15% (n=3) tried multiple biologics. The mean age for the biologic non responder group was 45.8 years compared to 49.9 years for the controls. Nonresponders had significantly reduced tissue eosinophilia, defined as >5 per HPF, (45% vs. 67.9%, p=0.039) and increased basement membrane thickening (100% vs. 77.4%, p=0.017). The remaining variables did not reach statistical significance.

Conclusion:
Histopathologic analysis of biologic nonresponders demonstrates decreased eosinophilia and thickened basement membranes. These findings, particularly low tissue eosinophils, are consistent with a non-type 2 CRSwNP that may be recalcitrant to biologic therapy. With the current lack of pretreatment diagnostic testing to subclassify CRSwNP, upfront FESS and histopathologic analysis may aid clinicians in predicting biologic outcomes and potential failures.

4:27 pm – 4:33 pm
Mitochondrial dysfunction is associated with age-related glandular remodeling and nasal polyp formation
Jenna Bergman, MD
Mark Tabor, MD
Seong Cho, MD
Jung Yeon Han, MS
University of South Florida

Rationale:
Our recent data show submucosal glandular remodeling in both aged nasal mucosa and nasal polyps (NP). This study investigates whether glandular remodeling is associated with mitochondrial dysfunction in aging and NP formation.

Methods:
NP and uncinate tissue from normal controls in the non-elderly (18-49yr) and elderly (≥65yr) were obtained during sinus surgery. PAS staining, immunohistochemistry, immunofluorescence (IF), transmission electron microscopy (TEM), Western blot, and explant nasal tissue culture were performed.

Result:
There was significant age-related reduction of submucosal glands in normal controls. Serous glandular cells in elderly controls and NP patients showed structural changes to mitochondria including reduced size. Several mitochondrial stress markers such as SOD2 and DRP-1 were increased in elderly controls and NP. Furthermore, there was reduced serous cell-derived antimicrobial proteins/peptides such as MUC-7 and lactoperoxidase in NP. Human nasal tissue culture showed increased production of mitochondrial reactive oxygen species (mtROS) with lipopolysaccharide (LPS) and H2O2 treatment; no treatment (52.85 mean integrated density/area) vs LPS (114.09 mean), p=0.009; no treatment (52.85 mean) vs H2O2 (137.19 mean) , p=0.002. Mitochondrial ROS inhibitors such as MitoQ and Necro-X5 alleviated the increased production of mtROS; LPS/vehicle (52.85 mean) vs LPS/MitoQ (42.99 mean), p=0.029 and H2O2/vehicle (137.19

mean) vs H2O2/Necro-X5 (55.84 mean), p=0.002.

Conclusion:
Our results suggest the possibility of mitochondrial dysfunction in both aging and NP formation; mtROS inhibitors are a potential treatment option for these conditions.

4:34 pm – 4:40 pm
Not just SNOT: Local inflammatory profiles in AERD patients differ from non-AERD CRS
Stella Lee, MD
Sophie Yu, Student
Simon Chiang, Research Assistant
Kathleen Buccheit
Marie Lundberg, MD, PhD
Regan Bergmark, MD, FARS
Alice Maxfield, MD, FARS
Rachel Roditi, MD, FARS
Brigham and Women's Hospital, Harvard Medical School

Introduction:
Patients with AERD exhibit severe and refractory chronic rhinosinusitis (CRS) with worse outcomes in comparison to CRS patients without AERD. This study aims to identify the local inflammatory mediators present in mucus samples from the sinuses of patients with AERD compared to patients without AERD, which may contribute to the more severe phenotype.

Methods:
A total of 136 mucus samples were collected from 100 patients diagnosed with AERD (n=6), CRSwNP (n=74), or CRSsNP (n=20) over 3 years. Ethmoid sinus secretions were evaluated by enzyme-linked immunoassay for levels of interferon (IFN)-γ, tumor necrosis factor (TNF)-α, IL-4, IL-5, IL-13, IL-17, IL-17E/IL-25, IL-33, thymic stromal lymphopoietin (TSLP), chemokine ligand 2/monocyte attractant protein-1 (CCL2/MCP1), CCL5/regulated-upon-activation normal T-cell expressed (RANTES), chemokine ligand 26/eotaxin-3/CCL26, and C-X-C motif chemokine ligand 8 (CXCL8)/IL-8.

Results:
Mean levels of IL-5 and CCL5 were elevated ($p<0.05$) in the sinus mucous secretions of patients with AERD compared to CRSwNP and CRSsNP patients. Local IL-18 levels were elevated in CRSsNP patients in comparison to CRSwNP patients but there was no difference in comparison to AERD patients.

Conclusions:
AERD is a complex inflammatory disease that exhibits elevated local levels of IL-5 and CCL5 in the sinus mucous in comparison to CRSwNP and CRSsNP patients. In addition to local eosinophilic activation and recruitment, supplemental mechanisms, including recruitment of monocytes, effector memory T cells, B cells, dendritic cells, and NK cells, may contribute to the severe local inflammatory milieu in patients with AERD.

4:41 pm – 4:47 pm
Optimizing the timing of biologic and surgical therapy for patients with refractory CRSwNP
Emily Garvey, BA
Bita Naimi, BA
Alexander Duffy, MD
Marc Rosen, MD, FARS
Mindy Rabinowitz, MD, FARS
Elina Toskala, MD, PhD, FARS
Gurston Nyquist, MD, FARS

Introduction:
Refractory chronic sinusitis with nasal polyposis (CRSwNP) is often treated with endoscopic sinus surgery (ESS), however, patients may require revision surgery due to recurrence. Patients with recurrence may see a greater benefit from revision surgery if they have started biologic therapy. However, there are no previous studies that focus solely on the outcomes of individuals who undergo surgery while on biologic therapy.

Methods:
This is a retrospective case control study. Patients with CRSwNP who underwent ESS while on dupilumab, mepolizumab, and benralizumab were included. Patient charts were queried for demographic and social history. Controls included CRSwNP patients who received only biologic therapy and were matched using age, gender, biologic prescribed, asthma status, SNOT-22, and polyp scores to the 21 cases.

Results:
21 patients underwent ESS while on a biologic (13 on dupilumab, 5 on benralizumab, and 4 on mepolizumab). There was no significant difference between baseline SNOT-22 scores (p=0.276) and polyp scores (p=0.472) between the combined and control cohorts. Patients received surgical intervention on average 3.87 months after starting a biologic (+/- 29 days). After 6 to 12 months of follow up, the average polyp score for the combined cohort went from 4.10 to 0.50, compared to controls which saw a reduction from 4.73 to 2.52 (p=0.013). The average SNOT-22 scores of the combined cohort was 32.63 +/- 27.65 at follow up, compared to controls 47.11 +/- 28.4, p=.305.

Conclusion:
Patients with severe CRSwNP demonstrate a sustained decrease in polyp burden when treated with combined biologic therapy and ESS. These improvements appear to be more dramatic when compared to biologic use alone.

4:48 pm – 4:54 pm
Characterizing adverse events of biologic treatment of CRSwNP: An analysis of the FDA adverse event reporting system
Taylor Stack-Pyle, Medical Student
Meredith Lamb, Medical Student
Sulgi Kim, Student
Abdullah Zeatoun, Researcher
Erin Lopez, MD
Daniel Alicea Delgad, MD
Brian Thorp, MD, FARS
Charles Ebert, MD, FARS
Brent Senior, MD, FARS
UNC

Background:
Over the last 3 years, the FDA has approved omalizumab, mepolizumab, and dupilumab for the treatment of CRSwNP; however, adverse events of these biologics haven't been described in post-marketing surveillance trials. By utilizing the FDA's Adverse Event Reporting System (FAERS), this study aims to describe and compare biologic-associated adverse events.

Methods:
A standardized search was applied to each biologic. Results were grouped by treatment indication. Each adverse event was categorized, and these categories were compared among treatment indication groups.

Results:
There were a total of 36,811, 18,981, and 25,562 adverse events reported for omalizumab, mepolizumab, and dupilumab. Of these, 57%, 55%, and 11% were classified as serious reactions. All three biologics had a high percentage of General reactions (fatigue, pyrexia, dizziness, death). Prescribing information cites eosinophilia, gastritis, and ear pain as common adverse events, but reports of these reactions were not common in this analysis. The top two reaction categories reported for omalizumab were General (25.7%) and Pulmonary (21.7%). The most common mepolizumab-associated adverse events were General (24.3%) and Pulmonary (24.8%). Dupilumab's top categories were Administration/Error (26.4%) and General (16.1%).

Discussion:
This is the first large-scale comparative analysis of the adverse event profiles of omalizumab, mepolizumab, and dupilumab. This FAERS investigation demonstrates differences in the percentage of serious reactions and reaction types among these biologics. Furthermore, there are discrepancies between these findings and the adverse reactions listed on the drug prescribing information documents.

4:55 pm - 5:00 pm
Q&A

5:00 pm
Meeting Adjourns

POSTERS

ARS Poster Viewing

Wednesday, May 3, 2023,
1:00 pm – 7:00 pm
Thursday, May 4, 2023,
9:00 am – 7:00 pm
Hynes Convention Center – Hall D

ARS Combined Poster Reception

Wednesday, May 3, 2023
5:30 pm – 7:00 pm
Hynes Convention Center – Hall D

Poster #B001

A 10-year comparative analysis of pediatric nasal foreign bodies on a national scale

Abdurrahman Al-Awady
Torin Thielhelm
Alfred Marc Iloreta, MD
Anthony G. Del Signore, MD
Madeleine Schaberg, MD
Aldo V. Londino 3rd
Satish Govindaraj, MD, FARS

Introduction:
Children comprise the majority of patients who present with nasal foreign bodies (NFB) in the emergency department. Previous literature indicates that children aged two to five years are most likely to suffer from NFB. Although most NFB are harmless, some materials significantly increase their morbidity. This study is the first to evaluate the epidemiology of pediatric NFB using a nationally representative sample. We aim to characterize the demographics and incidence of pediatric NFB on a national scale to facilitate evidence-based safety guidelines.

Methods:
The National Electronic Injury Surveillance System was queried for facial foreign bodies occurring between 2012 and 2021 in children aged zero to twelve years. Injury area was stratified for patient cases with nasal involvement.

Results:
A total of 12178 NFB cases were reported in the last ten years. 5193 cases occurred in children aged zero to two years while 6985 cases occurred in children aged three to twelve years. Chi-squared analysis in NFB between these age ranges revealed a p-value approaching 0. 8514 cases occurred in children aged zero to three years while 3664 cases occurred in children aged four to twelve years, with a p-value approaching zero. Black children had a total incidence of 2771 NFB while non-Black children had 5160 NFB, with a p-value approaching 0. The objects with the highest incidence were beads with 5259, paper products with 1104, and toy blocks with 1010.

Conclusion:
According to our analysis, NFB occur most commonly in children between ages zero to three. In addition, Black children are more likely to experience NFB than non-Black children. Amongst all NFB cases, the most frequent objects were beads, paper products, and toy blocks.

Poster #B002

A new phenotype of immune-related chronic rhinosinusitis in the era of immune checkpoint inhibitors

Kelly McKenna, MD
Sadie Casale, Medical Student
Shahid Ahmed
Carolyn Orgain, MD
University of Vermont Medical Center

Immune checkpoint inhibitors (ICI) treat malignancies by inducing the immune system to target malignant cells. They can induce severe and unintended auto-immune reactions in patients called Immune-Related Adverse Events (IRAE). We present a case of IRAE-related aseptic chronic rhinosinusitis (CRS) as a novel CRS phenotype.

The patient is a 64-year-old female with T4bN1 nodular melanoma treated with surgical excision and adjuvant nivolumab. She had a distant site recurrence treated with T-VEC. Her treatment course was complicated by autoimmune pancreatitis. Her T-VEC therapy was halted, and she underwent oral steroid therapy with resolution of her pancreatitis. The recurrence was excised with a favorable treatment response. A month later, the patient developed elevated transaminase levels and acute onset anosmia and nasal congestion. Her post-excision PET/CT showed near-pansinus partial opacifications. Nasal endoscopy revealed bilateral middle meatal edema and copious purulent drainage. The culture was aseptic with many neutrophils. This was consistent with both autoimmune sinusitis and hepatitis. She was placed on oral steroids and topical steroid rinses. The oral steroids were stopped at four weeks due to marked clinical improvement. Follow up imaging showed no sinusitis, and the rinses were tapered. There was no evidence of sinusitis or hepatitis at six months.

There are at least two other cases of aseptic sinusitis after use of ICIs reported. Its presentation can closely mimic bacterial sinusitis and this population is at risk of over-prescription of antibiotics which can lead to adverse cancer-related outcomes. This form of sinusitis will likely become more prevalent with the continued advancement of immunotherapy.

Poster #B003

A novel method for improving compliance in patients using continuous positive airway pressure (CPAP) during sleep

Keith Matheny, MD
Ewen Tseng, MD, FARS
Kenny Carter, MD
Tiffany Young, RN

Background:
Obstructive sleep apnea (OSA) is associated with stroke, hypertension, cardiovascular disease, and diabetes. It is estimated to affect ~200 million people worldwide. Continuous positive airway pressure (CPAP) during sleep has proven benefits, however, long term compliance is poor - often as low as 40%. Nasal discomfort, dryness and crusting are commonly reported by patients as reasons for poor compliance. We examined a novel method to decolonize and moisturize the nares in order to help improve CPAP compliance.

Methods:
Following informed consent, 45 CPAP patients completed a baseline survey. They were then instructed on use of a pre-packaged, antiseptic nasal cleansing kit (NasoClenz) for use before and after CPAP. After two weeks of twice daily cleansing, patients completed a second survey regarding CPAP comfort and compliance. Nasal cultures were also obtained from a subset of patients before and after the intervention.

Results:
50% of patients reported that the kit made CPAP more comfortable and increased their daily compliance with CPAP. 72% reported an overall positive experience, and 82% stated it would be beneficial to use this method on a routine basis. In the subset of patients cultured before the study, 50% were colonized with anti-biotic resistant bacteria. In these patients, 66% experienced a reduction or elimination in the bacterial growth following the intervention.

Conclusions:
Nasal discomfort, dryness and crusting are common complaints leading to poor compliance with CPAP users. This novel method of nasal cleansing shows improved comfort and potential for intranasal decolonization with resultant promise for improving compliance with CP

Poster #B004

A retrospective review of inverted papilloma attachment site distribution with a three-dimensional heat map

Jumah Ahmad, MD
Sean McKee
Andy Chua, MD
Chinmay Mokashi
Samia Islam
Brady Anderson, MD
William Yao, MD, FARS
Martin Citardi, MD, FARS
Amber Luong, MD, PhD, FARS
Luca Giancardo, PhD
University of Texas - Health Sciences Center at Houston

Background:
Inverted papilloma (IP) is a benign sinonasal tumor that arises from localized attachment sites (AS) which can be difficult to discern on computed tomography (CT) but are critical to address surgically. IP is reported to typically arise from the lateral nasal wall. Our study aims to determine the distribution of AS in patients with IP and to demonstrate this visually with a three-dimensional (3D) heat map.

Methods:
CT scans of all patients surgically treated for IP at our institution between 2004 and 2021 were reviewed. The IP AS were manually segmented on CT by the operating surgeon and categorized by location. The CTs and segmentations were resampled using a registration pipeline to a common template and a 3D heatmap of the AS was generated by averaging the segmentations as an overlay onto the template.

Results:
A total of 68 subjects were included. Given multifocal AS of some IPs, 94 AS were identified. The distribution of AS was as follows: 63.8% maxillary, 18.1% ethmoid, 9.6% nasal cavity, 5.3% sphenoid, and 3.2% frontal. Within the maxillary sinus, the superior, posterior, and lateral walls were most involved, accounting for 18.1%, 16.0%, and 12.8% of all AS respectively. The medial maxillary wall (lateral nasal wall) was only involved in 8.5% of AS. The subject CTs were successfully resampled for inclusion in the 3D heat map.

Conclusion:
In our patients, the AS of IP was most frequently in the maxillary sinus. Contrary to the literature, the superior, posterior, and lateral maxillary walls were more commonly involved than the lateral nasal wall. A 3D heat map of IP AS distribution can be useful when pre-operative CT does not show an obvious AS, especially as more data is added to the model in future.

Poster #B005

Access to biologic therapy in patients with chronic rhinosinusitis with polyps

Emily Garvey, BA; Bita Naimi, BA; Alexander Duffy, MD; Zachary Urdang, PhD, MD; Marc Rosen, MD, FARS; Gurston Nyquist, MD, FARS; Elina Toskala, MD, PhD, FARS; Mindy Rabinowitz, MD, FARS

Introduction:
Chronic Rhinosinusitis may be divided into Chronic Sinusitis with (CRSwNP) and without nasal polyps (CRSsNP). Although expensive, biologics have emerged as a treatment option for patients with refractory CRSwNP. No studies have explored demographic differences in access to biologic therapies for patients with CRSwNP.

Methods:
The TriNetX United States Collaborative Network was queried for patients with CRSsNP and CRSwNP using ICD-10 codes. Cohorts were created based on ethnicity and race. Outcomes included biologic prescription, endoscopic sinus surgery (ESS), oral antibiotic, and steroid use. Propensity score matching created balanced cohorts.

Results:
1,662,914 Non-Hispanic Caucasian, 283,794 Black, and 127,276 Hispanic CRS patients were identified. Of these patients, 5.7% Caucasian, 6.2% Black, and 5.5% of Hispanic patients had CRSwNP. Black patients had higher rates of all comorbidities examined including asthma and dermatitis ($p<0.0001$). After propensity score matching, Black individuals had the highest rates of dupilumab use compared to Caucasian (OR: 1.28, $p<0.0001$) and Hispanic populations (OR: 2.00 $p<0.0001$). Black individuals were also more likely to have ESS than their Caucasian counterparts (OR: 1.16, $p<0.0001$).

Conclusion:
Black patients were more likely to be prescribed biologics for CRS compared to their Hispanic and Caucasian counterparts. They were also more likely to undergo ESS, this may be related to more severe disease. Despite the cost, biologic therapy represents a viable treatment for severe disease cross demographics. Understanding access to CRS treatment and disease severity across populations is important to promote health equity.

Poster #B006
Acute invasive fungal rhinosinusitis in the COVID era: An observational study
Kevin Grafmiller, MD
Nikitha Kosaraju
Dipti Sajed
Jivianne Lee, MD, FARS
Jeffrey Suh, MD, FARS
Marilene Wang, MD, FARS
University of California Los Angeles Health

Background:
Acute Invasive Fungal Rhinosinusitis (AIFRS) is a rapidly progressive and deadly pathology that can quickly spread to involve the eyes and brain. During the COVID-19 pandemic, there have been reports of increased rates of AIFRS and COVID-associated Mucormycosis (CAM), especially in India, which may be more aggressive and portend worse outcomes.

Methods:
A retrospective chart review was performed at a tertiary medical center from March 2019-September 2022 to identify patients with AIFRS as an update and comparison to a previous similar chart review at the same institution evaluating demographics, disease characteristics, therapy, and outcomes.

Results:
A total of 27 patients with AIFRS were identified in this 2.5-year period compared to 34 in the previous decade. No patient had a COVID-19 diagnosis prior to development of AIFRS. Overall mortality was 25.9% compared to 61.8% during the previous decade. Orbital extension was present in 55.6% of patients compared to 64.7% of patients in the previous decade; however only 3.7% of patients underwent orbital exenteration compared to 23.3% in the previous cohort. Liposomal amphotericin B (AmB) was the most frequently used medical therapy (81.5%), and multidrug therapy was utilized in 85.2% of patients versus 73.8% of patients in the previous cohort. Intrathecal and intraorbital AmB treatments were also utilized when indicated.

Conclusion:
A previous or active COVID-19 infection does not explain the increased incidence of AIFRS. A combination of surgical and multimodal antifungal therapy represents the mainstay of AIFRS treatment, and orbital exenteration for orbital involvement is less frequently performed, as it may not provide significant survival benefit.

Poster #B007
WITHDRAWN

Poster #B008

Air flow and heat transfer among anatomical subsites within nasal passages

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Sarah Russel, Resident Physician
Meredith Lamb, Medical Student
Dennis Frank-Ito, MD
University of North Carolina

Objective:
Understanding airflow through anatomically normal nasal passages, particularly in localized anatomical subsites, allows for greater comprehension of nasal physiology both in healthy patients and also in those with allergic rhinitis or mild chronic rhinosinusitis. Computational fluid dynamics (CFD) was performed in patients with normal nasal and sinus anatomy to provide information about airflow and heat transfer at various anatomical subsites.

Study Design:
Retrospective cohort study.

Method:
Three-dimensional reconstructions of nasal passages and maxillary sinuses were created from computed tomography scans of three subjects with normal anatomy. CFD analysis was conducted at various anatomical subsites including the lateral and septal walls, osteomeatal complex, maxillary sinus, and entire nasal passage. Lateral and septal walls were divided into anterior and posterior portions via a plane at the anterior aspect of the inferior turbinate. Heat flux and wall shear stress at these sites were correlated to nasal and maxillary air flow, pressure, and resistance variables.

Results:
Percent difference in airflow between unilateral nasal passages (PDU), correlated with unilateral heat flux but only after a certain threshold. Subject 1 had no difference in heat flux between sides (PDU =6%), yet subjects 2&3 (PDU =56% & 46%, respectively) had greater heat flux on the side with lower nasal resistance. Moreover, septal heat flux exceeded lateral wall heat flux in all nasal passages both anteriorly and posteriorly.

Conclusion:
Mild nasal cycling contributed to PDU and, subsequently, differences in heat flux between sides. Notably, septal mucosa demonstrated more efficient heat flux per surface area than lateral nasal walls.

Poster #B009

Anatomical predisposing factors for solitary sphenoid sinus fungal ball

Ahmed Alanazi, MD
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Jeon Doo
Ministry of Health, Saudi Arabia

Abstract Objective:
Sinonasal fungal balls (FBs) commonly occur in the maxillary sinus (MS), followed by the sphenoid sinus (SS). Compared to MSFBs, relatively little is known about the predisposing factors and pathogenesis of unilateral SSFB. Thus, we investigated the intranasal anatomical variations as predisposing factors for unilateral SSFB.

Methods:
This study included 33 patients who underwent endoscopic sinus surgery for unilateral SSFB between 2010 and 2021. Preoperative computed tomography scans were used to analyze the presence of anatomical variations, including anterior and posterior nasal septal deviation (NSD), cephalocaudal NSD, concha bullosa (CB), Haller cell (HC), paradoxical middle turbinate (MT), everted uncinated process (UP), Onodi cell, sphenoid lateral recess, complete accessory septum of the SS, and types of SS pneumatization.

Results:
We found that the presence of HC (33.3% vs. 12.1%, p=0.04), complete accessory septum of SS (51.6% vs. 25.8%, p=0.04), and sellar type of SS (90.9% vs. 50%, p=0.003) differed significantly between FB-presence SS and FB-absence SS. However, other anatomical variations, including NSD, CB, paradoxical MT, everted UP, Onodi cell, and sphenoid lateral recess, were not significantly associated with the occurrence of unilateral SSFB (all p>0.05). In multivariable analysis, only types of SS pneumatization (sellar) showed statistical significance in the presence of SSFB (aOR=8.96; 95% CI, 1.27-63.19; p=0.03).

Conclusion:
We demonstrated that unilateral SSFB was strongly associated with ipsilateral types of SS pneumatization, followed by the presence of HC and a complete accessory septum of the SS. Intranasal anatomical variations may play a significant role in the localization of SSFB.

Poster #B010

Anti-neutrophil cytoplasmic antibodies (ANCA) positive cocaine induced midline destructive lesions (CIMDL): A case report and systematic review

Danielle Morrison, MD
Grace Baisden, Medical Student
Alex Otto, Medical Student
Tawfiq Khoury
Walter Reed National Military Medical Center

Background:
A subset of patients with cocaine induced midline destructive lesions (CIMDL) demonstrate anti-neutrophilic cytoplasmic antibody (ANCA) positivity. For this reason, misdiagnosis of CIMDL for vasculitis can occur when illicit drug use is denied.

Objective:
To evaluate presentation, diagnosis, prevalence, and treatment of ANCA positive CIMDL

Methods:
A PRISMA-compliant systematic review was conducted to query English-language articles discussing ANCA, vasculitis, cocaine, nasal necrosis from Cochrane, PubMed, and Embase.

Case Report:
45-year-old female with necrosis of bilateral nasal cavities and upper lip denying drug use on presentation with worsening disease between surgical debridement. Histopathology revealed c-ANCA/PR3+ tissue and questionable fungal debris triggering autoimmune and antifungal therapy. Final pathology with polarizable crystalline material, at which time the patient endorsed intranasal cocaine use.

Results:
Systematic review identified 33 articles with 88 patients for qualitative analysis. Common clinical features included nasal obstruction and facial pain. Nasal endoscopy revealed ulceration of the nasal cavity, inferior turbinates, and septal perforation. Characteristic pathologic findings included p-ANCA positivity (52%), PR3 positivity (35%), c-ANCA positivity (24%), and HNE positive (24%). Management included oral steroids (30%), immunosuppression (30%), antifungal therapy (47%), and surgical debridement (27%).

Conclusions:
CIMDL can present with similar histopathologic findings to vasculitis or fungal disease. However, the treatment consists of drug cessation. A high index of suspicion for illicit drug use must be maintained.

Poster #B011

WITHDRAWN

Poster #B012

Association between cocaine use and sinonasal symptoms among US adults

Matthew Lin, BS
Ryan Long, Medical Student
Nash Iyer, Medical Student
Benjamin Tam, Medical Student
Ian Kim PhD; Kevin Hur, MD
Keck School of Medicine of USC

Educational Objective:
Participants will be able to learn about how the association between cocaine use and sinonasal symptoms changes based on demographic characteristics and degree of drug use.

Objectives:
Evaluate the association between cocaine use and sinonasal symptoms.

Study Design:
Cross-sectional retrospective analysis of the National Health and Nutrition Examination Survey (NHANES).

Methods:
The NHANES 2013-2014 survey was queried for demographic, illicit substance use, and sinonasal symptom information among adults. Data was characterized through descriptive statistics. Chi-square and t-tests were used to assess for significant differences. Multivariate logistic regression was used to assess for factors associated with sinonasal symptoms.

Results:
Our 1596 patient cohort was 46.80% male (n=747), 42.73% white (n=682), and had an average age of 49.18 years (SD=5.75). 19.74% (n=315) reported ever using cocaine. Those who ever used cocaine were more frequently male ($p<0.01$) and endorsed higher rates of depression ($p<0.01$). Relative to non-cocaine users, ever cocaine users endorsed significantly higher rates of changes in smell ($p<0.01$) and phantom odor ($p=0.02$). There was a significant interaction between ever using cocaine and gender on sinonasal symptom likelihood (OR=0.55, 95% CI=[0.26-0.85], $p=0.04$). While females were more likely to endorse sinonasal symptoms regardless of cocaine use, this difference was exacerbated among ever cocaine users.

Conclusions:
Although cocaine use is more common among males, females who ever used cocaine may be disproportionately affected by associated sinonasal symptoms.

Poster #B013

Association between loss of smell and disease burden and Dupilumab efficacy in patients with chronic rhinosinusitis with nasal polyps

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Zara Patel, MD, FARS
Jose Mattos, MD
Changming Xia
Asif H. Khan
Scott Nash, MD
Medical University of South Carolina

Background:
This post hoc analysis investigated the association between baseline smell loss and other aspects of disease in chronic rhinosinusitis with nasal polyps (CRSwNP) and evaluated dupilumab efficacy according to severity of baseline smell loss in the pooled SINUS-24/SINUS-52 studies (NCT02912468/NCT02898454).

Methods:
Nasal Polyp Score (NPS, 0−8), patient-reported nasal congestion/obstruction (NC, 0−3), 22-Item Sinonasal Outcome Test (SNOT-22, 0−110), and Lund-Mackay CT score (LMK-CT, 0−24) were analyzed according to baseline weekly average patient-reported loss of smell scores (LoS, 0−3) of >1−≤2 (moderate) or >2−≤3 (severe) in patients treated with dupilumab 300 mg or placebo every 2 weeks.

Results:
Of 724 patients randomized, baseline LoS was severe in 601 (83%) and moderate in 106 (15%). At baseline, odds ratios (95% CI) for severe vs moderate LoS were 1.12 (0.96, 1.32), 6.01 (3.95, 9.15), 1.03 (1.02, 1.05), and 1.17 (1.11, 1.23) for 1-point greater baseline severity of NPS, NC, SNOT-22, and LMK-CT, respectively, and 3.01 (1.97, 4.59) for presence vs absence of prior sinonasal surgery. At Week 24, least squares mean differences (95% CI) dupilumab vs placebo in change from baseline were: NPS −1.90 (−2.56, −1.25) and −1.95 (−2.20, −1.70); NC −0.35 (−0.64, −0.06) and −1.00 (−1.13, −0.87); SNOT-22 −7.52 (−14.55, −0.48) and −21.72 (−24.63, −18.82); and LMK-CT −6.30 (−7.88, −4.72) and −6.22 (−6.82, −5.63) in the moderate and severe baseline LoS subgroups, respectively; all nominal $P < 0.05$ vs placebo.

Conclusion:
More severe smell loss is associated with greater disease burden in CRSwNP. Dupilumab significantly improved outcomes and HRQoL regardless of baseline severity of smell loss.

Poster #B014

Association between prolonged operative time and surgical outcomes in transsphenoidal pituitary surgery

Anthony Saad, BA
Ariel Omiunu, MD
Catalina Jaramillo-Moncayo, MD
Prayag Patel, MD
Christina H. Fang, MD
Jean Anderson Eloy, MD, FARS
Rutgers New Jersey Medical School

Objective:
To determine whether prolonged operative time (OT) has a statistically significant impact on adverse outcomes following TSPS.

Study Design:
Retrospective cohort study.

Methods:
Patients who underwent Transsphenoidal Pituitary Surgery (TSPS) between 2005-2018 were identified in the National Surgical Quality Improvement Program (NSQIP) database. Cases were stratified into two groups based on operative times ≤184 minutes and operative times >184 minutes. Univariate (e.g., chi-square, unpaired t-tests) and multivariate logistic regression analyses were performed to evaluate postoperative outcomes.

Results:
This study included 224 patients who underwent TSPS. The median OT (184 minutes) was used to categorize patients into two cohorts: ≤184 minutes and >184 minutes. The mean length of operation in the prolonged OT cohort was 265.2 minutes (compared with 130.8 minutes). Patients with prolonged OT were significantly older (53.8 ± 14.5 years vs 49.8 ± 16.3 years, p=0.046) and were more likely to have a lower body mass index (BMI) (30.3 ±6.6 vs 33.0±8.8, p=0.009). Univariate analysis did not yield any significant differences in baseline comorbidities between the two cohorts, however patients with prolonged OT demonstrated higher rates of overall surgical complications (p=0.013) and postoperative bleeding (p=0.023). On multivariate analysis, operative time greater than 184 minutes were not independently associated with postoperative complications.

Conclusion: Increased OT in patients undergoing TSPS was significantly associated with increased age and lower BMI, in addition to adverse postoperative outcomes including overall surgical complications and postoperative bleeding.

Poster #B015

Association between rising temperature norms and Lund-Mackay score in determining mucosal disease burden

Brett Campbell, MD
Peter Nagy, Resident
Abdurrahman Abdurrob, Medical Student
Christopher Brook, MD
Beth Israel Deaconess Medical Center

Objectives:
With temperature changes and pollution worsening, we aim to understand if there is an increase in mucosal disease burden as measured by Lund-Mackay Score (LMS).

Study Design:
This is a retrospective study looking at all CT sinus scans indicated for chronic rhinosinusitis symptoms from July 2004, 2009, 2014, and 2019 (time periods 1-4, respectively), representing random sample periods over the last two decades.

Methods:
In addition to descriptive statistics, a negative binomial regression model was used to evaluate the association of baseline characteristics and average temperature with LMS.

Results:
A total of 299 CT sinus scans were reviewed. The median age was 52, with 55% being female. The median LMS score for time periods 1-4 were 1.0, 1.0, 2.0, and 2.0, respectively (p-value 0.47). In time periods 1-4, the average temperature was 71.0, 70.5, 74.1, and 78.7°F. When controlling for covariates in the model other than average temperature, patients with any sinus disease in time periods 2-4 had a 24%, 17%, and 16% increase in the LMS, respectively, when compared to the year 2004 (time period 1) (p = 0.42, p = 0.53, and p=0.54 respectively).

Conclusion:
In this study, we found an increase in both median and mean LMS at each unique time point and an increase in mucosal disease as measured with the LMS as average temperature norms increased. However, this increase was not statistically significant most likely due to the limited sample size.

Poster #B016

Association between rising temperature norms and trends in most common allergens

Abdurrahman Abdurrob, MS
Peter Nagy, Resident
Brett Campbell, Resident
Sumedh Kaul, Statistician
Christopher Brook, MD
Tufts University School of Medicine

Objectives:
With temperature changes and pollution worsening, we aim to understand trends in the most common allergens via skin prick test as temperature norms have increased.

Study Design:
This is a retrospective study looking at all allergy skin prick data from June, July, and August of 2004, 2009, 2014, and 2019 (periods 1-4, respectively). These periods represent random samples over the last two decades. Specific focus was put on the following 5 allergens: birch, timothy grass, ragweed, oak, and dust mite.

Methods:
In addition to descriptive statistics, logistic regression was used to evaluate the association of baseline characteristics and average temperature with having any allergy.

Results:
314 individual tests were included in this study. The median age was 40.5, with 71% being female. From time-period 1-4, the percent of people who were positive to any of the top 5 increased from 60%, 60%, 71%, 66%, respectively (p-value= 0.60). In periods 1-4, the average temperature was 71.0, 70.5, 74.1, and 78.7°F, respectively. The odds of testing positive for any allergy (top 5) in the years 2009, 2014, and 2019 are 1.00, 1.67, and 1.32 times that of 2004 but not statistically significant.

Conclusions:
In this study, we found a general increase in the percentage of patients that had positive SPT at each unique time point. As average temperature norms increased, there was also an associated increase in patients who tested positive. However, this increase was not statistically significant most likely due to the limited sample size in this initial survey.

Poster #B017

Association between smell and taste loss and sexual activity: A NHANES database study

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Background:
Olfactory function has been shown to be associated with human sexual motivation, satisfaction, and arousal. However, there has not been any large population-based examining olfactory function and sexual function. This study looks to see if there is any correlation between smell and taste loss and decreased sexual activity.

Methods:
The 2011-2012 and 2013-2014 National Health and Nutrition Examination Survey (NHANES) database was queried for sexual behavior and smell and taste function. Questions pertaining to sexual frequency in the past year were analyzed in survey respondents with or without smell or taste loss. Logistic regression analysis was performed using statistical software R.

Results:
A total of 4739 (2248 females, 2291 males) people completed the sexual behavior and taste & smell questionnaires administered by NHANES. NHANES only administered the smell questionnaire to people 40 yo or older. Females who experienced smell loss had a decreased number of male sexual partners per year by 36% (p=0.002). Males who experienced smell loss had a smaller decrease in number of female sexual partners per year with a decrease of 16%, however, this result was not statistically significant (p=0.06). There were no statistically significant associations between taste loss and sexual frequency.

Conclusion:
Based on the NHANES survey, the decrease in number of annual male sexual partners for females who had smell loss was greater than the decrease in number of annual female sexual partners for males who had smell loss.

Poster #B018

Association of chronic rhinosinusitis with the incidence of head and neck cancer: A nationwide cohort study

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Introduction:
Chronic rhinosinusitis (CRS) is one of the most prevalent disease among upper airway inflammation. CRS can affect the patient's quality of life and can be associated with the head and neck cancers (HNCs). However, little is known regarding the association of CRS on the incidence of HNCs. Therefore, we analyzed the relationship between CRS and the incidence of HNCs in a whole Korean population.

Methods:
This is a retrospective cohort study including data from the Korean National Health Insurance Service database. Adjustments were made to minimize risk profiles for sex, age, diabetes, hypertension, dyslipidemia, and rhinitis between the two groups. The primary endpoint was newly diagnosed HNC between January 2009 and December 2018.

Results:
Among 1,337,120 subjects in the Korean National Health Insurance Service database, data from 324,774 diagnosed with CRS (CRS group) and 649,548 control subjects (control group) were selected. Patients with CRS exhibited a statistically significant greater risk for nasal cavity/paranasal sinus cancer, hypopharynx/larynx cancer, and thyroid cancer compared with the control group. In the CRS group, the adjusted hazard ratios for nasal cavity/paranasal sinus cancer were 1.809 (95% confidence interval (CI) 1.085–3.016), 1.343 (95% CI 1.031–1.748) for hypopharynx and larynx cancer, and 1.116 (95% CI 1.063–1.173) for thyroid cancer. CRS was associated with a higher incidence of HNCs.

Conclusions:
Physicians should carefully consider the possibility of HNCs development and implement therapeutic strategies to minimize the impact of these diseases.

Poster #B019

Smell and cognition in patients with persistent post-COVID olfactory dysfunction

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Introduction:
Olfactory dysfunction (OD) is associated with progression from mild cognitive impairment to more advanced neurodegenerative states. Persistent OD is common in post-acute sequelae of SARS-CoV-2 infection (PASC), where the longitudinal impact of protracted OD has yet to be evaluated. This study provides a baseline assessment of associations between PASC-related quantitative OD and neurocognition using the Montreal Cognitive Assessment (MoCA).

Methods:
83 PASC patients presenting with self-reported subjective OD underwent psychophysical assessment with Sniffin' Sticks and screening neurocognitive assessment with the MoCA. Individuals with pre-existing neurological, rhinological, or OD conditions were excluded. Patients were stratified based on semi-objective quantitative smell assessment: normosmic (n=20) and persistent OD (n=63). MoCA performances were compared across these two olfactory status groups and against a normative population score.

Results:
Analysis of our normosmic cohort and normative population MoCA scores demonstrated no difference ($p=0.697$). MoCA results from the persistent OD group were lower than the normosmics cohort ($p<0.01$), and lower than the normative population ($p<0.01$). Stratification by gender across these groups revealed no significant difference in MoCA score.

Conclusions:
Among individuals with persistent OD as a presenting symptom of PASC, these preliminary baseline cognitive performances suggest OD may associate with lower MoCA scores. Further stratification by level of quantitative OD is necessary to further clarify these associations. Additional evaluation is needed to assess association of OD with deficits in specific neurocognitive domains and to evaluate longitudinal correlations.

Poster #B020

Avoidance of posterior sinonasal epistaxis in endoscopic large sphenoidotomy: endoscopic preservation of sphenopalatine artery-posterior nasal artery pedicle technique and outcomes

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Postoperative and potentially life-threatening posterior sinonasal epistaxis can occur as a result of ligation of the sphenopalatine-posterior nasal artery pedicle during sphenoidotomy. Large sphenoidotomies due to anatomic variations or disease is indicted in some cases. During these approaches, electrocautery or clip ligation of the pedicle has been a standard in endoscopic sinus surgery which may result in delayed postoperative posterior epistaxis. Since adopting the “rescue flap” technique for all skull base procedures in our institution in 2011, a modified technique was adopted by the author to achieve large sphenoidotomies (i.e.: fungus balls, mucoceles, tumors, lateral aeration of the sphenoid wing, etc.) achieving an inferiorly based sphenoidotomy to the floor of the sphenoid and laterally to the vidian canal with preservation of the arterial pedicle avoiding postoperative epistaxis. 50 consecutive cases were included in the cohort with no episodes of postoperative posterior arterial epistaxis. Additionally, no patients required return to the operating room for debridement due to anatomic barriers or retained debris allowing post operative endoscopic care in the ambulatory setting with topical anesthesia. Endoscopic technique will be presented.

Poster #B021

Avoidance of postoperative epistaxis utilizing a sphenopalatine pedicle preserving technique in endonasal endoscopic skull base surgery: 11-year experience

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Postoperative and potentially life-threatening posterior sinonasal epistaxis can occur in endoscopic endonasal skull base surgery with a published incidence ranging from 0-7%. Our institution uniformly adopted a technique of bilateral sphenopalatine-posterior nasal artery preservation and septal olfactory strip preservation in 2011, publishing in 2014 our retrospective analysis of 174 patients. (1) The goal of this rescue flap technique is to avoid postoperative epistaxis and prevent anosmia; it is used in all cases when a nasoseptal or other pedicled flap is not used. Since August 2013 until June 2022 our center has performed an additional 879 endoscopic endonasal procedures on 795 pts, cumulative total of 1053 procedures on 956 patients. The cohort of tumor procedures will be presented. Nasoseptal flap was performed in 91 patients (11%) middle turbinate flaps 19 patients (2%) in current cohort analysis validating the ability to convert rescue flap technique into a formal nasoseptal flap as needed. Over this 11-year period, 2 incidences of arterial postoperative epistaxis occurred related to divergence from the standard rescue flap technique with accidental ligation of SPA-PNA for an overall incidence of epistaxis of 0.2%. Otherwise, there have been no episodes of major epistaxis while preserving and not ligating the sphenopalatine-posterior nasal artery vascular structures. Due to the potential for serious sequelae of postoperative posterior epistaxis, we recommend adoption of this technique to avoid delayed epistaxis in endoscopic endonasal surgery.

1. Griffiths CF et al: Avoidance of postoperative epistaxis and anosmia in endonasal endoscopic skull base surgery: a technical note Acta Neuro (2014) 156:1393-1401

Poster #B022
WITHDRAWN

Poster #B023
Bilateral antrochoanal polyp: An extremely rare entity with a review from the last two decades
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Antrochoanal polyp (ACP) is a well-known entity of benign sinonasal neoplasms described first in the early 20th century. ACP almost always presents as a unilateral mass and is treated solely with surgical excision. We report a rare case of a middle-aged man presenting with nasal obstruction, rhinorrhea, and sleeping disturbances, eventually diagnosed as bilateral antrochoanal polyps. After confirming the diagnosis with imaging and biopsy studies, the patient was treated conservatively with marked improvements in his symptoms during a 3-2-month regular follow-up. Successful ACP treatment depends on complete surgical excision to abolish any chance of recurrence. Long-term postoperative monitoring of at least two years is advisable. A frugal approach through a trial of medical treatment may provide symptom relief in patients who are otherwise unfit for surgery. A review of the relevant literature regarding the presentation, diagnosis, and outcome of this rare entity is presented while highlighting its fogged aetiopathogenesis. This case report adds to the scarce data pool of Bilateral ACP and highlights the necessity of prudent and timely diagnosis of this uncommon entity to avoid unnecessary investigations and lengthy medical or surgical treatment.

Poster #B024

Biological sex is a significant modulator in rhinologic health and disease: A scoping review of the current state knowledge and gaps

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Background:
Biological sex is increasingly recognized as a critical variable in healthcare. We reviewed the current literature regarding sex-based differences in rhinology to summarize the data and identify critical knowledge gaps.

Methods:
A scoping review of the literature was conducted. Publications reporting sex-based differences in anatomy, pathophysiology, disease prevalence and outcomes were studied.

Results:
Sixty-six relevant manuscripts were identified. While paranasal sinuses are of similar size at birth, they become larger in males, leading to differences in ostium location. Females outperform men in olfactory identification but only in the 18-50 years age-group. Fluctuating gonadal steroid levels and estrogen and progesterone administration can impact nasal mucosa receptor density. Epistaxis is more prevalent in males and postmenopausal females compared to premenopausal females, perhaps from differences in sex-hormonal and hypertension status. CRS overall and CRS without nasal polyp is more prevalent in females while CRS with nasal polyp is more prevalent in men. Allergic rhinitis is more common in males before puberty and in females after puberty. CRS symptom-burden is higher in females prior to and after ESS. However, females undergo ESS at lower rates than men. Baseline rhinitis QOL scores have been reported to correlate with estrogen-b receptor positive cell levels in the nasal mucosa, possibly an explanation for higher burden in females.

Conclusions:
Significant differences in disease prevalence, symptomatology and therapeutic responses exist between sexes. Biological factors may explain these differences but need to be studied. Gonadal hormones should be studied further as a therapeutic in rhinologic pathology.

Poster #B025

Biologics in the management of chronic rhinosinusitis with nasal polyposis: Two years real-life experience

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Background:
The introduction of biologics in the management of chronic rhinosinusitis with nasal polyposis (CRSwNP) has allowed new therapeutic options and Dupilumab represents the first approved biological agent by EMA. Aim of this article is to report our two years experience in the evaluation of quality of life outcomes in CRSwNP patients treated with biologics.

Methods:
Our Centre of Rhino-Allergology and the Pneumology Unit have been cooperating in a multidisciplinary management to treat patients with CRSwNP and/or with concomitant asthma. We have enrolled 56 patients with CRSwNP treated with Dupilumab. We have developed a dedicated collection form to monitor patients' compliance to therapy and their clinical outcomes.

Results:
We describe clinical outcomes of patients enrolled since December 2020 from our Centre of Rhino-Allergology affected by CRSwNP treated with Dupilumab: 60% of patients were male and 40% were female, the mean age was 58.7 years. Monitoring our patients, we have noticed a considerable respiratory gain associated with a nasal symptoms improvement and significant improvement of nasal congestion, loss of smell,SNOT-22 and VAS but especially in the psychological field.

Conclusions:
The role of Dupilumab in the management of CRSwNP is emerging. Based on our preliminary observations, quality of life has shown a general improvement, especially in the loss of smell. Further studies are needed to develop tailored guidelines and to identify the correct clinical indications to biologics therapy in CRSwNP patients. We assume that the patient endotyping is the pivotal aspect of diagnosis because the final result is strictly related with the right indication.

Poster #B026

BMI increases in individuals with COVID-19-associated persistent olfactory dysfunction

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Introduction:
Olfactory dysfunction (OD) is a well-known feature of acute and chronic illness associated with COVID-19. Associations between qualitative and quantitative OD and weight changes are suggested by the literature, but studies of post-COVID-19-associated chemosensory dysfunction and body mass index (BMI) are limited. The purpose of this study is to assess the impact of qualitative and quantitative COVID-19-associated OD on BMI.

Methods:
25 participants with self-reported OD were recruited for a prospective, longitudinal cohort study. Olfaction surveys, Sniffin' Sticks tests, and BMI measures were completed at 2 visits 1 year apart. Individuals with food insecurity, moderately-severe/severe depression, diabetes, and cancer were excluded. Group differences were assessed with Wilcoxon signed-rank tests. P-values were assessed for statistical significance using the Holm-Bonferroni method to correct for multiple hypothesis tests.

Results:
Individuals with persistent OD (n=15) showed a statistically significant increase in BMI after 1 year ($p=0.005$). Controls without persistent OD (n=10) showed no statistically significant change in BMI over the same time period ($p=0.093$). Individuals with self-reported parosmia (n=20) had a statistically significant increase ($p=0.002$) in BMI over 1 year, while those without self-reported parosmia (n=5) had no significant change in BMI ($p=0.345$).

Conclusions:
This preliminary study shows an association between COVID-19-associated OD and BMI, suggesting olfaction may play a role in altering dietary habits and nutrition in this population. Given limitations of sample size and study design, larger cohorts are needed to further evaluate the relationship between olfaction, nutrition, and weight.

Poster #B027

Cerebrospinal fluid rhinorrhea post routine coronavirus disease 2019 nasopharyngeal swab

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Introduction:
A 48-year-old female presented with a one-month history of left unilateral copious watery rhinorrhea. The patient reported receiving scheduled monthly COVID swabs and most recently two days prior to presentation. This is the first case report of CSF leak secondary to scheduled COVID-19 testing, thus it creates awareness for scheduled nasopharyngeal swab complications and emphasizes the need for proper technique training for allied health professionals.

Methods:
This is a case report on a single patient who presented on February 12, 2021 and was cared for through March 2021. Iatrogenic CSF rhinorrhea was studied in an outpatient specialty clinic with surgical treatment where skull base/endoscopic sinus surgery was performed.

Results:
The MRI of the brain with contrast showed a CSF leak from the left cribriform plate coursing along the anterior wall of the sphenoid sinus draining into the superior meatus of left nasal cavity and left nasopharynx. Five days after her initial presentation, surgery was performed with otolaryngology and neurosurgery to repair the cribriform-based encephalocele. We share our technique and showcase the video of the repair. One month post operation the patient had no rhinorrhea.

Conclusion:
Recently, regular COVID testing is becoming routine or even required by many occupations, increasing the risk for complications. With the severity of complications associated with persistent CSF leak, the proper education and training for allied health professionals on nasal cavity anatomy and swab technique to avoid skull base complications is imperative. Additionally, more allied health professional education on the signs and symptoms of CSF leaks as a potential complication is encouraged.

Poster #B028

Characterization of post-COVID-19 olfactory dysfunction treatment modalities and effect on quality of life

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Introduction:
Olfactory dysfunction (OD) occurs in a large subset of patients after COVID-19 infection with wide range of disease severity. This is the first study to investigate the relationship between the severity of post-COVID OD with the number of treatments pursued.

Methods:
A cross-sectional cohort of 36 patients with post-COVID OD were surveyed for treatment history and completed a Questionnaire of Olfactory Disorders (QOD-NS) and the Brief Smell Identification Test (BSIT).

Results:
34 (94.4%) of 36 patients trialed >1 treatment for an average of 3.3±2.0 months. Source of treatment information was most often by otolaryngologist (50.5%), internet search (32.1%), primary care provider (11.0%), or word of mouth (6.42%). Olfactory training was most pursued (80.6%) for an average of 4.9±5.2 months, followed by oral steroids (47.2%) for 0.5±0.4 months, nasal steroid spray (47.2%) for 4.6±5.7 months, saline irrigation (41.7%) for 6.2±7.4 months, omega-3 fatty acids (36.1%) for 6.9±5.7 months, alpha lipoic acid (30.6%) for 3.7±3.3 months, steroid irrigations (19.4%) for 3.1±1.8 months, and topical vitamin A drops (8.3%) for 6.5±3.5 months. Worse QOL as evidenced by higher QOD-NS scores correlated with greater number of treatments (r=0.3; p=0.02). Worse BSIT scores also correlated with greater number of treatments (r= -0.3, p=0.03).

Conclusion:
Patients with more severe post-COVID OD as evidenced by both lower QOL and decreased objective smell were more likely to pursue greater number of treatments. This study highlights the importance of objective smell testing and QOL metrics that should be part of the evaluation process for OD. These tests are necessary to understanding severity of disease in supporting and treating patients.

Poster #B029

Chronic rhinosinusitis in primary ciliary dyskinesia: Impact of disease and sinus surgery

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Primary ciliary dyskinesia (PCD) is a rare genetic disorder resulting from a loss of motile cilia. Patients experience pulmonary infection, recurrent ear infections, and chronic rhinosinusitis. Due to the underlying genetic cause of PCD, some authors advocate for aggressive gravity dependent sinus surgery with maxillary mega-antrostomies. We present a descriptive study of our institutional experience regarding sinus surgery in patients with PCD.

PCD patients who underwent sinus surgery from years 2000-2022 were identified. Demographic, age, indications for surgery, history of prior sinus surgery, sinus culture, sputum/bronchial culture were reviewed through the institutional electronic health record system.

Thirty patients were identified. Two patients underwent surgery for mucoceles. Twenty-nine received standard endoscopic sinus surgeries. One patient had bilateral medial maxillectomy. No patients underwent a Draf 3. Sixty percent of patients had history of previous sinus surgery. Sinus culture at the time of surgery showed 46% pseudomonas, 25% oropharyngeal flora, 10% staph aureus, 10% H. influenza, 3% E. coli, and 3% strep pneumoniae. Concomitant for at least one organism between sinus and pulmonary culture was approximately 45%.

While surgeons frequently argue for extended procedures for cystic fibrosis or PCD patients, in this single institutional study, a minority of patient underwent medial maxillectomy or Draf3. Of patients operated at our institutions, only 30% underwent a revision surgery over the 20-year period. Additionally, 45% concomitant culture between sinus and lung may further support the hypothesis that sinus could serve as a reservoir for recurrent lung infection in PCD patients.

Poster #B030
Cocaine induced midline destructive lesions vs. limited granulomatosis with polyangiitis: A diagnostic conundrum
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Introduction:
Cocaine-induced midline destructive lesions manifest in a small subset of habitual cocaine uses. The clinical manifestations of CIMDL can mimic other autoimmune vasculitities such as granulomatosis with polyangiitis.

Case Report:
This article describes a case of a middle-aged female who presented with nasal septal perforation and soft tissue mass causing nasal obstruction. She did not initially admit to previous cocaine use but was later noted to be positive for cocaine metabolites on a urine drug screen. At first, she was found to have pANCA positive which caused a diagnostic conundrum between limited GPA vs. CIMDL. However, recurrence of nasal soft tissue mass, repeat biopsies and characteristic findings on pathology lead to diagnosis of limited GPA. Her symptoms improved after starting medical therapy directed towards treating limited GPA.

Conclusion:
Due to the similar histological, clinical, serological manifestations of limited GPA and CIMDL, providing an accurate diagnosis can sometimes be very challenging. However, certain ANCA patterns (multiple positives or HNE ANCA positive), massive apoptosis on histology specimens, and symptoms refractory to standard GPA treatment, can point towards a diagnosis of CIMDL. This highlights the importance of obtaining a thorough history to avoid harm from unnecessary medical treatment because the most important factor in treating CIMDL is cessation from cocaine abuse.

Poster #B031
Comparing patient compliance with nasal sprays, irrigations, and medications in rhinology
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Patient medication compliance in general is highly variable. Many of the disease processes in rhinology are chronic in nature and require long-term medications for treatment. There are often many barriers with common medications used in the rhinologic field including difficulty with use, nasal sensitivity, and taste disturbance, however, there's a paucity of data on patient compliance with nasal medications. We hypothesize that nasal sprays and irrigations have poorer compliance compared to oral medications.

Patient compliance with medication regiments were recorded at tertiary rhinology practices. Type of medication (including intranasal steroids, azelastine, ipratropium bromide, oral antihistamine, leukotriene antagonist, saline irrigations, and medicated irrigations), recommended frequency use, and actual frequency of use. Patient demographics, diagnosis, and patient reported outcome measures were recorded.

A total of 99 patients were enrolled. 104 nasal sprays were prescribed with an overall compliance of 64.4%. 91 nasal irrigations (both medicated and non-medicated) were prescribed with an overall compliance of 63.7%. 38 oral medications were prescribed with a compliance of 97.4%. There was a significant difference between oral medication compliance and both nasal sprays and irrigations ($p = <0.001$). There was no difference in compliance between gender or ethnicities.

Overall compliance with medicated nasal sprays and irrigations remain low around 64%. This is lower compared to a prior study by Yoo et al which showed a postoperative irrigation compliance around 83%. It is important to consider this when evaluating for medication response. A medication failure may be from a failure in compliance.

Poster #B032
WITHDRAWN

Poster #B033
Cost and utilization of CT scans for acute rhinosinusitis between 2016 and 2018
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Acute rhinosinusitis (ARS) is a common problem in the United States. As most cases can be diagnosed clinically, computed tomography (CT) imaging in ARS is not recommended. However, the extent of continued CT scanning and associated healthcare expenditures (HCE) is unknown. We therefore sought to characterize CT scan cost and utilization from 2016 to 2018.

Using the IBM MarketScan Commercial Claims Database, we conducted a retrospective cross-sectional analysis of CT scan utilization for patients with a primary diagnosis of acute sinusitis between January 1, 2016, and December 31, 2018. Total HCEs were stratified by year and region. One-way ANOVA tests and two sample test of proportions were used to examine differences between mean HCEs by region and to examine differences in CT scan utilization by physicians over time (alpha=0.05). Analyses was performed using Stata version 17.

Between 2016 and 2018, almost 25,000 patients received a CT scan for ARS, though significantly fewer scans were ordered each successive year ($p<0.001$). Associated HCEs totaled $10,741,525. The majority of CT scans were ordered in on-campus hospital outpatient departments (n=14,141; 58.2%). While otolaryngologists and radiologists (n=9,601; 84.4%) were less likely to order CT scans over time ($p<0.01$), there was no significant change in CT scans ordered by primary care physicians (n=1,334; 11.7%). More CT scans were ordered in the South than in any other region ($p<0.01$), though the North Central region had the highest mean HCEs per patient ($469.63).

While otolaryngologists have appropriately reduced use of CT scans for ARS, results indicate potential need for outreach efforts to reduce costly and unnecessary CT use by primary care practitioners.

Poster #B034

Cost comparison analysis of single-use and reusable rhinolaryngoscopes – A multi-center study

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Background:
This study investigates how variation in reprocessing methods, clinical setting, procedure volume, and type of reusable rhinolaryngoscope (RLS) might impact the cost per rhinolaryngoscopy procedure using a reusable RLS compared to a single-use RLS by a multi-center cost study.

Method:
The cost of reusable RLS was estimated by a micro-costing analysis at three hospitals from UK and Ireland. The hospitals used different reprocessing methods, reusable RLSs, and had different volumes in their clinical settings. The cost per procedure was compared with the cost of single-use RLS.

Results:
The average per procedure cost of reusable RLS was £157. The cost per procedure with single-use RLS was £105. Thus, single-use RLS provided an average cost saving of £52 per procedure.

Conclusion:
The single-use RLS is cheaper per procedure. However, the different parameters between hospitals make it difficult to compare since the parameters simultaneously influence the outcome.

Poster #B035

COVID-19 infection and immune deficiencies in patients with new onset CRS

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Background:
Chronic rhinosinusitis (CRS) is a prevalent disease and immune deficiencies (I-def) can be a contributing factor. We recently noticed a rise in patients presenting for first time with symptoms of CRS after COVID-19 infection.

Objective:
To determine whether COVID-19 caused I-def in those patients with recent onset of CRS.

Methods:
A retrospective review of patients who presented to our Sinus and Allergy clinics with recent onset CRS was done. Those who had a Streptococcus pneumonia antibody titers test were reviewed. Demographic characteristics of the population, CT scans, history, date of COVID-19 infection, and S. pneumonia antibody titers test results were collected.

Results:
60 patients were included with a mean age of 52.4 years, and 38 (63.3%) patients were females. 52 patients had a CT scan of the sinus done confirming the diagnosis of CRS with an average Lund-Mackay score of 3.38 (0-20). 40 patients (66.7%) had low S. pneumonia titers, of which 18 (45%) were noted to have low titers after a COVID-19 infection, which is high compared to historical data of 25%. Of note, 30% of patients were diagnosed with I-def after recent onset of CRS after COVID-19 infection.

Conclusions:
To our knowledge, there are no studies that implicate COVID-19 infection as a cause of I-def, and this subject necessitates further investigation.

Poster #B036

Cranial nerve zero: What the rhinologist needs to know

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Background:
The Roman physician, Galen is credited with providing the first description of the human cranial nerves. Nearly 2000 years later, in 1878, Gustav Fritsch described a curious slender nerve located rostral to the olfactory nerve (CN 1) in a shark. Fritsch termed this new cranial nerve, “Cranial nerve 0.” It was then described in human embryos in 1905 and in adult humans in 1913. Despite this CN 0 is frequently not described in text books and remains unknown among most rhinologists.

Methods:
Literature review

Results:
Anatomically, the nerve is different from the other cranial nerves. At the cranial base, as opposed to a single defined fascicle, it exists as a plexus medial to the olfactory bulbs with ganglia found on the crista galli. Branches are seen to perforate the cribriform plate along with branches of CN 1. From there, its course in the nose and sinuses is poorly described. Based on rodent studies, severing the nerve results in sexual dysfunction with decreased mating. However, it is distinct from the olfactory system and the vomeronasal organ. Its function in humans is unclear.

Conclusions:
Cranial nerve 0 is a functionally and physically separate cranial nerve in animals and present in the cranial base of adult humans. Its exact location and function in the nose and sinuses of humans is unclear.

Poster #B037

CSF leak secondary to COVID-19 testing: A case series and systematic literature review

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Background:
Nasopharyngeal swab tests are an essential tool for COVID-19 screening. Iatrogenic cerebrospinal fluid (CSF) leak resulting from anterior skull base trauma is a rare and incompletely understood complication of nasopharyngeal swab testing.

Methods:
Retrospective institutional case-series combined with systematic literature review and meta-analysis.

Results:
Thirty-four patients with traumatic CSF leak after COVID-19 nasopharyngeal testing were identified. Twice as many women experienced a CSF leak as compared to men (23 vs 10 cases). The majority of patients (64.7%) had no identifiable predisposing factor in their clinical history. Five (14.7%) demonstrated radiographic evidence of idiopathic intracranial hypertension. The most common presenting symptoms were rhinorrhea (33, 97.1%) followed by headache (19, 55.9%), cephalocele (12, 35.3%), metallic taste (7, 20.6%), and meningitis (3, 8.8%). The average number of weeks from the traumatic COVID swab to identification of leak was 6.6 ± 8.9. Lumbar drain use was reported in only 4 (11.8%) case reports. Common defect sites included the cribriform plate (17), sphenoid sinus (10), fovea ethmoidalis (4), and posterior ethmoid roof (2). Most required surgical treatment (24, 70.6%), with the remainder resolving after conservative management. Acetazolamide was prescribed in 2 cases (5.9%).

Conclusions:
This report clarifies the presentation, risk factors, and management of CSF leaks attributable to diagnostic nasopharynx swabbing procedures in the COVID-19 era.

Poster #B037A

Current practice patterns among fellowship-trained rhinologists: A survey f past American Rhinologic Society fellows

Dennis Tang, MD, FARS

Poster #B038

Descriptive analysis of the management of 370 consecutive patients referred for chronic sinusitis: From primary care to specialty care

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Objectives:
To examine the management and treatment of patients with suspected chronic rhinosinusitis (CRS) by primary care providers (PCP) prior to referral through specialist evaluation.

Methods:
Kaiser Permanente (KP) is an integrated managed care organization. Patients from the KP Orange County service area with a referral diagnosis of CRS and a referral between April 1 and September 30, 2021, were identified. The electronic medical record was reviewed for demographics, comorbidities, and other relevant clinical data. An array of statistical analyses was performed to evaluate for associations.

Results:
A total of 370 patients were included (mean age 50.0 ± 16.8). Most of the patients were female (58.6%) and white (51.4%). Overall, 150 patients (40.5%) were confirmed to have CRS. Olfactory dysfunction (OR [CI 95%] 4.09 [1.39-12.0]) and comorbid asthma (OR [CI 95%] 2.30 [1.24-4.30]) were associated with increased odds of confirmed CRS on multivariate analysis. Documented rates of pre-referral treatment with intranasal steroids (25.7%) and saline irrigations (3.5%) were low. Many patients (26%) were treated with 3 or more antibiotic courses in 1 year prior to referral. CT sinus prior to specialist consultation was associated with shorter time to decision to surgery (mean 27.7 days vs. 46.3 days) compared to after consultation, though this was not statistically significant (p=0.12).

Conclusions:
Patients referred for CRS have high rates of divergent diagnoses upon specialist evaluation. Specific items in the patient history such as olfactory dysfunction and asthma, should raise suspicion for CRS. Examination of the longitudinal care of CRS patients may help identify opportunities to streamline care of these patients.

Poster #B039

Differentiating rhinogenic vs non-rhinogenic facial pain: A qualitative study

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Introduction:
Facial pain or pressure is one of the most common complaints leading to a diagnosis of chronic rhinosinusitis (CRS). However, many of these patients have non-rhinogenic facial pain (NRFP) rather than sinusitis. Misdiagnosis results in ineffective utilization of healthcare resources such as unindicated prescription of antibiotics. We aim to develop a screening tool to differentiate NRFP from CRS, allowing clinicians to direct patients to the most appropriate treatment path.

Methods:
A question bank for the NFRP screening tool was developed qualitatively using cognitive interview methodology in 3 rounds. Participants were purposely sampled by diagnosis: NFRP (n=15) or CRS (n=11). Questions were modified between rounds.

Results:
Participants with CRS reported the following symptoms more often than those with NRFP: runny nose (91% vs 47%), ear fullness (73% vs. 47%), discolored nasal discharge (82% vs. 47%), cough (91% vs 47%). Participants with NRFP reported the following symptoms more often during a typical episode: nausea (67% vs 27%), light sensitivity (80% vs. 46%), noise sensitivity (67% vs 18%), tooth pain (73% vs 36%). Participants with NRFP were more likely to report their episodes triggered by stress (73% vs 36%). The terms most commonly used to describe their facial pain were “pain” (NRFP 50%; CRS 20%), “pressure” (NRFP 50%; CRS 20%), and “discomfort” (NRFP 14.3%; CRS 40%).

Conclusion:
Using cognitive interviews, we developed an item bank for a screening tool to differentiate NFRP from CRS. The next step is to conduct a prospective, quantitative, psychometric evaluation with a larger sample, develop score interpretation guidelines, and evaluate the tool’s diagnostic performance in clinical settings.

Poster #B040

Disparities among patients seeking care for olfactory and taste dysfunction: A population-based study

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Objective:
Taste and smell impairment is associated with significant morbidity and quality-of-life concerns and in recent years has been a focus of medical evaluation and intervention. The purpose of this study is to evaluate potential disparities among a nationally-representative sample of individuals with taste or smell impairment.

Methods:
A cross-sectional analysis was performed using data from the 2013-2014 National Health and Nutrition Examination Survey. Factors associated with the likelihood of discussing taste/smell loss with a healthcare provider and subsequently receiving treatment for this impairment were assessed. Multivariate logistic regression models were constructed and included clinical demographics and multiple social determinants of health.

Results:
Overall, 306 (9.4%) individuals reported a problem with smell within the last 12 months and 199 (5.2%) individuals reported a taste issue. Of these individuals, 21.7% discussed this problem with a healthcare provider and 6.8% received treatment. A multivariate logistic regression model found that individuals with limited English proficiency were much less likely to discuss any taste or smell abnormality with a provider (OR=.08, 95% CI[0.01-0.99];p=.05). Of note, individuals with a high annual household income (>$100,000) were 5 times more likely to speak with a provider about their sensory impairment than those with lower incomes (<$54,999)(OR = 5.55, 95% CI[1.32-23.34];p=0.02).

Conclusions:
Chemosensory dysfunction is an overlooked and untreated complaint, despite substantial quality-of-life implications. Non-English speaking and lower income individuals are less likely to discuss smell and taste concerns, and providers should be aware of these disparities.

Poster #B041
Disparities in telehealth usage in patients with chronic rhinosinusitis
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Background:
Telehealth is a rapidly evolving frontier in modern medicine and during the COVID-19 pandemic, there has been a significant increase in the number of telehealth visits. Successful telehealth implantation, however, requires access to internet and smart devices, as well as technological literacy that may be a barrier across various populations. This study aims to further elucidate this potential disparity in telehealth visits for chronic rhinosinusitis (CRS).

Methods:
A total of 54 health care organizations were queried from TriNetX. Four different queries were made to evaluate patients who were seen for a complaint of CRS in-person and through telehealth in 2020 and 2021. Continuous variables were evaluated using descriptive statistics. Categorical variables were evaluated using frequencies and percentages. T-tests were used for continuous data, and categorical variables were compared using Fisher's exact tests.

Results:
In 2020 we identified 9,687 telehealth visits and 201,991 in-person visits for CRS. In 2021, we found 216,144 in-person visits and 7,285 telehealth visits. Between 2020 and 2021, telehealth visits for American Indian/Alaska Natives decreased from 0.5% to 0.2% ($p<0.01$), and for African Americans from 9.9% to 8.8% ($p<0.01$). There was no difference between White (83.8% vs 84.3%) or Hispanic (5% vs 5.2%) patients, and no difference by gender.

Conclusion:
For patients with CRS, this data shows that American Indian/Alaska Native and African Americans access to telehealth decreased from 2020 to 2021. This suggests that certain populations may have increased barriers to participating in virtual visits that should be investigated further.

Poster #B042
WITHDRAWN

Poster #B043

Drug delivery to anatomical subsites within the nasal passage

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Objectives:
Understanding drug deposition in patients with normal nasal anatomy is key to optimizing drug delivery for patients with allergic rhinitis or mild chronic rhinosinusitis. This study uses computational fluid dynamics (CFD) to simulate drug deposition in the nasal passages and maxillary sinuses at various spray positions.

Methods:
Radiographic images from three subjects with normal nasal anatomy were used to create three-dimensional reconstructions of nasal passages and maxillary sinuses. Multiple anatomic subsites were defined including lateral vs. septal and anterior vs. posterior nasal airways, with anterior defined as anterior to the inferior turbinate. CFD-simulated drug deposition was calculated for numerous spray release positions (Bottom, Center, Top, Lateral, and Medial) and drug particle sizes (1-100μm) at 1, 5, and 10m/s velocities with the head tilted forward.

Results:
Of the various spray positions, the Lateral and Top release positions maximized anterior-lateral deposition (Lateral: 42.8-45.0%, Top: 42.9-44.2%). However, the Top spray position deposited the majority of the medication anteriorly with little drug depositing posteriorly. The Lateral position favored drug deposition beyond the anterior nasal passage particularly along the lateral wall (4.06-8.89%) and osteomeatal complex (OMC: 1.58-2.75%). Although the Medial spray position effectively distributed medication on the lateral wall, little of this medication reached the OMC (0.29-0.65%) compared to the Lateral position.

Conclusion:
The Lateral spray position optimized drug delivery to the OMC and lateral nasal wall both anteriorly and posteriorly while limiting septal deposition relative to other spray positions.

Poster #B044

Dupilumab-related adverse events among patients with chronic rhinosinusitis with nasal polyposis

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Background:
Dupilumab targets the type 2 inflammatory pathway and has emerged as a promising novel biologic therapy for chronic rhinosinusitis with nasal polyposis (CRSwNP). While dupilumab demonstrated acceptable adverse effect (AE) profiles in phase 3 trials, a national database study reported a higher rate of AEs. Given this discrepancy, there is a need to examine real-world experiences with the use of dupilumab.

Methods:
A retrospective chart review of patients receiving dupilumab for CRSwNP at a tertiary Rhinology/ Allergy clinic between November 2018 and February 2022. Demographic and clinical information was collected. The indication, dose, and duration for treatment with dupilumab was recorded along with the reason for dupilumab discontinuation.

Results:
Out of the 58 total patients undergoing treatment with dupilumab for more than 6 months in the tertiary care clinic, 14 patients (24.1%) experienced AEs that required discontinuation of dupilumab. The most common reasons were severe rash (6 patients, 42.9%) or severe joint pain (5 patients, 35.7%). One patient developed a drug-induced systemic lupus erythematosus-like reaction with positive anti-nuclear antibodies. Another patient had angioedema requiring medical care. There was a higher proportion of females in those with significant AEs than those without, albeit statistical significance was not reached likely due to a small sample size.

Conclusion:
Our study highlights important dupilumab-related AEs, which were distinct from the phase 3 trials. This calls for further evaluation with post-market data to build epidemiological and potential biological causal links for dupilumab-related AEs.

Poster #B045

Economic evaluation of Dupilumab for the management of severe uncontrolled chronic rhinosinusitis with nasal polyposis

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Background:
Chronic rhinosinusitis with nasal polyposis (CRSwNP) represents a chronic inflammatory condition of the nose and paranasal sinuses. This disease leads to high healthcare-related costs and low quality of life for patients impacting on physical and social functioning and mental health. Recently, several biological agents (monoclonal antibodies, MAbs) have dramatically changed the therapeutic approach. Aim of the article is to report a review regarding the economic impact of Dupilumab in the management of these patients and a comparison with Endoscopic Sinus Surgery for the Treatment of CRSwNP.

Methods:
A review of all articles present in the main medical databases, such as PubMed (NLM NIH), Scopus (Elsevier) and Cochrane library (Wiley), was performed. The time period considered included all the published articles available within the databases from their inception until September 2022. Additionally, a manual search of the relevant literature in otolaryngology meetings and citation chaining were performed.

Results:
Only a few studies directly addressed the issue comparing differences in terms of costs for days of hospitalization, days of absence from work and additional therapies for Th2-related comorbidities. The results are diversified varying from country to country, highlighting significant differences among the reimbursement systems.

Conclusion:
In CRSwNP management there are many available treatment options, as steroids and surgery, which may have undesirable side effects with related managing costs. Dupilumab is the first approved Mab to demonstrate sustained efficacy and safety. Further studies are needed to identify the specific phenotype or endotypes that will benefit most from Dupilumab in a cost-effective manner.

Poster #B046

Efficacy of biologics on eosinophilic ear polyposis (EEP) associated with NSAID-exacerbated respiratory disease (N-ERD)

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Background:
EEP is a rare and chronic disease of the middle ear characterized by polypoid overgrowth that can be associated with N-ERD. EEP-associated hearing loss can lead to significant functional impairment and challenges with amplification secondary to fluctuating hearing loss. There is a paucity of case reports in the literature about the remission of EEP with biological treatment.

Methods:
A case report of a patient with EEP remission with dupilumab therapy.

Results:
A 66-year-old man with N-ERD and bilateral hearing loss with significant aural polyps extending into the external canal bilaterally. The patient underwent three endoscopic sinus surgeries for CRSwNP with a Draf III and middle turbinectomies during his last surgery. His CRSwNP remained under excellent control with Aspirin desensitization and budesonide irrigations. Notably, he had a longstanding history of significant mixed hearing loss from his EEP with failure of surgery and corticosteroid drops. Cochlear implantation was considered the next step for his hearing loss.

Given the excellent airway control with ASA desensitization and surgery, he was not deemed a candidate for biologic therapy via traditional avenues. The patient received compassionate approval for a trial of dupilumab. Significant regression of his aural polyposis was seen on therapy allowing for postponement of cochlear implantation.

Conclusion:
Dupilumab led to remarkable remission of eosinophilic ear polyposis almost immediately after beginning therapy with preservation of hearing. EEP is a rare manifestation of eosinophilic disease, and a trial of biologic therapy should be considered for recalcitrant cases.

Poster #B047

Elexacaftor/tezacaftor/ivacaftor therapy reduces rhinologic healthcare utilization in people with Cystic Fibrosis

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Introduction:
Many people with cystic fibrosis (PwCF) have chronic rhinosinusitis (CRS). CRS requires additional management beyond that of pulmonary disease and leads to increased utilization of healthcare resources. Elexacaftor/tezacaftor/ivacaftor (ETI) is a highly effective modulator therapy that has been shown to improve CRS in PwCF. However, the impact of ETI on rhinologic healthcare utilization is understudied.

Methods:
A single-center, cohort study investigating adult PwCF was performed in September 2022. Demographics, clinical characteristics, medication use, and rhinology healthcare utilization were retrospectively abstracted. Characteristics of the cohort were compared over two periods: the 12-months prior to ETI initiation and the 12-months after ETI initiation. Post-ETI data were linearly extrapolated if a subject had not yet completed the full 12 months of ETI. Paired t-testing, Wilcoxon signed-rank testing, and regression analysis were performed.

Results:
Of 120 PwCF, 96 (80.0%) were on ETI therapy and 34 (28.3%) were both on ETI and concurrently followed by the rhinology service (ETI-ENT). Rhinology clinic visits (p=0.034) and frequency of obtaining nasal cultures (p=0.047) decreased for the ETI-ENT cohort after initiating ETI treatment. There were no significant changes in the number of endoscopic sinus surgeries (p=0.766) performed. Beyond ETI use, regression analysis did not identify any factors associated with changes in utilization.

Conclusions:
Aspects of rhinology healthcare utilization by PwCF decreased after initiation of ETI therapy. Additional studies are needed to determine rhinologic healthcare requirements for PwCF who remain on ETI for the long-term and to evaluate larger cohorts of PwCF on ETI.

Poster #B048

Endonasal odontoidectomy in pediatric and adult populations: A systematic review and meta-analysis

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Introduction:
Endonasal odontoidectomy (EO) is performed to decompress the craniocervical junction. We compare rates of cervical fusion and complications in adult versus pediatric populations.

Methods:
A systematic literature review was conducted for EO outcomes in adult and pediatric patients using PubMed, Web of Science, and Embase. Studies reporting rates of cervical fusion and complications were included. Meta-analysis compared these outcomes in adult versus pediatric populations using a random-effects model.

Results:
471 articles were screened. 29 met criteria for systematic review. Of 317 adult cases, indications for EO included basilar invagination (33.1%), inflammatory pannus (27.2%), and neoplasm (17.6%). Of 22 pediatric cases, indications included congenital basilar invagination (63.6%), neoplasm (9.1%), and trauma (4.5%). Success rate of decompression was 98.4% in adults and 100% in pediatrics. Tracheostomy was performed in 2.9% of adults and 0% of pediatrics. 6 studies met criteria for meta-analysis, which demonstrated no difference in rates of cervical fusion (90.0% vs 74.3%, OR 0.45, 95%CI 0.11-1.93), and no difference in complications related to swallowing (6.3% vs 8.7%, OR 2.92, 95%CI 0.61-13.90) or breathing (14.3% vs 8.3%, OR 3.12, 95%CI 0.42-23.46). Pediatric patients had a higher rate of neurologic complications (16.7% vs 9.6%, OR 4.83, 95%CI 1.01-23.12).

Conclusions:
EO is a well-established technique in adults, with increasing reports of this procedure in pediatrics, though indications may differ. There are similar rates of aerodigestive complications and need for cervical fusion in pediatric versus adult patients. Pediatric patients may be at higher risk of neurologic complications.

Poster #B049

Endoscopic evaluation of nasal septal perforation: Assessment of a novel tool for grading nasal septal perforation inflammation

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Background:
Nasal septal perforations (NSP) can have a heterogenous appearance on endoscopic examination with varying degrees of crusting, inflammatory change, and associated septal deviation. The clinical applicability of these findings as contributors to patient symptoms may be enhanced by use of a standardized assessment.

Methods:
Video nasal endoscopy recordings were obtained of 40 patients with NSP. Five raters with varied levels of training ranging from a senior resident to an experienced septal perforation surgeon independently reviewed the videos for the following exam findings: crusting, scarring, granulation tissue, septal deviation, and edema. Scoring for each item was reported on a 3-point (0-2) scale and each reviewer repeated scoring at a 14-day interval. Interrater and intrarater agreement were calculated using Fleiss kappa for each item and the total scores.

Results:
Interrater agreement for the overall instrument was in the “fair-to-moderate” agreement range with the following interrater agreement for each item: crusting (0.458-0.575), scarring (0.286-0.308), granulation (0.403-0.406), deviation (0.487-0.494), and edema (0.253-0.406). Intrarater agreement was generally “substantial” for individual items as well as the overall instrument (0.688).

Conclusion:
An endoscopic evaluation of NSP comprising 5 exam findings has acceptable interrater and intrarater reliability and may be applied to future clinical studies of NSP disease and outcomes.

Poster #B050

Endoscopic reconstructive techniques for high flow anterior skull base cerebrospinal fluid leaks: A systematic review of outcomes and complications

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Importance:
Anterior skull base (ASB) defects pose a significant challenge to the endoscopic reconstructive surgeon. Several endoscopic reconstructive options exist, ranging from free grafts to locoregional flaps. Choice of technique and material depends on defect location and size, as well as severity of intra-operative cerebrospinal fluid (CSF) leak. No definitive algorithm exists, but locoregional flaps are generally favored for high flow CSF leaks and large defects. Our study analyzes surgeon trends in reconstructive method choice and compares outcomes of available reconstructive methods for ASB defects

Method:
Systematic review of outcomes and complications of reconstructive techniques for anterior skull base defects delineated by defect location. Reconstructive methods included free grafts and local vascularized flaps. Outcomes of each method were stratified by initial defect size (> or < 2cm) and by intra-operative CSF leak severity (high or low). Statistical analysis was done via Welch t-test.

Results:
Preliminary analysis included 9 studies with 377 patients with high flow CSF leaks after tumor resection reconstructed using free grafts (n=39) or local flaps (n=338). Surgeons used a local flap for 89% of high flow CSF leaks regardless of defect size. Post-operative CSF leak rate for high flow defects, regardless of size, was 14% with free graft reconstruction compared to 5% with local flaps ($p<0.05$). Free grafts had a 70% post-operative CSF leak rate for defects >2cm.

Conclusion:
High flow CSF leaks are reconstructed with a vascularized local flap regardless of defect size. Local flaps significantly reduce post-operative CSF leaks for high flow defects compared to free grafts, especially for defects larger than 2cm

Poster #B051

Ergonomics of otolaryngology trainees in rhinology

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Introduction:
Poor ergonomics during endoscopic sinus surgery (ESS) can lead to significant physical discomfort. The purpose of this study is to compare objective ergonomic posture and subjective pain scores among otolaryngology residents and medical students performing simulated ESS.

Methods:
In a cross-sectional study, participants performed ESS on cadavers and were assigned a Rapid Upper Limb Assessment (RULA) score by an Occupational Therapist trained in ergonomics. Participants completed a survey addressing discomfort related to ESS. Participants were compared by level of training: senior residents (SRs) vs junior residents (JRs) vs medical students (MSs), gender, monitor gaze, and other factors.

Results:
A total of 14 participants completed surveys (SRs: 4, JRs: 6, MSs: 4) with 10 participants meeting inclusion criteria for RULA analysis (SRs: 3, JRs: 3, MSs: 4). Total average RULA was 3.8 +/- 1.0. A total of 57% of survey respondents experienced pain attributed to ESS. No independent risk factors were found to be significantly associated with pain during ESS: level of training ($p = 0.223$), female gender ($p = 0.408$), non-horizontal gaze ($p = 0.064$), height (dichotomized) ($p = 0.221$), and footwear ($p = 0.273$). No independent risk factors were found to be significantly associated with RULA score: amount of training ($p = 0.380$), female gender ($p = 0.999$), non-horizontal gaze ($p = 0.576$), footwear ($p = 0.999$), and perceived pain ($p = 0.999$).

Conclusions:
Our study did not demonstrate a significant association between RULA score and subjective pain between SRs, JRs, and MSs. Further study examining potential associations between objective ergonomic posture and subjective pain during ESS is needed.

Poster #B052

Errors in Beta-2 transferrin testing: A systematic review

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Background:
Beta-2 transferrin (B2-Tf) testing of nasal fluid is the preferred non-invasive diagnostic modality for confirming nasal cerebrospinal fluid (CSF) rhinorrhea. While B2-Tf testing is highly sensitive and specific for CSF, false-positive and false-negative results can lead to diagnostic and therapeutic dilemmas. Case reports and small series have demonstrated potential causes of false B2-Tf results, but no large studies have investigated the reasons for these B2-Tf testing errors. The purpose of this systematic review was to describe sources of B2-Tf testing errors.

Methods:
A systematic review was performed by searching OVID, EMBASE, and Web of Science databases for B2-Tf testing studies. After applying exclusion criteria, original research studies directly addressing erroneous B2-Tf results underwent qualitative analysis.

Results:
Of the 243 abstracts screened, 74 underwent full-text review, and 32 studies reporting errors in B2-Tf testing were included for analysis. The following factors were identified as sources of error: inadvertent sampling of other Tf-containing bodily fluids (aqueous humor, saliva, blood) (n=6), inability to produce enough fluid to test (n=5), experimental assay errors (n=6), Tf mutations or concentration abnormalities (e.g. chronic alcohol use, immunodeficiencies) (n=10), and infection with neuraminidase-producing bacteria (n=3). Two papers noted B2-Tf testing errors without specifying the causative etiologies.

Discussion:
There are numerous causes of false B2-Tf results when assessing nasal fluid for CSF. Future studies should explore reasons for B2-Tf testing errors and how these should affect clinical decision-making.

Poster #B053

Esthesioneuroblastoma with orbital involvement: Management and outcomes

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Background:
Orbital invasion occurs less commonly in esthesioneuroblastoma (ENB) than other sinonasal malignancies (SNM) and its management and outcomes are not well-described.

Methods:
An institutional SNM database was searched to identify ENB patients with orbital invasion at presentation. Relevant patient and tumor factors were recorded including degree of invasion, modified Kadish staging (mKadish), symptoms, treatment, and outcomes.

Results:
Among 202 ENB patients, 17 cases of ENB with orbital involvement were identified. Twelve patients (70%) were mKadish C and five (30%) were mKadish D. Nine patients (53%) had no ocular symptoms on presentation. For those with ocular symptoms, diplopia and decreased visual acuity were the most common. Five patients (29%) presented with only erosion of the bony lamina, five (29%) with periorbita involvement, and seven (41%) with intraorbital soft tissue involvement. Nine patients (53%) received upfront surgery and adjuvant radiotherapy (RT), five patients (29%) underwent induction chemotherapy followed by surgery and adjuvant chemoradiotherapy (CRT), while three patients received non-surgical therapy (18%). Of surgical patients, three (17%) underwent orbitotomy, 10 patients (59%) underwent periorbita resection, and one patient underwent orbital exenteration. Orbit preservation was achieved in 16 (94%) out of the 17 patients. Twelve (70%) patients had normal visual acuity and extraocular movements following surgery. Six patients (35%) developed recurrent disease. The 5-yr overall survival was 65% and the 5-year disease specific survival was 76%.

Conclusion:
Orbital involvement in ENB is not common. Orbital preservation can be achieved in most cases with reasonable 5-yr survival.

Poster #B054

Evaluating feasibility of a cooperative-control robotic assistant for endoscopic endonasal sinus surgery: A pre-clinical study

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Introduction:
Robotic assistance in functional endoscopic sinus surgery (FESS) can reduce surgeon task load by holding the endoscope thus, freeing the surgeon to operate with both hands. Here we describe the preclinical use of a cooperative-control robotics platform during FESS.

Methods:
The platform used in this study is a third-generation, cooperative-control robot consisting of a gantry arm with five actuated degrees of freedom developed by Galen Robotics. The robot is currently being evaluated by the US FDA and can only be used for investigational (non-human) uses. The robot allows manipulation of conventional surgical instruments, in this study a Karl Storz Video Camera equipped with a 0° rigid endoscope. FESS was performed on fresh-frozen cadaver heads with the endoscope held by the robot arm. We qualitatively evaluated safety, feasibility of two-handed actions, user-friendliness, and achievement of surgical goals.

Results:
The robot facilitated safe, successful completion of FESS by holding the endoscope. The surgeon was able to adjust the endoscopic view by unlocking the robotic arm with a gain-control foot pedal. The robot accommodated a conventional surgical instrument by facilitating a non-obstructed operative corridor.

Conclusion:
We have demonstrated a preclinical, CT-validated, feasibility study using a cooperative-control robotics platform to assist during performance of FESS. As technology continues to improve, the robot will be equipped with autonomous behavior to cooperate with surgeons by automatically adapting the endoscopic view. These preclinical studies are critical for elucidating the platform's fault modes in preparation for deployment in a clinical context.

Poster #B055
Evaluating management and outcomes of juvenile nasopharyngeal angiofibroma (JNA) using public health information system (PHIS)
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Introduction:
Juvenile nasopharyngeal angiofibroma (JNA) is a benign vascular tumor predominantly affecting adolescent males. JNA comprises only 0.5% of all head and neck tumors, thereby limiting examination of outcomes in large case series. This study collates aggregated data on JNA from the Public Health Information System (PHIS) database, a database of patient encounters from over 50 children's hospitals in the US.

Methods:
The PHIS database was queried for all males diagnosed with ICD 9 code 210.7 or ICD 10 code 10.6 (benign neoplasm of nasopharynx) who underwent surgical resection between 2004 and 2022. Continuous variables were compared using Wilcoxon Rank Sum Test and categorical variables were compared with Chi-square test. Bivariate and multivariable logistic regression was calculated to examine length of stay. Where surgical technique data was available, open, and endoscopic approaches were compared.

Results:
706 patients, with a mean age of 14 years, were analyzed. Patients undergoing preoperative embolization had an average length of stay one day longer than those who did not (3 days vs. 2 days). Multivariable analysis showed that preoperative embolization resulted in an 18% increase in length of stay. Nine centers were identified as having significantly higher inter-center variation in length of stay. No difference in transfusion rate was seen between the two groups. When comparing patients undergoing endoscopic resection to patients undergoing open resection, no significant difference was seen between length of stay or transfusion rates.

Conclusions:
Preoperative embolization appears to increase length of stay in patients undergoing resection of JNA

Poster #B056
WITHDRAWN

Poster #B057

Factors associated with postoperative complications following resection of sinonasal tumors

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Introduction:
As surgical management of sinonasal tumors is increasingly common, an improved understanding of risks for postoperative complications is imperative. This study used the National Surgical Quality Improvement Program (NSQIP) database to identify factors associated with 30-day postoperative complications following resection of sinonasal tumors.

Methods:
The NSQIP database was queried from 2005-2020 for patients undergoing open or endoscopic surgical resection of sinonasal tumors. A Cox proportional hazards model was used to identify factors associated with postoperative complications. Kaplan-Meier survival analyses and log-rank tests were used to compare time to complication onset. Frailty was defined as a 5-factor modified frailty index score >2.

Results:
Of the 859 patients with sinonasal tumors, 539 (62.7%) were male, and the average age was 59.3 ± 14.1 years. Postoperative complications were observed in 251 (29.2%) patients. The most common 30-day complications were bleeding requiring transfusions (20.0%) and ventilation longer than 48 hours (4.3%). Frailty (aHR [95% CI]: 3.58 [1.80-7.12]), malignancy (3.43 [1.59-7.38]), and maxillary tumor location (2.40 [1.86-3.09]) were associated with greater risk for 30-day postoperative complications. Similarly, patients with frailty (c2=7.04; p=.008), malignant tumors (c2=13.38; p<.001), or maxillary sinus tumors (c2=34.56; p<.001) experienced earlier onset of postoperative complications.

Conclusions:
Frailty, malignancy status, and tumor location may modulate risk for 30-day postoperative complications following resection of sinonasal tumors. These results may help inform preoperative patient counseling and identify patients at risk of postoperative complications.

Poster #B058

Financial costs of COVID-19 induced smell and taste loss

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Background:
Increasing numbers of patients are seeking treatment for COVID-19-induced smell/taste loss. The financial burden of treatment impacts the healthcare system, but also individuals spending their own money outside of the healthcare system.

Methods:
The Colorado All-Payer Claims Database was examined, representing 65% of insured lives in Colorado and updated through February 2021. Unique claims of COVID-19-induced smell/taste loss were categorized as acute or chronic. Member liability and plan-covered amounts were recorded. Additionally, a poll was administered in two Facebook groups dedicated to COVID-19-induced smell/taste loss. The poll asked members to select an option corresponding to the amount spent outside of the healthcare system to treat these symptoms.

Results:
4,077 unique claims of COVID-19-induced acute smell/taste loss totaled $2,389,836.31 spent by both insurance and individuals (n=3086) within the Colorado healthcare system. The average patient spent $47.16. Insurance plans covered $727.27 on average per patient. The 991 claims of chronic COVID-19 smell/taste loss cost patients (n=617) and their insurance $462,333.59. Patients spent $106.47 on average; insurance covered $642.85 per patient. Patients paid 1.86 times more out-of-pocket for chronic smell/taste loss claims than for acute.
Of the Facebook poll respondents, 15% spent $0-20, 11% spent $21-50, 27% spent $51-100, 14% spent $101-200, 23% spent $201-1000, and 11% spent $1001+.

Conclusions:
COVID-19-induced smell/taste loss continues to burden patients financially both inside and outside of the healthcare system. To alleviate this burden, we must continue to research treatments, disseminate evidence-based algorithms, and educate patients.

Poster #B059

Giant frontoethmoidal mucocele with orbital extension secondary to chronic intranasal cocaine abuse: A case report with fifteen-year follow-up

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Introduction:
Mucoceles are benign cystic lesions commonly arising from the frontal and ethmoid sinuses due to chronic obstruction of sinus outflow tracts. Giant frontoethmoidal mucoceles are exceedingly rare. Although histologically benign, fronto-ethmoid mucoceles can expand and impinge on surrounding orbital contents causing ophthalmic complications such as diplopia, optic neuropathy, and nasolacrimal obstruction, as well as headache, facial pain, and nasal obstruction.

Case Presentation:
A 50-year-old woman with history of chronic cocaine abuse presented with an 18-month history of progressive proptosis of the right eye, diplopia, impaired vision, epiphora, frontal headache and nasal obstruction. On exam, she was noted to have a near total nasal septal perforation, diffuse fibrous scarring of the nasal cavity, severe proptosis and infero-lateral displacement of the right globe, smooth bony swelling of the right medial orbit and supraorbital area, right sided ophthalmoplegia and mild visual compromise. CT and MR imaging demonstrated a 5.8 x 5.3 x 4.4 cm right fronto-ethmoid mucocele extending into the right orbit and supraorbital soft tissues. The mucocele was resected through a combined coronal and endoscopic approach with a frontal sinus stent, ethmoidectomy, maxillary antrostomy and open dacryocystorhinostomy with excellent results. She has been followed for over 15 years, with minor revisions, without recurrence of the mucocele.

Discussion:
This is a long-term follow-up of a giant frontoethmoidal mucocele with significant orbital extension secondary to cocaine abuse. We discuss our clinical experience and present a literature review including clinical presentation, workup, and management of giant frontoethmoidal mucoceles.

Poster #B060

Has COVID-19 changed pediatric acute sinusitis epidemiology during the first two pandemic years?

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Importance:
The coronavirus (COVID) years were associated with decreased all-cause upper respiratory tract infections due to social distancing measures in different severities.

Objective:
To study national pediatric acute rhinosinusitis (ARS) burden fluctuations before and during the first two COVID years.

Design:
Cross-sectional, population-based study covering the three pre-COVID years (03/2017-02/2018, 03/2018-02/2019, and 03/2019-02/2020) and the first two COVID years (03/2020-02/2021 and 03/2021-02/2022). Records were retrieved from Clalit Health Services, the largest Healthcare Maintenance Organization, insuring 51.6% of the pediatric population (~1.37 million children <15 years). Urinary tract infection (UTI) was compared for time trend analysis due to its lack of airborne-transmitted pathogenesis.

Setting:
Nationwide community clinics and hospitals.

Participants:
Children <15 years with ARS and UTI episodes were categorized according to age (0-1, 1-5, 5-15 years) and presentation date.

Results:
We identified 44,483 ARS and 121,263 UTI episodes. There was a substantial reduction in ARS episodes during the COVID years (IRR 0.36, 95%CI 0.24-0.56, $p<0.001$). Although UTI episode rates also decreased during COVID (IRR 0.79, 95%CI 0.72-0.86, $p<0.001$), the reduction in ARS burden was more prominent (3-fold higher). ARS episode distribution showed a seasonal fluctuation with a peak during the summer months during the COVID years. Although telehealth visits for ARS diagnosis increased from 2% to 10% ($p<0.0001$), antibiotic prescription rates dropped from 79% to 73% during the COVID years ($p<0.0001$).

Conclusions:
Pediatric ARS burden decreased during the first two COVID years. Episode distribution was noted to be year-round.

Poster #B061

HRCT-MRI fusion: A novel imaging protocol surpasses current modalities in identifying and localizing cerebrospinal fluid leaks

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Background:
Long-term outcomes of cerebrospinal fluid (CSF) leaks depend on successful operative closure. However, site localization continues to be a challenge. Here we present a novel imaging protocol by fusing magnetic resonance imaging (MRI) T2 weighted images with high-resolution computerized tomography (HRCT) of 0.625mm slices overlayed with color gradient highlighting CSF. This study demonstrates efficacy of HRCT-MRI fusion protocol in identification and localization of CSF leaks.

Methods:
Cases were obtained through a patient repository from a single tertiary level center. HRCT-MRI fusion imaging was reviewed for patients who underwent surgery for beta-2 transferrin positive-confirmed CSF leaks. Two blinded radiologists independently reviewed HRCT, MRI, and fusion HRCT-MRI scans to identify and localize CSF leaks. Results of the blind reads were compared to intra-operative localization.

Results:
Five cases were included. All CSF leaks were confirmed intra-operatively at the cribiform plate. All were female patients with a median age of 56 years old. Localization sensitivities of HRCT, MRI, and HRCT-MRI fusion were 80%, 70%, and 90%, respectively.

Conclusions:
This study features a novel HRCT-MRI fusion imaging protocol with higher sensitivity and accuracy in the identification and localization of CSF leaks compared to current modalities of HRCT and MRI alone. This new imaging modality allows for more accurate pre-operative diagnosis of CSF leaks. Future work will include a larger group of patients to determine the accuracy of this technique for CSF leaks in alternate locations.

Poster #B062

Identifying patients with chronic rhinosinusitis (CRS) in Medicare claims

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Administrative datasets provide an opportunity for population health research but studying chronic rhinosinusitis (CRS) remains limited by the need for accurate definitions using existing diagnosis codes. The objective of this study was to develop and validate a case definition for CRS using International Classification of Diseases-10 edition (ICD-10) code claims in Medicare claims.

We analyzed Medicare fee-for-service claims from patients under 43 primary care physicians and 14 otolaryngologists within a major urban hospital system generated from February 2021 to August 2022. We defined patients as having true CRS if they received one or two separate claims with the codes for CRS (J32.0-9) in an 18-month period. Validation of the algorithm was performed using data from 212 patients with known CRS based on reported symptoms and objective findings on imaging and/or endoscopy.

With the predefined algorithm, 114 patients were identified using one claim with the appropriate diagnosis code in an 18-month time frame and 98 patients were identified with two. The positive predictive value (PPV) and negative predictive value (NPV) was 18% and 82%, respectively using the criteria of one claim and increased to 65% and 35% respectively using the criteria of 2 claims. Further refinement by removing nonspecific codes (Chronic sinusitis, unspecified [J32.9]) significantly enhanced performance:1 claim, PPV=37.2%, NPV=98%; 2 claims: PPV=90.5%, NPV=64.4%.

This study optimized a working case definition of CRS in Medicare administrative data. Future studies that refine such an algorithm to identify patients with CRS may prove useful in examining health care utilization and outcomes in this prevalent, burdensome disease.

Poster #B063

Impact of a novel nasal cleansing kit on relief of allergy symptoms

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Background:
The World Health Organization has reported that 40% of the world's population is sensitized to foreign particles in the air, with 10-30% suffering from allergic rhinitis. Yet, a universal method for routine nasal hygiene has not been adopted. This study examined the impact of an antiseptic nasal cleansing kit (NasoClenz) in patients with chronic allergy symptoms.

Methods:
Following informed consent, nasal, respiratory, and other symptoms were examined in 20 patients. An antiseptic nasal cleansing kit was used twice daily for two weeks. A modified RCAT survey was administered before and after the two-week period. Nasal cultures were obtained from a subset of 9 patients before and after the study period.

Results:
At baseline, (15/20) 75% of patients reported exposure to allergens in their daily life with (19/20) 95% of patients reporting respiratory and allergy symptoms. Nasal and allergy symptoms that impacted home and work life were reported in 65% and 60% respectively. After the two-week routine use of the nasal cleansing kits, 84% of subjects with severe symptoms reported a reduction, and 58% reported a reduction in allergy symptoms that impact work & home life. Frequent coughing and/or shortness of breath was decreased in 71% of symptomatic patients. Before the study, 44% of the nasal cultures tested positive for mold. After two weeks of twice daily nasal cleansing, mold was eliminated in 50% of those subjects.

Conclusion:
In this group of symptomatic chronic allergy patients, routine use of a novel nasal cleansing kit (NasoClenz) led to a marked reduction in allergy symptoms with a majority of patients reporting improvement in symptoms that had previously impacted their daily work and home life.

Poster #B064

Impact of corticosteroids on sinonasal wound healing

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Corticosteroid administration after endoscopic sinus surgery (ESS) for chronic rhinosinusitis with nasal polyps (CRSwNP) aims to modulate the chronic inflammation underlying this disease. Benefits of corticosteroids include improved endoscopic scores and long-term disease control. While timely initiation of these medications is important to realize these benefits, corticosteroids are known to adversely affect early phases of wound healing, and the optimal time to initiate post-operative therapy with these agents remains uncertain. To this end, we employed a primary human nasal epithelial cell (HNEC) culture model to examine the effects of corticosteroid exposure during the initial phases of wound healing.

HNECs were isolated and cultured from tissue samples obtained during ESS for CRSwNP. Once confluent, HNECs were scratched in a cell-wounding assay and subjected to cell culture media with, or without budesonide. Scratched HNECs were immediately placed in a microscope stage top incubator and wounds were imaged at 15-minute intervals for 16 hours. Cell culture media was then collected and stored for quantitative cytokine analysis.

Preliminary results indicate wounded HNECs exposed to Budesonide-containing media display increased average time to epithelial wound resealing when controlling for initial wound size. Given the clinical importance of epithelial barrier function restitution following ESS, further analyses will substantiate these early findings and shed additional light on the effects of corticosteroid exposure on the initial phase of sinonasal wound healing.

Poster #B065

Impact of Dupilumab prescribing on utilization of medical and surgical therapies for chronic rhinosinusitis with nasal polyps

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Background:
Chronic rhinosinusitis with nasal polyposis (CRSwNP) has a profound impact on the quality of life of affected patients. Dupilumab is a monoclonal antibody directed against IL-4 and IL-13 with the potential to impact and alter established treatment algorithms for CRSwNP. This study aims to characterize how rates of conventional treatment options for CRSwNP may have changed after the FDA approval of dupilumab.

Methods:
The Clinformatics™ Data Mart Database was utilized. All patients with a diagnosis of nasal polyps between August 2017-March 2021 were identified. Information including demographic and geographic data, concurrent prescription of oral steroid as well as if the patient had ESS or a dupilumab prescription was recorded. Rates of septoplasty were obtained as a surgical control group.

Results:
Rates of dupilumab prescriptions in patients with NP increased from 0.28% prior to approval to 2.48% after approval ($\chi2=473.6$, $p<0.001$). Concurrently, rates of ESS decreased from 18.5% to 15.9% ($\chi2=65.3$, $p<0.001$). Compared to receiving ESS, Dupilumab recipients were likely to be younger (aOR 0.991, $p<0.001$), and less likely to be from a rural (aOR 0.83, $p=0.0048$) or low household income area (aOR 0.77, $p=0.0011$).

Conclusion:
Our study shows increased rates of dupilumab utilization coinciding with decreased rates of ESS utilization after FDA approval of dupilumab for CRSwNP in June 2019. One confounder is impact of the COVID-19 pandemic on surgery utilization rates. Longer follow up and further study needs to be done to characterize the role of dupilumab in the treatment of CRSwNP.

Poster #B066

Impact of social determinants of health on chronic rhinosinusitis disease severity, treatment outcomes, and complications: A population-based database study

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Introduction:
This study used a national database to explore associations of unfavorable social determinants of health (SDOH) with chronic rhinosinusitis (CRS) treatment and complications.

Methods:
The TriNetX database United States network was queried by ICD-10 codes to identify unfavorable SDOH, CRS-specific treatments, and CRS-related complications. Patients with a previous history of any queried complication or treatment (not including antibiotics) prior to CRS diagnosis were excluded from the analysis.

Results:
2,179,417 US adults were diagnosed with CRS from 2015 to 2022, among which 23,335 (1.07%) experienced unfavorable SDOH including job insecurity, housing insecurity, and low education level. Within one year after CRS diagnosis, those with unfavorable SDOH were more likely to be prescribed CRS-related antibiotics (1.61, 1.57-1.66), saline irrigation (1.45, 1.28-1.64), and intranasal steroid spray (1.46, 1.30-1.64). There was no statistical difference in oral prednisone or methylprednisolone treatment within a year of CRS diagnosis. Those with unfavorable SDOH had all-time lower odds of endoscopic sinus surgery (0.88, 0.81-0.95). Patients with unfavorable SDOH had higher odds of complications within 6 months of CRS diagnosis, including bacterial meningitis (3.41, 1.99-5.84) and brain abscess (3.58, 2.41-5.31).

Conclusion:
Patients with unfavorable SDOH are more likely to be treated medically and less likely surgically for CRS, with increased odds of severe CRS-related complications. Providers should identify these patients and consider frequent follow-up and referral to social work for support. As a database study, results are limited by the fact that treatments or complications may not always be directly due to CRS.

Poster #B067

Impact of the inferomedial strut on diplopia after endoscopic orbital decompression for dysthyroid ophthalmopathy: A systematic review

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Background:
Endoscopic orbital decompression is a mainstay approach in the surgical treatment of dysthyroid ophthalmopathy. However, it carries a risk of new or worsened postoperative diplopia (NOD). Preservation of a bony inferomedial strut has been proposed to reduce the incidence of NOD, though data is lacking about its efficacy.

Methods:
A systematic review of PubMed, Ovid MEDLINE, Web of Science, and Google Scholar was performed in October 2022. Case studies and randomized control trials reporting outcomes of endoscopic orbital decompression for dysthyroid ophthalmopathy were considered. Articles which did not address diplopia or define the approach to the inferomedial strut were excluded. Three reviewers independently assessed the quality of the trials and extracted the data.

Results:
After removing duplicates, 157 total citations were screened for eligibility. No randomized controlled trials were identified. 18 case studies (describing 334 patients and 554 eyes) met inclusion criteria. Among the 554 eyes undergoing endoscopic decompression, the strut was preserved in 290 (52.3%) and removed in 264 (47.7%). The average incidence of NOD was 19.2% overall. Incidence varied among patients in whom the strut was preserved (median 10%, range 0% - 38.1%) versus removed (median 23%, range 0% - 91.7%).

Conclusion:
Data suggests that the incidence of NOD after endoscopic orbital decompression may be reduced by preserving a bony inferomedial strut. To the best of our knowledge, this represents the first systematic attempt to assess the impact of the inferomedial strut on postoperative outcomes in endoscopic orbital decompression.

Poster #B068

Implementation of an optimized preoperative checklist for endoscopic sinus surgery within a multi-institutional resident education curriculum

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Background:
Preoperative review of computed tomography (CT) imaging assists with endoscopic sinus surgery (ESS) planning, where trainees may benefit from a systematic approach. We have previously developed an optimized preoperative checklist for sinus CT imaging using an iterative modified Delphi method. In this study, we assess the utility of this checklist as part of an educational curriculum for residents.

Methods:
Resident sinus CT scan education consisted of a pre-intervention questionnaire, an 18-minute video outlining the optimized preoperative checklist, and a delayed post-intervention questionnaire; these were distributed via Qualtrics to otolaryngology residents across 5 training programs in the NY metro area. The pre-intervention questionnaire contained 25 survey questions and a 225-point quiz on sinus CT anatomy; the delayed post-intervention questionnaire contained the same 25 survey questions and a second, distinct 225-point quiz.

Results:
In total, 74 residents completed the pre-intervention questionnaire; of these residents, 36 participated in the longitudinal educational curriculum. Among residents completing both questionnaires, the average pre-intervention quiz score was 136.8 ± 24.0 and the average post-intervention quiz score was 156.0 ± 23.5 ($p < 0.001$). Additionally, more residents used a checklist for sinus CT scan review (74.5% vs. 21.6%) following curricular intervention.

Conclusion:
We find that an educational program centered on an iteratively optimized preoperative checklist for ESS improves trainees' ability to identify critical sinus CT structures. Further integration of checklists and educational curricula may enhance rhinology education efforts and improve surgical anatomy competency.

Poster #B069

Insurance coverage and survival outcomes in patients with olfactory neuroblastoma

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Background:
Olfactory neuroblastoma (ONB) is a rare sinonasal malignancy that requires resource intensive interventions and long-term follow-up care. The aim of this study is to examine the association of insurance coverage with ONB survival outcomes.

Methods:
A retrospective cohort of ONB patients was analyzed using the National Cancer Database (NCDB). Patient demographics, median household income, Charlson Comorbidity Index (CCI), Hyams tumor grade (I and II vs. III and IV), and treatment (surgical intervention or radiation vs. other) were reviewed. Tumor grade, a partially observed confounder, was imputed using an ensemble machine learning algorithm. A multivariable Cox proportional hazard model was performed to determine health insurance effect on overall mortality while adjusting for confounders.

Results:
1,450 patients were included with 3.6% (N=52) uninsured, 32.7% (N=474) with Medicaid, and 63.7% (N=924) privately insured. When controlling for age, race, gender, CCI, tumor grade and income, privately insured patients had a 45% reduction in mortality risk than uninsured patients (hazard ratio [HR]: 0.55, 95% confidence interval [CI]: [0.32, 0.96], $p < 0.05$). However, this trend was not statistically significant in patients with Medicaid (HR: 1.13, CI: [0.064, 2.01], NS). Increased age, lower median income, greater CCI and higher tumor grade ($p < 0.01$, all) were associated with increased mortality risk, while being non-white, female, and receiving first-line treatment ($p < 0.01$, all) were associated with decreased mortality risk.

Conclusion:
Private insurance is significantly associated with better ONB patient survival. Inequalities to insurance access likely contribute to this disparity and warrant further investigation.

Poster #B070

Interleukin 4 induces loss of smell in mice by altering olfactory signaling

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Background:
Anosmia is a cardinal symptom of patients with chronic rhinosinusitis with nasal polyps (CRSwNP). Dupilumab, a human IL-4 receptor-α (IL-4Rα) monoclonal antibody that blocks both IL-4 and IL-13 signaling, improves sense of smell in patients with CRSwNP via mechanisms not well understood. Here we investigate the effects of IL-4/IL-13 on the mouse olfactory system.

Methods:
IL-4Rα expression was assessed using published single-cell RNA-Seq data and by immunofluorescence staining. Calcium uptake was measured in primary murine olfactory sensory neurons (OSN) after challenge with IL-4 and/or IL-13. Sense of smell in mice was assessed by time to discover hidden food at baseline and after 5 days of intranasal administration of IL-4 and/or IL-13. RNA-Seq analysis was conducted on murine olfactory epithelium exposed to IL-4 and/or IL-13.

Results:
Analysis of scRNA-Seq data showed that IL-4Rα is widely expressed in murine olfactory epithelium, including immature and mature OSN. IL-4Rα expression in primary murine OSN was confirmed by immunofluorescence. IL-4 and IL-13 each significantly increased calcium uptake in murine OSN. Intranasal administration of IL-4, but not IL-13, induced anosmia in mice (mean ±SE time to discover hidden food 41±10 vs 39±11s at baseline; 217±33 vs 24±4s after 5 days' administration of IL-4 or IL-13, respectively; $P<0.0001$). RNA-Seq analysis showed that IL-4, but not IL-13, decreases expression of olfactory receptors, activates neuronal regeneration, and triggers immune cell recruitment in olfactory epithelium.

Conclusion:
Modulation of IL-4 signaling may play a dominant role in the therapeutic effects of dupilumab in restoring smell in CRSwNP, with direct effects on OSN contributing to this mechanism.

Poster #B071
Intraosseous hemangioma of the nasal septum: A reported case
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Introduction:
Intraosseous hemangiomas are slow-growing, benign tumors most often found in the vertebrae and skull.1 Involvement of the nasal septum is exceedingly rare. This study adds to the literature the second case of this presentation and the first case reported within the United States.2

Methods: Case report.

Results: We present the case of a sixty-five-year-old female with incidentally found intraosseous hemangioma of the nasal septum after presenting with nasal obstruction and epistaxis following closed reduction of nasal fracture secondary to trauma. Ultimately, the patient underwent endoscopic resection of the mass with large septectomy and frontal sinus exploration, followed by nasal reconstruction.

Discussion:
Intraosseous hemangioma of the nasal septum is a rare, benign tumor. Endoscopic resection can be used to treat symptomatic intraosseous hemangioma of the nasal cavity and septum. Consideration for embolization prior to resection as well as nasal reconstruction following resection may be discussed during operative planning.

Conclusions:
We reported this case of an extraordinarily rare tumor of the nasal septum. Future studies may further explore the rate of growth and management of these tumors in the head and neck. Otolaryngologists evaluating patients for a nasal mass should be aware of this rare diagnosis.

Poster #B072
Leadership trends in otolaryngology rhinology fellowship
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Background:
Otolaryngology fellowship directors (FDs) have a significant educational impact on future leaders in the field. This study aims to describe the demographic and professional backgrounds of rhinology FDs.

Methods:
Rhinology fellowship programs were identified using the American Rhinologic Society (ARS) website. Data collection was conducted via IRB-approved email survey to all identified rhinology FDs. Demographic characteristics, residency/fellowship training, leadership roles, and research output as measured by Hirsch index (H-index) were collected.

Results:
Across 35 institutions, we identified 37 programs with 38 primary FDs. Survey response rate was 94.7%. The majority were male (n=34, 94%) and Caucasian (n=15, 42%). Most FDs were between the ages of 41-45 (n=11, 31%). The mean H-index was 28.75±15.11. Age was significantly correlated with H-index (r=0.678, p=0.002). The majority of FDs completed fellowship training (n=32, 89%). The mean duration between fellowship completion to FD appointment was 9.44±5.29 years. The residency program most frequently attended by FDs was Mount Sinai (n=5, 14%), and the fellowship institution most frequently attended was the University of Pennsylvania (n=9, 25%). FDs held, on average, 5.2 leadership positions. National society leadership positions were most common, followed by departmental leadership roles, leadership positions in academic journals, and broader institution leadership roles.

Conclusion:
Most rhinology FDs have a strong research background, completed fellowship training, and hold leadership positions in national societies or in their department. Most FDs are Caucasian males, which highlights an opportunity to promote diversity among leaders of the field.

Poster #B073
Long-term revision surgery rates of chronic rhinosinusitis treated with endoscopic sinus surgery and standard medical therapy
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Objective:
Data on contemporary results of endoscopic sinus surgery (ESS) have become increasingly pertinent as alternative therapies such as biologics become available for chronic rhinosinusitis (CRS) with nasal polyps. The goal of this study was to evaluate rate of revision surgery for CRS treated with wide-hole ESS and standard postoperative medical therapy.

Methods:
We performed an electronic database review of adult CRS patients who underwent ESS between 2010 and 2016 by the senior author. Revision rates and median time for revision were analyzed based on subtype.

Results:
We identified 427 patients who underwent ESS for CRS, 190 patients with polyps (CRSwNP) and 237 patients without polyps (CRSsNP). At a median follow-up of 6.7 years (IQR: 2.8, 9.0), thirty-two (7.5%) of 427 patients underwent revision ESS. Overall, median (IQR) time to revision was 45 months (17.5, 57.8). Revision rates were 7.4% for CRSwNP and 7.6% for CRSsNP. There was a significant difference in median time to revision surgery for CRSwNP at 54 months compared to CRSsNP at 29 months (p=0.03). Revision rates for CRS subtypes were: allergic fungal sinusitis 6.4%, eosinophilic CRS 7.5%, aspirin-exacerbated respiratory disease 8.5%, CRS with asthma 9.9%, eosinophilic granulomatosis with polyangiitis 14.3%, and granulomatosis with polyangiitis 33.3%, with median time to revision in months at 45, 53, 45, 47, 45, and 29, respectively.

Conclusion:
At a median follow-up of 6.7 years, overall revision rate for CRS treated with ESS and medical therapy was 7.5%. Historically patients with CRSwNP have had higher revision rates than CRSsNP, however our study with long-term follow up found similar rates of revision surgery.

Poster #B074
WITHDRAWN

Poster #B075

Management paradigms for chronic rhinosinusitis in individuals with asthma: An evidence-based review with recommendations

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Background:
Despite the significant morbidity associated with chronic rhinosinusitis in individuals with asthma (CRSwA) there is a paucity of codified, evidence-based management strategies for CRS in this population.

Methods:
Using PubMed, EMBASE, and Cochrane Review Databases, a systematic review was performed covering management strategies for CRSwA. 5,903 articles were screened; 70 were included for full-text analysis. After application of exclusion criteria, 53 articles comprised the qualitative synthesis. The level of evidence was graded, and benefit-harm assessments, as well as value judgment and recommendations were provided.

Results:
Strong evidence confirms the benefit of oral and topical medications on sinonasal-specific outcomes in individuals with CRSwA; there is low-grade evidence demonstrating that these agents improve lung function and/or asthma control. Moderate to strong evidence suggests that endoscopic sinus surgery (ESS) improves both sinonasal- and asthma-specific quality of life. Although there is insufficient-to-low evidence to indicate that this intervention improves pulmonary function in this cohort, data indicate a positive impact of ESS on asthma control. Biologic medications strongly improve both subjective and objective sinonasal- and asthma-specific outcomes, including lung function.

Conclusion:
Evidence supports managing CRS in individuals with CRSwA in a stepwise fashion, starting with traditional non-biologic oral and topical medication, and escalating to second-line treatments, such as ESS and biologics. Optimal treatment of individuals who suffer from CRSwA often requires concurrent, directed management of asthma, as not all CRS interventions impact asthma status.

Poster #B076

WITHDRAWN

Poster #B077

Murine model of minimally invasive nasal depot (MIND) technique for central nervous system drug delivery across the blood-brain barrier

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Introduction:
The blood-brain barrier (BBB) poses a significant obstacle to the successful delivery of therapeutics to the central nervous system. The Minimally Invasive Nasal Depot (MIND) technique, developed in-house, has successfully delivered drugs trans-nasally across the BBB in rodents. Here, we describe the surgical technique for MIND and discuss its early results.

Technique:
The surgical aim is to expose the submucosa of the olfactory epithelium by creating a window in the dorsal nasal bones of the rodents while developing a controlled subcutaneous pocket to accommodate either a drug depot, or an infusion catheter. This may be done under loupe or microscopic magnification. Under general anesthesia, a sagittal incision is made over the nasal bones. A subcutaneous pocket is carefully created to prevent the overflow of drugs onto the maxillae or occiput. The nasal bones are blue lined with a drill and resected while preserving the olfactory mucosa. To maximize the size of the bone window, the pericranial incision is extended rostrally and caudally, and the skin is carefully retracted in a "moving window" fashion to achieve exposure. A catheter may be placed. After water-tight closure with a running-locking stitch, depot injections are given under microscopic vision to confirm that the needle tip is positioned in the subcutaneous pocket.

Results :
The MIND technique has been performed on over 48 rodents, and good drug delivery to various brain subsites was achieved with excellent safety and reproducibility.

Conclusion:
The MIND technique can be successfully used in murine models to perform a detailed analysis of BBB impermeant drugs for clinical trial planning.

Poster #B078

Mycotic aneurysm of the internal carotid artery associated with COVID and sphenoid sinusitis in a pediatric patient: A case report and review of the literature

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Background:
Intracranial infectious aneurysms can occur secondary to arterial wall seeding of bacteria from the paranasal sinuses. These complications are rare and typically seen in immunocompromised patients who are more prone to invasive fungal infections and septic emboli.

Methods:
The electronic medical record was reviewed for the case presentation. Additionally, published literature related to mycotic internal carotid artery (ICA) aneurysms secondary to sphenoid sinusitis was reviewed on PubMed.

Results:
Here, we present a previously healthy 18-year-old male with a recently diagnosed COVID infection, and presumed secondary immunocompromise, who presented with diplopia, headaches, and palsies of cranial nerves III, IV and VI. Imaging revealed a 1.4 x 1 cm mycotic cavernous ICA aneurysm, cavernous sinus thrombosis and sphenoid sinus opacification. Blood cultures were positive for H influenzae and F necrophorum. Bilateral endoscopic sphenoidotomies were completed followed by selective embolization of the left ICA aneurysm by Neurosurgery. After completion of antibiotic therapy, a complete recovery was made. The literature review yielded 21 cases of mycotic ICA aneurysms secondary to sphenoid sinusitis, with 15 cases of fungal etiology, four cases of bacterial etiology and two cases of undetermined etiology. There was a 50% overall mortality rate.

Conclusion:
This is the first reported case of a coexisting COVID infection and acute complicated sphenoid sinusitis resulting in an ICA aneurysm. COVID may have led to an immunocompromised and hypercoagulable state which resulted in an elevated risk of severe sinusitis complications. However, with early initiation of medical and surgical management, a complete recovery was achieved.

Poster #B079

Nasal citology as a procedure to follow-up patients treated with biological drugs with type II inflammation

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Background:
Nasal cytology is an easily accessible diagnostic tool in the management of patients with chronic rhinosinusitis with polyps (CRSwNP). Nowadays in the management of CRSwNP, different biologic therapies can be used. Limited data exist regarding comparison of improvement in patient-reported measures of quality of life and improvement in nasal cytology. We hypothesized that improvement in symptoms and quality of life after biologic therapy should be reflected in the nasal cytology.

Methods:
This is a prospective study performed at an academic tertiary medical center from 2019 to 2022. A total of 75 consecutive patients with CRS and asthma candidates to a biological therapy were screened: 45 with two samples of nasal cytology - at baseline and between 6-12 months after treatment initiation- were included. Demographics, medical history, and endoscopy nasal polyp score (NPS) were collected. Sinonasal Outcomes Test-22 (SNOT-22) and visual analogue scales (VAS) were administered for assessing quality of life and symptoms. Asthma Control Test (ACT) was also administered to assess asthma status.

Results:
Patients treated with any anti-IL5, and higher cytological improvement presented a greater reduction in VAS for total impact. No statistically significant differences were seen regarding SNOT-22, ACT or NPS.

Conclusions:
Biologic therapies improve quality-of-life regardless of the presence of nasal polyps. Nasal cytology is a diagnostic tool that can be used for monitoring biologic drugs in patients with nasal polyps and comorbid asthma.

Poster #B080

Negative sinus biopsy does not rule-out orbital invasive fungal sinusitis

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Introduction:
Acute Invasive Fungal Sinusitis (AIFS) is a rare, aggressive infection of the sinonasal cavity which can invade nearby structures including the orbit and cranium, leading to high morbidity and mortality. Diagnosis of AIFS requires tissue biopsy showing invasive fungal elements. However, sinus biopsy may not be sufficient – particularly when the orbit is the primary site of disease. We present two cases where surgical exploration of the sinuses with biopsy showed no AIFS, yet ultimately the patients were found to have invasive fungus within the orbit.

Methods:
Two cases are presented of patients with a high suspicion of orbital AIFS who underwent surgical sinus exploration followed by orbitotomy. Discussion includes evaluation, lab findings, imaging, surgery, and outcomes.

Results:
Both patients had uncontrolled diabetes and presented with orbital pain, proptosis, varying degrees of vision loss, and ophthalmoplegia. Patient #1 had a CT and MRI showing mucosal thickening of the sphenoid sinus with a lateral bony defect, fat stranding into the orbit, and T2 enhancement of the orbital apex. Patient #2 had a CT and MRI showing maxillary and ethmoid mucosal thickening surrounding T2 non-enhancing material, with T2 enhancement of the orbital fat and optic nerve. Both underwent endoscopic sinus debridement followed by orbitotomy. Frozen and final pathology of sinus tissues revealed no fungus. However, in both cases, biopsies from the orbital apex showed tissue necrosis and invasive fungal disease.

Conclusion :
Sinus debridement for orbital AIFS may lead to false negative results on pathology. Orbital exploration should be considered in patients with a prior negative sinus exploration yet high pretest probability of AIFS.

Poster #B081

Novel application of a self-assembling peptide hydrogel in endoscopic skull base surgery

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Background:
Advancements in instrumentation have allowed for the evolution of endoscopic skull base surgery (ESBS). Post-op nasal morbidity remains a challenge given prolonged healing. We investigate the role of a novel, self-assembling peptide (RADA16) in promoting tissue healing following inverted papilloma (IP) resection and harvest of a nasoseptal flap (NSF) in ESBS.

Methods:
Two cases were selected to study the role of a novel hydrogel containing RADA16, shown to optimize hemostasis and wound healing in models of sinus surgery. In Case 1, a sphenoid sinus IP was resected with stripping of all sphenoid mucosa. In Case 2, an NSF was harvested for skull base reconstruction. The hydrogel was applied to the denuded surfaces of bone and/or cartilage. Endoscopy was performed at 1-week, 4-weeks, and 8-weeks. Endoscopic grading of crusting and mucosalization was the primary outcome.

Results:
Expedited healing with reduced crusting was noted in both. Debridement was required in both at 1-week, but early mucosalization was noted with remnant hydrogel. In Case 1, complete mucosalization and no crusting were identified at 4-weeks, with no further debridement. In Case 2, limited debridement was needed at 4 weeks with minimal crusting. Fully healed septum was identified at 8-weeks. There was no incidence of adhesion formation or post-op bleeding. At 8-weeks, nasal irrigations were stopped. Follow-up was 9 months with no complications.

Conclusion:
Innovation in sinonasal healing is critical in ESBS. We demonstrate the role of a novel hydrogel in promoting early healing following ESBS. Endoscopic data shows expedited mucosalization and tissue regeneration, mitigating debridement requirement. Further controlled studies are required.

Poster #B082

Novel use of biliary stent in drainage of Potts Puffy Tumour

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Introduction:
“Pott’s puffy tumour” (PPT) was first described by Sir Percival Pott in 1760. The ‘tumour’ is in fact a subperiosteal abscess secondary to frontal bone osteomyelitis.

Case Detail:
A 46-year-old Chinese lady presented with intermittent frontal headache and enlarging forehead swelling over 2 months. A 5cm left paramedian forehead swelling was seen and nasoendoscopy showed purulent discharge from bilateral middle meati. CT revealed a left frontal bone subperiosteal abscess with marked surrounding bony sclerosis. The frontal sinus and abscess cavity were communicated via an anterior table erosion 1cm in diameter. She underwent urgent endoscopic sinus surgery and copious pus was drained from the left frontal sinus. A narrow bony canal communicating the abscess cavity and frontal sinus drainage pathway was expanded with rongeurs and drills. A 3mm biliary T-tube was inserted via a supra-brow insertion through a frontal trephine, its horizontal limb sitting within the abscess cavity and vertical limb in the frontal ostium. The tube was removed a month later. Repeat nasoendoscopies showed progressive narrowing of the abscess drainage pathway after removal of the T-tube. However, she remained asymptomatic, and the sinus cavities remained clear.

Discussion:
Whilst an osteoplastic flap used to be the preferred method of surgical access to the frontal sinus, there has been a shift towards endoscopic sinus surgery as a safe alternative. More recently, the Draf III procedure has also been shown to be effective for surgical drainage of PPT. Besides draining the infection, maintenance of sinus patency also needs to be considered. Employment of endoscopic, open, or combined techniques will need to be customized to each clinical scenario.

Poster #B083
Olfaction in patients with long-haul COVID-19
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Background:
Early in the pandemic, olfactory dysfunction (OD) strongly indicated acute COVID-19 infection. However, acute OD has become less prevalent with more recent variants. Long-haul COVID-19 is characterized by ongoing symptoms caused by SARS-CoV-2 infection that last longer than 3 months. Despite increasing prevalence of long COVID-19, associated OD is poorly understood. Current estimates suggest that 1-63.5% of patients have ongoing OD at 1 year, and little is understood about whether certain COVID-19 variants affect long-haul symptoms. This study aimed to (1) investigate the prevalence and severity of OD in patients with long-haul COVID-19 and (2) investigate OD severity based on the dominant variant at the time of diagnosis.

Methods:
Patients were recruited from the UNC Long-Covid Recovery Clinic. Each patient completed the University of Pennsylvania Smell Identification Test (UPSIT). CDC, WHO and NCDHHS databases were used to determine the dominant strain at the time of infection based on patients' date of COVID-19 diagnosis. Kruskal-Wallis test was used to assess for correlations between COVID-19 strain and UPSIT scores.

Results:
Of 45 patients, 43 (95.6%) had some degree of OD, and persisted for 2 or more years from initial infection. Mean UPSIT score was 28.0 (SD = 6.7) denoting moderate microsomia. Among the G, alpha, delta, and omicron variants, there was not a significant difference in degree of OD in these long-haul patients (p=0.2126).

Conclusion:
Nearly all patients had some degree of ongoing olfaction complications due to long-haul COVID-19 infection, but further data is necessary to determine whether certain COVID-19 strains lead to worse olfactory function in patients with long-haul COVID-19.

Poster #B084
Olfactory and gustatory dysfunction: A comparison between omicron and previous variants in Turkey
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Aim:
Olfactory dysfunction is common in coronavirus disease 2019 (COVID-19) patients. The aim of this study is to compare the incidence of subjective olfactory and gustatory disorder in patients with laboratory-confirmed COVID-19 of earlier variants to those with presumed later omicron variant.

Methods and results:
In a previous cross-sectional study by E. Deniz Gozen, et al. of 59 laboratory-confirmed COVID-19 infected patients between April 10 and May 10, 2020, screened by questionnaire for olfactory and gustatory dysfunctions, it was found that the rate of self-reported smell and taste loss in all COVID-19 patients was 52.5% and 42%, respectively, a rate similar to reports from other centers. We contacted 200 laboratory-confirmed COVID-19 infected patients identified January 13 - 14, 2022 during a time when reports showed 97% of Turkish infections were omicron variant. Screening them by a questionnaire for olfactory and gustatory dysfunction, we found that the rate of self-reported smell and taste loss in these patients was 37(18.5%) and 35 (17.5%), markedly lower than COVID-19 reports.

Conclusion:
Olfactory and gustatory dysfunctions are common in COVID-19 patients, however with decreased prevalence in the new variant omicron cases.

Poster #B085

Olfactory dysfunction secondary to COVID-19 infection is associated with diminished quality of life

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Background:
Approximately 40-50% of people diagnosed with COVID-19 develop olfactory dysfunction (OD), with 5.6% reporting persistent OD. Prior research suggests that OD secondary to diseases such as chronic sinusitis may impair quality of life (QoL) and increase depression. The purpose of this study is to determine the associations between COVID-19-related OD, QoL, and mental health.

Methods:
In this cross-sectional study, olfaction was assessed with Sniffin' Sticks psychophysical testing. QoL was assessed with the Questionnaire of Olfactory Disorders (QOD-NS) and PROMIS-29, anxiety with the Beck Anxiety Inventory (BAI), and depression with the Patient Health Questionnaire-9 (PHQ-9). Kruskal-Wallis rank sum test, Dunn's test and Wilcoxon rank sum test were used to compare groups.

Results:
All individuals reported subjective OD (n=64). Those with quantitative hyposmia had a higher median score on the PROMIS-29 compared to those with normosmia (p=0.048). Those with qualitative OD (parosmia) had a lower median score on the QOD-NS compared to those without parosmia (p=0.013). There was a trend toward increased anxiety among those with quantitative OD (p=0.060), but no difference for those with qualitative OD (p=0.698). Differences in these same groups were negligible on PHQ-9 (p=0.109 and p=0.345, respectively).

Conclusion:
The results of this study suggest COVID-19-related quantitative and qualitative olfactory loss negatively impact QoL. In contrast, there was no association identified between quantitative or qualitative OD and anxiety or depression scores, possibly due to limited sample size. Further research is needed to evaluate the longitudinal effects of post-COVID OD and modifying factors such as adaptation and resilience.

Poster #B086

Oral corticosteroid burden and healthcare resource utilization (HCRU) in patients with chronic rhinosinusitis with nasal polyps (CRSwNP) undergoing functional endoscopic sinonasal surgery (FESS): A real-world retrospective cohort study

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Background:
The impact of FESS on oral corticosteroid (OCS) burden and HCRU for patients with CRSwNP is understudied.

Methods:
Retrospective cohort study of CRSwNP patients undergoing vs not undergoing FESS, using US claims data (Optum; 2012−2020). Groups were propensity score-matched to adjust for confounding. Intervention/follow-up periods were defined as Day 0−44/45−365, respectively. OCS burden (cumulative dose in mg prednisone equivalents), other medications, HCRU, and costs were compared among FESS vs non-FESS patients in the 1-year post surgery.

Results:
Each group included 8,909 patients. During follow-up, overall OCS use was marginally lower among FESS vs non-FESS patients (mean difference in cumulative dose: −40 mg [95% CI −64 to −16] per patient); though in patients who filled an OCS prescription (34.6% and 36.0%, respectively) OCS burden remained high in both groups with mean (SD) cumulative doses of 521 (786) and 612 (906) mg, respectively. OCS users in both groups had mean (SD) of 2 (1) OCS bursts (OCS events >7 days apart) in follow-up; mean duration of OCS bursts was 14 (29) days (FESS group) vs 15 (32) days (non-FESS group). Mean total estimated cost of the FESS intervention was $26,295 (95% CI 25,436 to 27,155); however, only $267 (−915 to 381) in average cost savings were observed in FESS vs non-FESS patients during follow-up. HCRU was similar in follow-up, except more FESS patients visited an otolaryngologist (57.5 vs 32.0%). Overall, 20.7%, 22.5% and 29.2% of patients filled a prescription for leukotriene antagonists, NSAIDs and oral antibiotics, respectively.

Conclusion:
Patients with CRSwNP have similar OCS and HCRU burden with vs without FESS, indicating high treatment burden and unmet needs in both groups.

Poster #B087
Outcomes of endoscopic endonasal transsphenoidal surgery in the pediatric population
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Purpose:
To provide a descriptive analysis of the indications and outcomes of endoscopic endonasal transsphenoidal surgery in the pediatric population.

Methods:
Retrospective review of presentation, outcomes, and complications of pediatric patients who underwent endoscopic endonasal transsphenoidal tumor resection at a single tertiary referral center from 2015 through 2020.

Results:
Thirteen patients met inclusion criteria with a median age of 14 years (IQR: 10 - 16 years). The most common presenting symptoms were vision loss and headache. Gross total resection was achieved in 5 patients. The remaining 8 patients had on average 88% gross resection. The average post-operative ICU stay was 4 days (IQR 2 – 8 days). Three patients had intraoperative CSF leak and one patient had post-operative CSF leak with pneumocephalus. New post-operative diabetes insipidus was present in 3 patients, two of which required desmopressin following hospital discharge. Two patients developed central hypothyroidism and adrenal insufficiency post-operatively. All patients with vision deterioration pre-operatively improved following the surgery. Patients were followed for a median of 26.5 months (IQR 11.9 – 31.5 months) following surgery with two patients requiring repeat endoscopic resection.

Conclusion:
Endoscopic endonasal transsphenoidal surgery on pediatric patients is safe and effective but requires close monitoring for post-operative complications.

Poster #B088
WITHDRAWN

Poster #B089
Pediatric functional endoscopic sinus surgery: Comparison of postoperative debridement in the office versus OR
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Background:
Sinonasal debridement is a mainstay of postoperative management for functional endoscopic sinus surgery (FESS). The pediatric population may require a return to the operating room (OR) if debridement cannot be tolerated in office. There is limited evidence assessing the necessity and impact of this practice.

Methods:
We retrospectively studied pediatric patients (age <18 years) undergoing postoperative debridement following FESS for chronic or recurrent acute sinusitis. Rates of revision surgery and symptomatic visits were compared between office vs OR debridements. Multivariate regression analysis assessed for associations between debridement setting and outcomes.

Results:
116 patients were studied; 83 (71.5%) debridements in office and 33 (28.4%) in OR. The OR group was significantly younger (9 vs 15 years, p<0.0001) and more frequently underwent frontal sinusotomy (p=0.02) and septoplasty (p<0.0001). Office debridements occurred sooner after index surgery than OR debridement (mean 10 vs 14 days, p<0.0001). Mean follow-up was similar between groups at 21.1 vs 23.9 months. Controlling for age, debridement in the OR vs office trended toward lower rates of revision surgery (6.1% vs 9.6%, OR 0.08, 95%CI 0.005-1.211, p=0.07) and symptomatic follow-up visits (15.2% vs 33.7%, OR 0.29, 95%CI 0.042-1.897, p=0.20), though the differences were not statistically significant.

Conclusion:
Postoperative debridements in the office vs OR have similar rates of need for revision surgery and symptomatic follow up visits in children, although age and procedure type may suggest potential benefit of one over the other. Prospective controlled studies are needed to assess the necessity and optimal setting of postoperative debridement.

Poster #B090
Pediatric nasal septal abscess: Case report and literature review
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Nasal trauma in children is more likely to be associated with septal injury due to their softer septal cartilage. Tearing of blood vessels contiguous with the septal cartilage can cause a hematoma to form in the submucoperichondrial plane. If nasal septal hematomas (NSHs) are not treated timely, inflammation, suppuration and necrosis of the septal cartilage will occur, leading to a nasal septal abscess (NSA). Although NSA is rare in the pediatric population, complications can be devastating.

The online database PubMed was searched for reports on NSA in the pediatric population. Data collected include presenting symptoms, radiologic techniques, surgical/medical treatment, and complications. One previously unpublished case of nasal septal abscess in a pediatric patient is reported with information including presenting symptoms, radiologic techniques, surgical and medical management, and patient follow-up.
A 7-year-old boy presented with nasal obstruction, rhinorrhea, and fever 5 days after a nasal trauma. On examination, a bilateral, anterior septal protrusion diagnostic of a septal collection was found. CT of the sinuses revealed fracture of left nasal bone with associated paranasal soft tissue edema. Incision and drainage expressed purulent material consistent with a nasal septal abscess.

Nasal septal hematomas and abscesses should be considered in all children with acute onset nasal masses or obstruction after nasal trauma. Although nasal trauma is common in childhood, septal injuries are often overlooked and go undiagnosed until complications arise. Increased education and awareness of NSH is crucial to aid prompt diagnosis and treatment, therefore preventing abscess formation and lifelong dysfunction or deformity.

Poster #B091

Penetrating orbital maxillary sinus trauma with a glass crack-cocaine pipe: A unique case report

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Introduction:
Foreign bodies within the paranasal sinuses are rare in the adult population, often occurring secondary to trauma. Critical surrounding structures including the globe, optic nerve, ophthalmic and internal carotid arteries, and the nasal lacrimal system are all at risk of injury in the setting of trans-orbital, trans-sinus penetrating trauma. The proximity of these delicate structures presents many unique surgical challenges.

Case Description:
A 25-year-old male presented after penetrating trauma to the right side of his face with a crack-cocaine glass pipe. A right 1 cm infraorbital laceration was noted with right scleral depression and decreased sensation along the right V2 nerve distribution. A maxillofacial CT scan demonstrated a fractured pipe extending through a large right infraorbital soft tissue laceration, along the inferior orbit, through a fracture in the inferior orbital wall, and terminating in the maxillary sinus. The patient was taken to the operating room and underwent orbital exploration, wound debridement, eyelid laceration repair, and endoscopic maxillary antrostomy with foreign body removal. A combined trans-orbital and trans-maxillary incision were used to repair the right orbital floor fracture. The patient has been seen in follow-up clinic visits and has intact extraocular movements and grossly normal vision.

Discussion:
This case presents a complex foreign body lodged in an uncommon location with many surgical risks. We report a unique trans-orbital and trans-maxillary approach that has not been described previously. The patient had a successful outcome, and the technique could be utilized for future foreign body or trauma cases.

Poster #B092

Personal statements for rhinology fellowship: A sentiment and deep learning linguistic analysis based on gender and training location of applicant

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Background:
The personal statement is a key component of the application for Rhinology fellowship. The linguistic composition of these personal statements has not previously been characterized. In this study, we analyzed sentiment and linguistic differences among genders of applicants and between international medical graduates (IMGs) versus US-trained applicants.

Methods:
Personal statements from 2021 and 2022 applicants to a single rhinology fellowship program were gathered. A natural language processing sentiment analysis package generated sentiment scores for each statement and t-test comparisons were made between comparison groups. A peer-reviewed tool, Empath, categorized words and phrases through a deep learning method of neural embedding over 1.8 billion words of modern fiction.

Results:
Among 56 total applicants, 46 were male and 10 were female. 31 were US-trained and 25 were IMGs. There were no differences between applicant genders in word count ($p=0.29$) and sentiment scores ($p=0.10$) and no differences between IMGs and US-trained applicants in word count ($p=0.38$) and sentiment score ($p=0.87$). Among linguistic categories, females used more words associated with negative emotions ($p=0.02$) and leadership ($p=0.04$). US-trained applicants used more optimistic words ($p=0.04$), and IMG applicants used more work-related words ($p=0.01$).

Conclusion:
There was similar positive sentiment between genders and among US-trained and IMG applicants. However, female applicants emphasized leadership narratives. US-trained applicants wrote more optimistic personal statements, while IMGs wrote more about previous work and accomplishments. These linguistic differences may perpetuate bias and influence evaluations in the application process.

Poster #B093

Post Covid parosmia demographics and treatment

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Introduction:
Parosmia can be a debilitating qualitative olfactory dysfunction. The literature on post-COVID parosmia is sparse. This survey collected clinical features, symptom time-course, and the efficacy of different therapies trialed in post-COVID parosmia. Methods: Online REDCap survey targeting adult patients with post covid parosmia circulated on AbScent research group and Facebook COVID parosmia groups from Sep. 22 to Oct. 19, 2022. Results: 212 participants completed the survey. 86.4% (184) were female, and 80% were from the USA. 51% (108) reported receiving at least one dose of the COVID-19 vaccine prior to infection. Persistent severe parosmia was reported by 42% (87), while only 3.4% (7) reported complete resolution. Weight loss was reported by 52% (109), with a 15.5 % average reduction of body weight (SD 10). Many treatments for parosmia were trialed, with participants reporting trials of Nasal steroid sprays (50%), Nasal steroid irrigation (40%), Oral steroids (40%), Smell training (75%), Vitamin A drops (42%), Sodium citrate Spray (13%), Stellate Ganglion block (34%), Colloidal Silver spray (15%), and Lion's Mane (34%). The reported efficacy rates were under 15%, except for a Stellate Ganglion block with reported efficacy of 50%. 55% of respondents reported having pre-existing conditions such as depression, anxiety, or fibromyalgia, with approximately 32% taking antidepressants regularly. Conclusion: Post-COVID parosmia can be associated with significant morbidity and remains a challenging problem to treat. Stellate ganglion blocks appear to be successful for a significant proportion of this population. Further research into the pathophysiology, efficacy and mechanism of effect is warranted.

Poster #B094

Posterior extension of fusobacterium nucleatum sinusitis leading to posterior circulation cerebellar and pontine infarcts

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James Pierre
Marco Ayala

Fusobacterium nucleatum is an anaerobic bacterium, native to the oral cavity. Although most associate Fusobacterium infections with Lemierre's syndrome, or septic thrombophlebitis of the internal jugular vein, we describe a rare case of posterior extension of Fusobacterium nucleatum sinusitis resulting in posterior circulation infarcts. This is a 58-year-old male with a 6-month history of refractory chronic sinusitis, who presented to the Emergency Department with sudden onset diplopia, weakness, hyperventilation, fevers, and chills. Work up revealed severe Fusobacterium nucleatum pansinusitis, which extended posteriorly, progressing to cranial sinus thrombophlebitis, multiple posterior circulation infarcts, and thrombosis of the cavernous sinus and ophthalmic veins, resulting in increasing somnolence, right-sided hemiplegia, airway compromise. He required multiple surgical sinus washouts, craniotomy with external ventricular drain placement, tracheostomy, and extensive antibiotic therapy. Throughout his hospital course, a successful multidisciplinary approach led to significant improvement in his neurologic status, with response to stimuli and return of movement in all extremities.

Poster #B095

Posterior turbinate reduction and its impact on eustachian tube dysfunction

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Objective:
The aim of this study was to evaluate the relationship between persistent nasal obstruction caused by the posterior third of turbinate enlargement and Eustachian tube dysfunction-related nasal symptoms using the Eustachian Tube Dysfunction Questionnaire (ETDQ-7) and Total Nasal Symptom Score (TNSS) as assessment methods.

Methods:
A total of 46 adults were enrolled. A diode laser with thin malleable long fiber tip easily reaching the nasopharynx was utilized. Interstitial method of ablation in two passes at 8w, CW, effectively reduced the posterior third of middle and inferior turbinates. The TNSS and ETDQ-7 scores were analyzed before and 90-180 days after procedure and compared.

Results:
The vast majority (90%) of the patients had preoperative median total ETDQ-7 scores of over 21. Statistically significant improvement in ETDQ-7 scores was recorded at 90-180 days. The impact on TNSS scores were even more dramatic. No adverse events related were noted. Almost 40% of these procedures were performed in an office setting under topical / local anesthesia.

Conclusions:
In addition to expected nasal symptoms, patients with posterior turbinate enlargement may have additional complaints about Eustachian tube dysfunction compared to healthy controls. Most patients with Eustachian tube dysfunction had normal otoscopy. Allergy or other rhinitis does not seem to cause a difference in symptoms related to Eustachian tube dysfunction. Posterior turbinate reduction of middle and inferior turbinates should be considered in conjunction or prior to ET balloon dilation.

Poster #B096

Predicting adherence to topical medications in chronic rhinologic disease

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Objectives:
To determine risk factors of medical adherence as well as describe strategies to increase adherence to topical medications in patients with chronic rhinologic disease.

Study design/Methods:
Systematic review of 4 databases (PubMED, SCOPUS, CINAHL, Cochrane) from inception of databases to September 1st, 2022, to identify studies that evaluated factors related to and affected by medical adherence to topical medications in patients with chronic rhinologic disease.

Results:
Of 1491 studies screened, 24 studies met inclusion criteria. Of these, 7 studies described how sensory attributes of intranasal sprays affect adherence; odor, taste, aftertaste, and side effect profiles of nasal sprays influenced adherence. Five studies described improved adherence when using record keeping diaries or web-based platforms to send reminders as well as to keep record of medication usage. Eight studies described patient-specific risk factors to non-adherence, with demonstration of underlying disease burden and conscientious personalities correlating with medical adherence. Four studies looked at pediatric patients specifically. Overall, the adherence rates in children parallel that of adults and non-adherence may have greater implications in school performance.

Conclusions:
Overall, adherence to topical medical therapy in patients with chronic rhinologic disease is affected by patient-related and medication-specific factors. These should be considered when counseling patients. Web-based diary or notification systems may help increase adherence. Additionally, children are equally adherent to topical medical therapy as adults.

Poster #B097

Predicting sinonasal inverted papilloma attachment using machine learning

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Background:
Surgically addressing the origin of inverted papilloma (IP) is key to its complete resection, which is critical in preventing tumor recurrence. Areas of hyperostosis on computed tomography (CT) scans provide an indication of the IP's origin but is sometimes hard to discern. Herein, we developed a machine learning model to analyze CT images and assist in identifying IP attachment sites.

Methods:
A retrospective review of patients treated for IP at our institution between 2004 and 2021 was conducted. The IP tumor attachment site was manually segmented on CT by the operating surgeon. We used a nnU-Net model, a deep learning-based segmentation algorithm that automatically configures image preprocessing, network architecture, training, and post-processing to identify the IP attachment site. The model was trained and evaluated using a 5-fold cross validation, where each iteration split the data into train/validation/test to avoid chances of overfitting. The Sørensen–Dice coefficient (Dice) was used to evaluate the segmentation performance of the nnU-Net model.

Results:
A total of 68 subjects were included in the nnU-Net model. Thirty-nine (50%) subjects passed the initial preprocessing phase. The tumor attachment site was correctly identified by the nnU-Net model output in 22 (56%) subjects with an average Dice score of 0.345 and standard deviation of 0.237.

Conclusion:
The nnU-Net deep learning model was able to successfully identify the sino-nasal attachment site of IP with a high degree of fidelity in selected cases. Machine learning shows early promise as a novel technology for identifying IP tumor origin. Future work is needed to fine-tune the model for greater accuracy.

Poster #B098

Prevalence and epidemiology of facial and nasal injuries in 2017-2021

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Introduction:
Literature regarding facial trauma in adults with different etiologies is scarce. Our study aims to characterize the causes of facial trauma in adults to provide insight into injury patterns and activities that may necessitate facial protection.

Methods:
We performed a cross-sectional study of patients from the National Electronic Injury Surveillance System from 2017 - 2021. Patients 18 years and older with face or nose injuries were included. Descriptive statistics and bivariate correlations were performed. Results were reported as statistically significant if $p < 0.05$.

Results:
59,648 patients with injuries to the face and nose were identified. The patient demographic was predominantly male (52.55%) and Caucasian (47.1%) with a median age of 54.66±23.31. The largest age group of face & nose injuries was 18-30 (22.2%). The most common diagnoses were laceration (25,901, 43.4%), contusion (14,549, 24.1%), fracture (9,572, 16.0%), hematoma (2,786, 4.7%). Of the patients, 8,834 (14.8%) were either transferred, admitted, or kept for observation. There is a positive correlation between age groups and transfer, admission, and observation (p-value <.01). Among the causes of injury, the most common were floors (9,721, 16.3%), stairs (5,118, 8.6%), beds (4,703, 7.9%), bicycles (2,741, 3.6%), and chairs (1,657, 2.8%). The largest age group with bicycle injuries was the 18-30 age group (31.7%)

Conclusion:
The most common injuries to the face and nose are due to injuries from products found in the house. There was a positive correlation between age and transfer, admissions, and observation. As the rates increase, safety countermeasures should be considered to limit the number of facial and nasal injuries.

Poster #B099

Primary lacrimal sac b-cell lymphoma, diagnosis, and management: A case report

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Introduction:
Lacrimal sac tumours are rare entities with the majority being epithelial in origin. Primary malignant lymphomas of the lacrimal sac are even more uncommon with incidence figures as low as 6 percent (7) We present a patient with primary diffuse large B cell lymphoma, managed with endoscopic assisted excisional biopsy and adjuvant chemotherapy at a tertiary care otolaryngology service in Kingston, Jamaica.

Patient Concerns/ Findings:
The patient, a 47-year-old female presented with a 1-month history of a progressively enlarging left sided lacrimal sac swelling with associated epiphora and worsening facial and maxillary teeth pain in the absence of local infection/inflammation.

A 2x2 cm left sided firm non tender swelling was noted to the lacrimal sac, which was not fixed to underlying structures. There was no purulent discharge on milking the sac. She had no visual changes and no cervical lymphadenopathy. MRI showed a mass in the lacrimal sac.

Diagnosis/Intervention/Outcomes:
The patient was offered excisional biopsy (combined open/endoscopic approach) upon suspicion of malignancy in a patient presenting with atypical features of an obstructed lacrimal sac. She was managed with primary adjuvant chemotherapy. The patient is doing well clinically and has no evidence of recurrence one year post treatment.

Conclusion:
This case highlights the value of preoperative MRI scans in patients with atypical features of a dacryocystocele or dacryocystitis. It also highlights the potential limitations of fine needle aspirate cytology and endoscopic incisional biopsies of the lesions in the lacrimal system, which warrants further study.

Poster #B100

Psychophysical testing outcomes in post-COVID-19 persistent olfactory dysfunction

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Introduction:
COVID-related olfactory dysfunction (OD) is thought to occur secondary to widespread damage to the olfactory epithelium, an alternate manner compared to other OD pathologies. Thus, efforts to understand how OD manifests in this population are crucial. Few studies have investigated olfactory characteristics in this novel, prevalent population.

Objective:
The study characterized psychophysical measures of OD for COVID-OD patients with regard to odor identification, discrimination, and intensity with single-use tests.

Methods:
Cross-sectional study of patients with a historical diagnosis of COVID-19 and reported OD >6 months. Patients completed the SCENTinel (Monell Chemical Senses Center), which tests identification, discrimination, and intensity, and the Brief Smell Identification Test (B-SIT).

Results:
68 patients of OD duration 17.8 months (range 6-32) completed the B-SIT and SCENTinel. Mean B-SIT score was 6.2+0.4/12, categorized as severely microsmic, without significant differences based upon OD duration (> or < 12 months, p=0.4). On SCENTinel, odor intensity was rated at 41+3.7/100; 59% correctly identified odors, and 94% correctly discriminated between odors. There were no significant differences for odor intensity, identification, or discrimination on SCENTinel by OD duration (p= 0.2, 0.8, 0.6).

Conclusion:
COVID-OD patients demonstrated poor odor identification on both B-SIT and SCENTinel. While patients also performed poorly on odor intensity testing, they were more successful in odor discrimination. Performance does not appear to differ based upon OD duration. Future study of this population must pursue a multifaceted investigation of psychophysical olfactory outcomes and compare with other etiologies.

Poster #B101

Pterygopalatine fossa schwannoma with orbital extension in a pregnant woman presenting as amaurosis: A case report

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Schwannomas are benign, slow growing and well differentiated tumors arising from the schwann cells of nerve sheath. They may develop from many nerves, most commonly, cranial nerves. Trigeminal schwannomas are the second most common type of schwannomas in skull base, representing 8% of these tumors. Less than 4% develop at the nasal cavity, paranasal sinuses, or pterygopalatine fossa. Pterygopalatine fossa trigeminal schwannoma is very rare, and its orbital extension is even more infrequent. Because of the slow growing nature of the tumor, symptoms are usually insidious, can be very morbid and associated with irreversible sequelae. It is extremely important to have a high diagnosis suspicion. Definite diagnosis is confirmed by histopathological examination. We report the first case of trigeminal schwannoma with orbital extension in a twelve-week pregnant woman presenting as painless left vision loss and proptosis. Complete removal through endoscopic transnasal approach was achieved, orbital decompression was performed. Even so, the patient didn´t fully recover vision loss. Research on incidence and etiology of head and neck tumors in pregnancy is uncommon, there is no data about trigeminal shwannoma in this specific population.

Poster #B102

Quality-of-life metrics and correlation with psychophysical testing outcomes in post-COVID persistent olfactory dysfunction

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Introduction:
10% of patients experience persistent olfactory dysfunction (OD) >6 months after COVID infection. OD patients face increased morbidity, mortality, and psychosocial distress. No previous studies have investigated the correlation between psychophysical olfactory testing and quality-of-life (QOL) metrics in persistent COVID-OD.

Objective: This study investigated the relationship between psychophysical OD measures including smell identification and intensity with OD-QOL metrics in COVID-OD patients.

Methods: Cross-sectional study of patients with a historical diagnosis of COVID-19 and OD >6 months. Patients completed the B-SIT, SCENTinel, and Questionnaire of Olfactory Disorders (QOD-NS). QOD-NS questions were grouped into 4 categories reflecting social isolation, sustenance challenges, emotional distress, and OD pervasiveness.

Results: 68 patients completed the aforementioned tests. There was no significant difference in QOD-NS score based upon OD duration. Age was negatively correlated with QOD-NS score ($R=-0.38$, $p=0.005$). Females reported lower QOL ($p=0.004$). B-SIT score negatively correlated with QOD-NS score ($R=-0.24$, $p=0.06$). Lower B-SIT score was associated with worse QOD-NS social and sustenance-related scores ($R=-0.26$ and -0.31, $p<0.05$). SCENTinel intensity score did not have an association with QOD-NS score.

Conclusion: This study demonstrates a correlation between OD-QOL metrics and psychophysical olfactory testing in COVID-OD. Patients that are younger, female, or perform poorly on olfactory testing demonstrate correlation with poorer QOL metrics.

Poster #B103

Quantification of the diseased sinonasal airspace in chronic rhinosinusitis patients relative to normative size

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Objective:
Comparison of the sinonasal airspace volume in chronic rhinosinusitis (CRS) patients and healthy normative patients will allow understanding of how much CRS shrinks the sinonasal airspace anatomy due to the presence of inflammation in the nasal and paranasal sinuses.

Methods:
Computed tomography scans from 9 (5 females and 4 males) adult CRS patients with varying disease severity, and 10 (6 females and 4 males) adult subjects with healthy normal anatomy were used. Sinonasal airspace volumes were quantified based on computer modeling involving three-dimensional reconstructions of the airspace. The airspace volumes (cm3) from the following anatomical regions were compared: nasal cavity (NC); frontal sinus (FS); maxillary sinus (MS); ethmoid sinus (ES); and sphenoid sinus (SS).

Results:
Mean (± standard deviation) NC volume (cm3) were: CRS=10.02±2.95 vs Normal=11.32±2.34; CRS airspace shrunk by 13%. The FS and MS volumes from CRS shrunk by 13% (CRS=2.85±2.63; Normal=3.16±1.42) and 25% (CRS=12.97±9.50; Normal=16.27±2.99), respectively. ES (17%) and SS (19%) also shrunk due to CRS. Among females, NC volume from CRS reduced by 23% (CRS=8.58±2.45; Normal=10.59±2.09); with corresponding volume reduction in FS (67%), MS (148%), ES (65%), and SS (40%). On the contrary, although airspace volumes among males with CRS shrunk in NC (14%), FS (5%), and MS (11%); ES and SS volumes were larger by 26% (CRS=5.41±2.38; Normal=3.99±1.23) and 5% (CRS=9.62±3.75; Normal=9.17±8.26), respectively.

Conclusion:
Disease induced by CRS reduces the sinonasal airspace volume, magnitude of reduction was dependent on disease severity. Airspace volume among females with CRS relative to normative sizes was significantly greater than males with CRS.

Poster #B104

Racial and socioeconomic differences amongst chronic rhinosinusitis subtypes

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Background:
Literature on the demographic and socioeconomic distribution of chronic rhinosinusitis (CRS) is scarce. Elucidating this is imperative as various pharmaceutical treatments are investigated in randomized clinical trials with increasing frequency and subsequently implemented into practice. Racial minority patients have conventionally been underrepresented in clinical trials, such as those for biologics. We aim to evaluate for socioeconomic and racial differences in CRS patients within a private and public health system.

Methods:
A retrospective review identified 200 patients with CRS. Data on demographics, payer type, and CRS subtype were analyzed using Pearson's chi-squared and ANOVA tests as appropriate.

Results:
Amongst patients, 39.7% had CRSsNP, 28.4% CRSwNP, 12.9% AFRS, 4.1% AERD, 7.2% fungal ball, and 6.2% odontogenic sinusitis (OS). 5.7% were Asian, 19.6% were Black, 18.6% were Hispanic, and 50.5% were White. 50% had private insurance, 12.9% had Medicare, 26.3% had Medicaid, and 5.7% were uninsured. Patients with Medicaid or uninsured status were more likely to be Black or Hispanic ($p<0.001$). There was a higher prevalence of Black patients with AFRS, Hispanic patients with CRSwNP, and White patients with CRSsNP than expected ($p<0.05$). Those with Medicaid or uninsured status had a higher prevalence of CRSwNP and AFRS ($p<0.001$). Those with Medicaid or uninsured status, and those of minority race had higher Lund-Mackay scores ($p<0.001$).

Conclusions:
Demographic and socioeconomic differences exist amongst CRS subtypes. A representative patient population should be utilized when designing and conducting clinical trials. Further research is necessary to validate our findings and clarify the true epidemiology of CRS.

Poster #B105

Radiographic features of sinonasal malignancies: Multi-institutional evaluation

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Objectives:
CT and MRI are important radiographic modalities for assessing sinonasal malignancies. In this study, we evaluated how different sinonasal tumors manifested on CT and MRI and attempted to elucidate distinguishable imaging characteristics across common pathologies.

Methods:
The Cole-Reagins Registry for Sinonasal Cancer (CORSICA) was queried for sinonasal cancer patients with available radiology reports. Six histopathologies were assessed: adenocarcinoma, adenoid cystic carcinoma (SNACC), esthesioneuroblastoma (ENB), melanoma, neuroendocrine carcinoma (SNEC)/undifferentiated carcinoma (SNUC), and squamous cell carcinoma (SNSCC). Tumors were assessed for extent of invasion, CT signal density, and MRI signal intensity. Wilcoxon rank sum and chi-square tests were used to assess for differences in variables.

Results:
Imaging data was available for 230 patients. Approximately 48% of tumors originated from the nasal cavity. The most common pathologies were SNSCC (34%), ENB (17%), and melanoma (16%). Lesion densities on non-contrast and contrast CT were not significantly associated with tumor histology (all $p>0.05$). Similarly, lesion intensities on T1- and T2-weighted MRI were not associated with tumor histology (all $p>0.05$). Rates of dural enhancement ($p=0.044$), intracranial involvement ($p=0.003$), and brain invasion ($p=0.050$) were higher in SNEC/SNUC compared to all other pathologies except ENB. Perineural invasion was more frequently observed in SNACC than all other tumors ($p=0.005$).

Conclusions:
Despite being a heterogeneous group, sinonasal malignancies exhibited similar enhancement patterns on CT and MRI. Differences in growth pattern and extent of invasion may facilitate pretreatment evaluation and diagnosis.

Poster #B106

Rates of discontinuity between the maxillary sinus natural ostia and the surgical antrostomy in revision sinus surgeries

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Revision endoscopic sinus surgery (ESS) rates are reported to be as high as 19%. In the US, >250,000 ESS are performed annually casting a significant burden on the healthcare system. Unfortunately, even in the post image guidance era, many revisions are plagued by poor technique. One of the best-known markers of this is maxillary discontinuity which occurs when the surgical antrostomy is not connected to the maxillary sinus natural ostium, often leading to recirculation. In order to better understand both the rates of discontinuity, and other features common to revision cases, we sought to analyze our own population of revision ESS at a quaternary care academic hospital. After IRB approval, patients that underwent ESS at our institution between 2019 and 2021 were reviewed, yielding 161 revision cases, approximately 24.7% of all patients undergoing ESS in that time frame. The mean number of previous ESS was 1.62 (SD = 1.23) and the mean time since the most recent ESS was 7.4 years (SD = 8.55). 37.3% of patients presented with maxillary discontinuity, 55.1% of patients presented with a residual uncinate process, 8.8% of patients presented with excised middle turbinates, and 6.3% of patients presented with excised inferior turbinates. Overall, this analysis demonstrates that despite improved visualization and image guidance technology, poor management of both the natural ostium and uncinate process still occurs. It is unclear if poor initial training or subsequent deficiencies in practice lead to increased revision rates. Nonetheless, it is essential to manage both the natural ostium and the uncinate process to prevent revision surgery.

Poster #B107

Referrals for chronic rhinosinusitis in the age of telemedicine

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Background:
More referrals to otolaryngologists for chronic rhinosinusitis (CRS) now arise from virtual encounters given the expansion of telemedicine during the COVID-19 pandemic. The risk of incongruent symptoms and physical or radiologic findings may be more significant since virtual encounters typically lack an examination component. This study aims to evaluate and quantify correlation between primary care (PCP) clinical symptoms and exam findings in evaluation of patients with suspected CRS.

Methods:
A retrospective review of consecutive patients between April 1 and September 30, 2021, referred to specialty care for suspected CRS in an integrated managed healthcare system was performed. PCP documented symptoms (nasal discharge, nasal obstruction, hyposmia, facial pain/pressure) and physical exam (PE) findings (nasal discharge, septal deviation, nasal polyps, inferior turbinate hypertrophy, facial tenderness) were recorded. Statistical analysis was used to compare congruence versus divergence of specialist final diagnosis of CRS based on PCP pre-referral documentation.

Results:
370 patients were included in the study. 236 (63.8%) did not have any documented primary care physical exam findings. Purulent nasal discharge ($p=0.01$), hyposmia ($p<0.01$), and the presence of two or more cardinal symptoms ($p=0.01$) were congruent with specialist confirmation of CRS while facial pain/pressure ($p=0.94$) and nasal obstruction ($p=0.85$) were not. No physical exam findings were associated with nasal endoscopy findings or increased rate of CRS diagnosis congruence on specialist evaluation ($p>0.05$).

Conclusions:
Telemedicine may be a viable option for PCP evaluation of CRS patients given unreliability of PE findings in the primary care setting.

Poster #B108

Rhinolithiasis misdiagnosed as intranasal osteoma: Diagnostic challenges and literature review

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Background:
Rhinolithiasis is a rare clinical presentation and may be a diagnostic challenge. We present the case of a rhinolith initially misdiagnosed as an intranasal osteoma, along with a review of all reported cases of rhinolithiasis.

Methods:
Case report with review of literature.

Results:
A 50-year-old patient presented with chronic left nasal obstruction and cyclic pain with foul discharge. Imaging revealed a high-density lesion filling the inferior left nasal cavity effacing the inferior turbinate. Initially thought to have intranasal osteoma, the patient was scheduled for endoscopic resection. However, pre-operative exam revealed a mobile, calcified concretion of the left nasal cavity, consistent with a large rhinolith. Under topical anesthetic, the rhinolith was morcellated and removed in its entirety. Her scheduled surgery was cancelled, and gross pathology confirmed the diagnosis. While the literature contains only case reports and series on rhinolithiasis, clear patterns arise when assessed collectively. Common symptoms include unilateral, chronic nasal obstruction with purulent/foul nasal discharge. Rhinoliths commonly present between the inferior turbinate and septum. Endoscopy reveals a solid, somewhat mobile mineralized mass of the nasal cavity. On imaging, a rhinolith appears as a mass with radiopaque calcifications.

Conclusion:
Rhinolithiasis can mimic other pathologies such as intranasal osteoma. Literature review reveals that key characteristics such as chronic unilateral nature of symptoms, location of the mass, lesion mobility, and radiographic findings collectively differentiate this diagnosis to provide targeted, definitive treatment.

Poster #B109

Rhinoscleroma in a non-endemic area: Case report and review of the literature

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Background:
Rhinoscleroma is a rare, chronic granulomatous disease of the upper respiratory tract, most commonly of the nasal cavity. The causative organism is typically Klebsiella rhinoscleromatis. It is most prevalent in Central America, Central Africa, and South Asia. Due to its rarity, cases of rhinoscleroma in non-endemic regions are extremely uncommon and may present a diagnostic challenge. Herein, we report a case of rhinoscleroma at our institution and present a review of the current literature.

Case Report:
A 29-year-old woman was referred to our clinic with progressive right-sided nasal obstruction for a few years. Nasal endoscopy revealed a polypoid mass completely filling the right nasal cavity. Imaging showed extension of this mass superiorly to the level of the skull base and extensive bony remodeling. A diagnosis of Erdheim-Chester disease was initially discussed based on histiocytosis found on office biopsy. The patient was taken to the operating room for resection. All margins were negative, with exception at the right nasal valve. The presence of Mikulicz cells on final pathology confirmed a diagnosis of rhinoscleroma. The patient was subsequently treated with long-term ciprofloxacin and is without evidence of disease relapse.

Conclusion:
This is one of the few published case reports in the current literature of rhinoscleroma in a non-endemic area. Rhinoscleroma should remain on the differential for histiocytic lesions and a travel history should be obtained. Literature supports a combination of surgical debridement and antibiotics for treatment, followed by long-term antibiotic therapy due to the risk of recurrence.

Poster #B110

Risk factors to recovery of subjective olfactory dysfunction after endoscopic transsphenoidal hypophysectomy

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Introduction:
This is the first study to characterize recovery of subjective olfactory dysfunction (OD) after transsphenoidal hypophysectomy (TSH) based on OD severity in the initial post-operative period.

Methods:
This is a retrospective cohort study of patients undergoing primary TSH from 2017-2019 at an academic institution. Patients completed pre- and post-op sinonasal outcome test-22 (SNOT-22) questionnaires. Data was collected on demographics, tumor characteristics, surgical approach, reconstruction technique, total SNOT-22, and SNOT-22 smell-specific subdomain scores (smell-SNOT).

Results:
112 patients with adequate pre- and post-op follow-up were included. Post-op visits on average occurred at 10 days (visit 1), 1.5 months (visit 2), 3.5 months (visit 3), and 7.3 months (visit 4). Smell-SNOT scores out of 5 were 0.31 at pre-op; and 2.34, 1.7, 0.8, 0.8 at post-op visits 1-4 respectively. All pre-op to post-op score changes were statistically significant ($p<0.0001$). Of patients with early-onset OD (smell-SNOT ≥ 2 at post-op 1), 64% of had continued smell-SNOT ≥2 at post-op 2, 29% at post-op 3, and 27% at post-op 4. Patients with early-onset OD had statistically significant worse post-op smell-SNOT through post-op 3 ($p<0.05$). Tunnel approach (n=30) was significantly associated with a 1.1-point increase in smell-SNOT score at post-op 1 from pre-op ($p=0.02$). Sex, age, BMI, smoking, pituitary apoplexy, tumor type, completeness of resection, and nasoseptal flap reconstruction were not associated with changes in smell-SNOT scores post-op.

Conclusion:
Patients with smell-SNOT scores ≥2 at the initial post-op visit have persistently worse post-op smell-SNOT scores ≥2 for up to 7.3 months longer than those without early-onset OD.

Poster #B111

Role of corticosteroid in the treatment of acute orbital infections

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Background:
The standard of treatment for acute orbital infections includes systemic antibiotics.

Objective:
To investigate the role of corticosteroids in the treatment for acute orbital infections.

Methods:
Retrospective cohort study of patients presenting to the emergency department with acute orbital infections from 2012 to 2022. Comorbidities, treatment, hospital length of stay (LoS), and readmission were reviewed.

Results:
269 patients were reviewed. Mean age was 28 years (0-94), 50.9% were female. 36.8% had pre-septal cellulitis vs 63.2% had more advanced infections (orbital cellulitis or orbital abscesses), and 4.8% had neurological complications at presentation. 226 (84%) patients received antibiotics alone vs 43 (16%) patients received both antibiotics and corticosteroids. There was no difference in age, diagnosis category, antibiotic treatment, and comorbidities between groups. Median LoS for the steroid group was 4 days (IQR=5-1) vs 3 (IQR=5-2) in the non-steroid group, p=0.853. More patients in the non-steroid group presented with neurological complications (5.8% vs 0%, p=0.107), whereas more patients in the steroid group underwent surgical drainage (44.2% vs 22.6%, p=0.003). There was no difference in the 30-day readmission between groups (p=0.952). Multivariate linear regression of LoS showed association with neurological complications (Coef=19.5, p<0.0001) and surgical drainage (Coef=4.3, p<0.0001), but no association with corticosteroid use (Coef=-1.27, p=0.101). Similar results were obtained in the pediatric and adult populations.

Conclusion:
The use of corticosteroids as adjunct treatment for acute orbital infections does not seem to have an effect on outcome when adjusting for the severity of the infection.

Poster #B112

Seasonal variations and acute rhinosinusitis as risk factors for orbital complications in children

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Background:
Orbital complications in children occur mainly secondary to acute rhinosinusitis. There is discussion as to whether seasonal variations can predispose to these complications mirroring acute rhinosinusitis incidence.

Objective:
To determine the incidence of ARS as a cause of orbital infections and determine whether seasonality is a risk factor.

Methods:
A retrospective review of all children who presented to West Virginia University tertiary children's hospital between 2012-2022 were reviewed. All children with CT evidence of orbital infection were included. Date of occurrence, age, gender, and presence of sinusitis were reviewed. Children whose orbital infection was secondary to tumors, trauma or surgery were excluded.

Results:
118 patients were identified with mean age of 7.3 years and 65 (55.1%) males. 65 (55.6%) children had concomitant sinusitis on CT scan, and the distribution of orbital complications per season showed 37 (31.4%) cases occurred in the winter season, followed by 42 (35.6%) cases in spring, 24 (20.3%) cases in summer, and 15 (12.7%) in fall. Children with orbital infections during winter & spring had sinusitis in 62% of children vs. 42% in other seasons (P=0.03). Preseptal cellulitis was present in 79 (67%) children, 39 (33%) children with orbital cellulitis, with 40 (33.9%) children with abscesses. 77.6% of children were treated with IV antibiotics and 94% with oral antibiotics, with 14 (11.9%) with systemic steroids. Only 18 (15.3%) children required surgery.

Conclusions:
There seems to be a seasonal predisposition for orbital complications mainly in the winter and spring season. Rhinosinusitis was present in 55.6% of children presenting with orbital infections.

Poster #B113

Semi-automated virtual endoscopy of the frontal recess

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Introduction:
Virtual endoscopy (VE) is a computer-based reprocessing of diagnostic imaging to stimulate endoscopy of an anatomic region of interest. VE of the frontal sinus outflow path (FSOP) may assist surgical planning and education.

Method:
VE was performed on 16 normal sinus computed tomography (CT) scans for a total of 32 sides using “”path-to-target”” tool on the TruDi (ver2.3) surgical navigation (Acclarent, Irving, CA). To aid orientation during VE, planning points were placed on the middle turbinate, ethmoid bulla, and skull base. The VE representation of anatomy and FSOP accuracy was manually confirmed by reviewing the corresponding orthogonal CT images and comparing it to the computed pathway.

Results:
Of the 32 sides, the software successfully calculated the FSOP in 22 sides (69%). Of those 22 sides, the calculated FSOP depicted in the VE sequences, accurately represented the FSOP in 19 sides (86%). Among sides with an accurate calculated FSOP, the VE sequences did depict a “”fly-through”” from a starting point in the middle meatus around various frontal recess cells to the end point in the frontal sinus.

Conclusion:
This pilot study demonstrates software-generated VE of the FSOP is indeed feasible but requires reconfirmation by the surgeon for accuracy. Instances in which the software did not achieve its objective may drive further refinement of the protocol. VE of the FSOP can be explored as a tool for preoperative planning and surgical education.

Poster #B114

Semi-quantitative assessment of surgical navigation accuracy during endoscopic sinus surgery in a real-world environment

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Introduction:
Despite reports of submillimetric accuracy during surgical navigations, many surgeons observe accuracy of 3 mm or greater in endoscopic sinus surgery (ESS) cases. In an attempt to understand factors that reduce surgical navigation accuracy, a systemic assessment of accuracy was undertaken.

Methods:
The TruDi surgical navigation system (Acclarent, Irving, CA) was registered using a contour-based registration protocol in accordance with the manufacturer’s instructions. The surgeon estimated target registration error (e-TRE) at up to 8 points during ESS, and recorded each point as a snapshot, which also served a timestamp for the system logs. Then the system logs were used to simulate the localization for quantitative assessment of TRE (q-TRE) at each point.

Results:
A total of 27 localization were available for analysis. Quantitative TRE for all points was 1.18 (range, 0.5 – 3.0 mm). Mean difference between the e-TRE and the q- TRE was 0.2 mm ($p = 0.42$) . Of note, q-TRE at the posterior ethmoid and sphenoid were 0.94 mm and 1.5 mm, respectively.

Conclusion:
Surgical navigation q-TRE of 1.18 mm can be achieved during actual ESS. Surgeon’s estimates of TRE may slightly overestimate actual measured accuracy. This approach to q-TRE may represent a framework for more detailed analysis of registration errors in the operating room.

Poster #B115

Sinonasal angioleiomyoma: A case report and review of the literature

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Introduction:
Angioleiomyoma (ALM) is a benign smooth muscle tumor that is found most commonly in the extremities. Approximately 10% of ALMs occur in the head and neck; however, ALM of the sinonasal tract is exceedingly rare. Treatment of ALM involves complete surgical resection with clear margins, as recurrences have been reported. Herein, we report a case of ALM originating from the right nasal cavity floor.

Methods:
A literature search on sinonasal ALM was conducted using PubMed and Google Scholar. The epidemiology, presentation, diagnosis, treatment, and outcomes of sinonasal ALM were reviewed. The patient's medical record, imaging, and histopathology were reviewed.

Results:
A 75-year-old male presented with a right nasal cavity mass causing symptoms of nasal obstruction and pressure. MRI of the face demonstrated a T1 isointense, T2 hyperintense, contrast-enhancing mass measuring 2.4 x 2.2 x 1.9 cm. The lesion was centered along the anterior right nasal floor, with bony erosion of the maxilla. Internal flow voids suggested hypervascularity of the tumor. The patient underwent endoscopic en bloc resection of the tumor. Intraoperatively, the mass was found to be pedunculated and polypoid. Histopathological analysis revealed ALM with adipocytic differentiation. Immunohistochemistry was positive for SMA and negative for HMB45, MART 1, and MiTF. The patient's postoperative recovery was uncomplicated, and the patient remains free of disease.

Conclusion:
ALM of the nasal cavity is exceedingly rare. Although slow-growing and benign, ALMs may cause local destruction of neighboring tissues. Despite its rarity, ALM should be on the differential for tumors of the sinonasal cavity. Surgical resection with negative margins is recommended.

Poster #B116

Sinonasal inflammation manifestations and the role of autonomic nervous system

Kamlesh Kumar Dubey, MS

Introduction:
Sinonasal inflammatory manifestations like nasal congestion, discharge and sneezing along with other complaints related to sinusitis can be explained with respect to changes in the autonomic nervous system is known since the time of the great Greek physician who served roman emperors. Scientific discussion begins during 1950s by one publication by Hilger titled autonomic dysfunction in otolaryngology. Despite of recent advancement in technology our understanding of exact mechanisms involved in the changes in autonomic nervus system during sinonasal inflammation because of exposure to inflammatory agents like allergen, viral infection and exposure to physical inflammatory agent is limited. Author in the current article is trying to review published articles related to this important topic of present time, which has high level of prevalence and chronicity resistant to common methods of treatment.

Method:
Author performed detailed online data search for publications on PubMed, Medline, Google Search, Scopus platforms between 1950-2022. During search author focus was on sinonasal inflammation, common manifestations, and relation of the patient's complaints to the changes in autonomic nervous system.

Result:
Still, we are far away from clearly knowing the reason behind refractory and chronic rhinitis, sinusitis cases. The association of autonomic nervous system changes and manifestations of rhinosinusitis knowledge may help the treating physician to plan newer form of treatment for the resistant cases.

Conclusion:
The better understanding of the autonomic nervous system disturbance will help in planning better methods of treatment for chronic and resistant sinonasal inflammatory diseases.

Poster #B117
Sinonasal intraosseous hemangioma: A literature review and case presentation
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Hemangiomas are slow growing, benign vascular tumors originating from endothelial cells. They most commonly arise from soft tissues such as the skin or mucosa, but when found within bone, they are referred to as intraosseous hemangiomas (IH). IH account for 0.7-1% of all primary bone tumors, and when found, are typically located in the vertebrae or calvarium. IH of the sinonasal cavity (SIH) are very rare, with only a limited number of case reports in the literature. Herein, we present a new case of SIH and provide a literature review.

A 59-year-old female presented with a mass involving the lateral right nasal wall and anterior wall of the maxillary sinus. Initially, the mass was an incidental finding on imaging and was followed with serial MRIs. Over five years, the mass slowly grew and eventually led to a sensation of fullness in the nasolabial fold and nasal obstruction. The mass was excised with a combined endoscopic and open approach via the Caldwell-Luc approach. No significant bleeding was encountered during surgery.

A review of the existing literature revealed 22 case reports of SIH. Median age at presentation was 42 years old. 13 patients were male while 10 were female. The most common sites of involvement were the middle turbinate (5), maxillary sinus (4), and inferior turbinate (4). The most frequent presenting symptom was nasal obstruction (10), followed by facial deformity (6). 12 cases were treated exclusively endoscopically while 11 cases involved an open or combined approach. In one case, embolization was utilized preoperatively. There was one reported complication consisting of postoperative epistaxis controlled with nasal packing. SIH are an indolent group of tumors that can safely be excised.

Poster #B118
Sinonasal quality of life in primary ciliary dyskinesia and Cystic Fibrosis patients
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Background:
Diseases affecting mucociliary clearance such as primary ciliary dyskinesia (PCD) and cystic fibrosis (CF) result in nearly universal chronic rhinosinusitis (CRS). The morbidity of CRS is frequently measured using standardized sinonasal quality of life (QOL) instruments. Previous studies have demonstrated that patients with CF frequently underreport symptoms; however, it is unknown if this is true for PCD patients. We hypothesized that sinonasal QOL would be similar between PCD and CF and worse than patients with idiopathic CRS.

Methods:
A retrospective chart review was performed to identify patients with CF, PCD, and idiopathic CRS. Clinical information and Rhinosinusitis Disability Index (RSDI) scores were abstracted. Statistical analysis was performed.

Results:
The mean RSDI scores for PCD (n=35), CF (n=72), and idiopathic-CRS patients (n=58) were 30.01 (SD = 23.38), 14.19 (SD = 15.77), and 25.21 (SD = 25.23). PCD scores were greater than CF scores ($p < 0.001$) and there were no statistically significant differences between any other pairing. Of our 72 CF patients, 51 were on elexacaftor/tezacaftor/ivacaftor and 19 of these had pre-treatment and post-treatment RSDI scores. Pre-treatment RSDI averages were greater than post-treatment averages (14.58 vs. 8.46, $p = 0.003$).

Discussion/Conclusion:
Given the similar etiologies of sinus disease in CF and PCD, we postulated these diseases would have similar sinonasal QOL; however, PCD patients had significantly worse sinonasal QOL. As sinonasal QOL is a frequently used endpoint in clinical trials, it is important to understand how underlying causes of sinus disease may affect this metric.

Poster #B119

Sinonasal tumors masquerading as invasive fungal sinusitis (IFS)

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Invasive fungal sinusitis (IFS) in the setting of sinonasal malignancy has been rarely described in literature. Opportunistic fungal invasion has been mistaken for tumor progression in other parts of the body; however, few reports exist in rhinology literature. We describe three cases of sinonasal malignancies mimicking IFS from a single hospital.

Each case presented as outpatient sinonasal complaints. Case 1 was an elderly female with uncontrolled diabetes who presented with sinusitis and facial swelling. Biopsy showed necrotic debris and fungal elements. Eventual necrosis of her nasolabial fold and hard palate progressed despite antifungals and serial debridement. Final pathology from debridement showed NK/T cell lymphoma; 11 weeks after consult. Case 2 is an elderly male with diabetes, ESRD, and immunosuppression after a transplant who presented with what was initially diagnosed as nasal cellulitis for months. Initial biopsy showed necrotic debris and fungi. After multiple hospitalizations, final pathology on repeat debridement resulted NK/T cell lymphoma; eight weeks after consult. Case 3 was a healthy female with months of sinonasal complaints managed by an outside ENT. Initial biopsy showed fungus and necrotic tissue, but given her lack of IFS symptoms, repeat biopsy was performed revealing sinonasal neuroendocrine carcinoma. All cases had initial biopsies suspicious for IFS, which resulted in delay of oncologic care. The fungal elements were likely opportunistic in nature colonizing the necrotic portions of the tumors.

We emphasize the importance of obtaining viable tissue on biopsy specimens as the presence of necrosis with fungal elements may limit the diagnosis and delay the care of an underlying sinonasal malignancy.

Poster #B120

Smell disturbances after endoscopy olfactory groove meningioma resection

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Background:
Olfactory groove meningioma (OGM) is a rare skull base tumor which is often associated with loss of smell following resection. Smell disturbances have a significant impact on quality of life. However, few studies have evaluated smell preservation after endoscopic approaches to these tumors. The only study to use objective measures to determine smell preservation was based on MRI findings. Our aim is to describe a single institution's olfactory outcomes after endoscopic resection of OGM using UPSIT.

Methods:
This is a prospective cohort of patients who have undergone endoscopic endonasal resection of OGMs. A gross total resection was achieved with the preservation of the olfactory cleft tissue and bulb, whenever possible. Olfactory function was assessed preoperative and 12-week postoperative using the University of Pennsylvania Smell Identification Test (UPSIT).

Results:
Nine patients (age 56.5 ± 11.9, 50% female) were included. 55% (5 /9) were unilateral meningiomas and 45% (4/ 9) were bilateral OGMs. All patients with unilateral OGMs were normosmic preoperatively and reported some degree of smell preservation postoperatively. In the unilateral OGM group the median postoperative UPSIT percentile, based on age and gender, was 33.57± 13.77 (normosmia). Seventy-five percent of unilateral OGM maintained their baseline olfactory function postoperatively.

Conclusion:
To our knowledge, this is the largest cohort of OGM with reported data on olfactory preservation outcomes using UPSIT scores. Based on our cohort smell preservation is possible following endoscopic endonasal resection of unilateral OGMs.

Poster #B121

Sociodemographic factors and perceived financial insecurity among acute and chronic rhinosinusitis patients

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Objectives:
Sinusitis is associated with significant financial burden, may result in cost-saving measures and adversely impact patients' quality of care. However, it is unclear whether sociodemographic differences are associated with sinusitis-related financial insecurity. We examined the association between sociodemographic factors and financial insecurity/cost-saving measures in individuals with a history of sinusitis.

Methods:
We utilized the 2016-2018 cross-sectional data (n = 10,814) from the National Health Interview Survey to estimate weighted frequencies and odds of financial insecurity/cost-saving measures among adults with sinusitis, based on sociodemographic factors (race/ethnicity, income, insurance status), and co-morbid allergic conditions (asthma and hay fever data).

Results:
About 1-in-3 patients (38.5%) reported ≥1 cost-saving measures, with ""asking physicians to lower the medication cost"" (27.81%) being the most frequent. After adjusting, odds of cost-saving measures did not differ by race/ethnicity or gender. However, compared to younger patients (18-39 years), older patients (aOR85+ years = 0.23, 95% CI 0.10, 0.55; aOR75-84 years = 0.35, 95% CI 0.20, 0.60; aOR65-74 years = 0.48, 95% CI 0.30, 0.76) had significantly lower odds of financial insecurity/cost-saving measures. There were also significant associations with insurance status (aORuninsured = 3.71 95% CI 2.16, 6.39) and lower income (aOR<45K = 1.75 95% CI 1.17, 2.62). Finally, patients with asthma had 41% greater odds of cost-saving measures (aOR=1.41, 95% CI, 1.14-1.75).

Conclusion:
Among individuals with history of sinusitis, younger age, income, and health insurance status are significantly associated financial insecurity, as is co-morbid asthma.

Poster #B122

Sphenopalatine ganglion interventions for intractable headaches and facial pain: A scoping review

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Background:
The sphenopalatine ganglion (SPG) is the most approachable parasympathetic ganglion and is a part of the autonomic system's regulation of several key underlying mechanisms of intractable headache, such as intracranial vessel dilatation and the release of certain neurotransmitters. We aimed to obtain a comprehensive overview of the existing evidence on SPG interventions in the management of headaches and facial pain.

Method:
A search of PubMed, Embase, Web of Science databases was performed. Studies reporting the use of both blockage and stimulation of SPG for various types of headaches and facial pain were included. Covidence, an online platform for conducting systemic reviews, was used for screening and study extraction.

Results:
After 472 duplicated studies were excluded by Covidence, two independent reviewers screened 1047 studies by title and abstract and 702 studies by full text, resulting 239 studies selected for extraction. In 27 randomized control studies (RCTs), SPG blockage by transnasal medication delivery was the most performed procedure. Six published RCTs of SPG block by transnasal injection were mainly for peri- or post-operative pain management, and 6 RCTs of using SPG stimulator for cluster headache revealed good responses. The majority of included studies were not RCTs, providing mainly level 4 evidence.

Conclusion:
SPG interventions have been shown beneficial in the management of a broad range of craniofacial pain. We anticipate that transnasal SPG injection, as a more precise and less invasive way for medication delivery, is applicable in the management of various intractable headaches and facial pain and deserves further research to validate treatment responses.

Poster #B123

Survey of in-office rhinology and skull base questionnaires

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Introduction:
Validated health surveys provide a standardized tool for assessing patient symptom severity before and after treatment, and furthermore can serve as a dual purpose for research.

Objective:
To identify how rhinologists are utilizing and implementing 18 different in-office questionnaires for their patients.

Methods:
An electronic survey was distributed to rhinologists who practice at academic institutes with an active neuro-rhinology fellowship.

Results:
The survey was sent to 88 recipients. There were 24 respondents. Respondents included practitioners ranging from less than 6 years to >20 years in practice. The majority of practitioners reported using questionnaires in order to track patient outcomes and perform clinical outcomes research. 52.2% of respondents stated they administer surveys on paper and required manual data entry. 85.7% of respondents used the sinonasal outcome test 22 (SNOT-22), 9.5% used the SNOT-20 and 9.5% used the SNOT-16 questionnaire. The RSOM survey was utilized by only 14.3% of respondents, and many reported it was too lengthy. 78% of respondents utilized questionnaires for both rhinology related and skull base related disorders. The remainder of the other 18 questionnaires assessed in this study are not being used by the majority of respondents.

Conclusion:
Patient questionnaires are a useful clinical and research tool. The ideal patient questionnaire is quick to administer, validated, and able to reliably evaluate patient outcomes. The SNOT-22 questionnaire was the most widely used amongst survey respondents.

Poster #B124

Synergistic effect of electronic and conventional cigarette use on sinonasal symptomatology

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Background:
Conventional cigarette (CC) smoking is a well-known risk-factor for chronic rhinosinusitis (CRS); however, the effects of electronic cigarette (EC) smoking on CRS are not well-established. Moreover, given that a large portion of EC users are dual EC/CC users, there is growing interest in characterizing the effect of dual EC/CC use on CRS. This presentation aims to evaluate the potential synergistic effect of EC and CC on the symptomatology of CRS.

Methods:
Respondents (n=10,128) from the CDC's 2013-2014 National Health and Nutrition Examination Survey (NHANES) were sorted by smoking status (Dual (EC/CC) user; EC user; CC user; never smoker) based on subjective smoking survey responses and objective urine cotinine levels. The frequency of reported CRS symptoms within each group were compared using Fisher's Exact Test.

Results:
Significantly more dual EC/CC users experienced "Frequent Nasal Congestion" when compared to controls ($p=0.002$), CC ($p=0.006$), and EC ($p=0.04$) users. Similarly, significantly more dual EC/CC users experienced "Two or More Sinus Infections in Previous 12 months" when compared to CC users ($p=0.001$) and controls ($p=<0.001$). Single EC and CC users demonstrated comparable rates of symptomatology in head-to-head comparison, however "taste problems" were reported more commonly in EC users ($p=0.035$).

Conclusions:
In this large CDC database, dual EC/CC users were more likely to report CRS symptoms when compared to single EC or CC users and controls. Dual EC/CC use may have a synergistic effect on sinonasal inflammation. Given the rising popularity of EC and dual EC/CC use, this observation may portend an increasing incidence of CRS in these populations.

Poster #B125

Taste and smell dysfunction after endoscopic endonasal resection of olfactory groove meningioma: A pilot study

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Introduction:
Endonasal endoscopic (EEA) resection of olfactory groove meningioma (OGM) requires resection of the olfactory mucosa which results in post-operative anosmia and associated reduction in patients' quality of life. The incidence of changes in taste, however, is not well established despite the close neuroanatomical relationship between olfaction and gustation.

Methods:
We administered a validated taste and smell survey after endonasal resection where all the olfactory mucosa was resected endoscopically, and ethmoid skull base was reconstructed with a vascularized flap. Relevant demographic and medical history were collected. Tumor size and laterality were determined from the radiology report of preoperative imaging and the operative note.

Results:
Eight (N=8) OGM patients responded to the survey. 100% of patients reported a change in sense of smell while only 37% reported a change in sense of taste. The median time from surgery was 14 months [4 - 48]. Significant heterogeneity existed when rating severity of symptoms though most patients did not rate their abnormal taste or abnormal smell as "severe to debilitating." Taste coinciding with smell complaints did not consistently associate with laterality or size of the neoplasm. None of the patients had a history of diabetes or preoperative covid infection. One patient had history of chronic rhinitis but had low score in both taste and smell.

Conclusions:
To our knowledge this is the first case series examining taste changes after EEA resection of OGM. The olfactory apparatus was fully resected, so all patients were anomic. Abnormal taste or loss of taste is a result of anosmia, but we found that the quality and severity vary greatly between patients.

Poster #B126

The effect of anticoagulants and antiplatelets on the outcomes of acute epistaxis: A case-control study

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Introduction:
Novel anticoagulants (NOACs) are considered the gold standard treatment for patients requiring anticoagulation therapy.

Aims:
To evaluate the effect of NOACs on the outcomes of acute epistaxis compared with old-generation anticoagulants (AC), antiplatelets (AP), and patients without AC or AP (control).

Patients and Methods:
This is a case-control study. All patients who presented with acute epistaxis between 2014-2022 were included. We excluded children (<18 years), patients after nasal surgeries, with known coagulation disorders or sinonasal tumors. Outcome measures were: minor interventions (i.e., electrical cautery, nasal tamponade), major interventions (i.e., posterior packing, endoscopic ligation, embolization), recurrent events, and hospitalization.

Results:
A total of 790 patients were included. 299 (37.8%) patients received AP, 60 (7.59%) patients received AC, 85 (10.8%) patients were treated with NOAC and 346 (43.3%) received no treatment. Patients with AP or AC treatment demonstrated higher rates of minor interventions compared with the control group (73.2% and 74.5% Vs. 62.1%, respectively. $p<0.01$) as well as higher hospitalization rates (20.1% and 25.5% Vs. 8% respectively, $p<0.01$). A higher rate of major interventions was noticed in patients treated with dual AP (Aspirin + Clopidogrel) compared to control (6.5% Vs. 1.3%. $p<0.05$). No significant differences were found between the NOAC subgroup and the control group in the need for major or minor interventions (0% Vs. 1.3% and 70.6% Vs. 62.1%, respectively, $p>0.05$). Recurrent ER visits due to acute epistaxis were significantly higher in both NOAC and old-generation AC compared to control (22.4% and 24.1% Vs. 11.3%, respectively. $p<0.01$).

Poster #B127

The effects of oxymetazoline on nasal aerodynamics and symptomatology in patients with chronic nasal obstruction

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Background:
Topical Oxymetazoline relieve nasal obstruction via vasoconstriction. However, the range of where it is most effective in shrinking nasal mucosa tissue, and what changes in nasal structures or aerodynamics that improve symptom the most are still unclear.

Methods:
This study aims to quantify the effect of oxymetazoline using Computational Fluid Dynamic (CFD) modeling based on CT scans at baseline and post oxymetazoline among 13 patients with chronic turbinate hypertrophy. To tease out placebo effect, a sham (saline solution) was topically sprayed prior to oxymetazoline treatment, with 30 minutes rest in between. Nasal obstruction symptom evaluation (NOSE) and visual analogue scale (VAS) were collected at baseline, after sham and 30 min after oxymetazoline.

Results:
NOSE score improved significantly from baseline to post-oxymetazoline (61.25±4.49 to 32.92±6.61, $p<0.01$), and post-sham (49.17±7.23) to post-oxymetazoline ($p<0.05$). The effect of oxymetazoline was observed broadly throughout the entire length of the inferior and middle turbinates ($p<0.05$), contrary to the common belief of targeting anteriorly. While flow rate, nasal resistance, heat flux (mucosal cooling), and mucosal wall shear stress (WSS) all changed significantly, only decreasing nasal resistance (spearman $r=0.409$, $p<0.01$), increasing inferior heat flux ($r=-.421$, $p<0.01$) and WSS ($r=-0.280$, $p<0.05$) were strongly correlated with symptom changes.

Conclusion:
Oxymetazoline broadly effect inferior and middle turbinates, increasing both airflow rate and nasal cross-sectional area throughout the entire length of the turbinates. Symptomatic improvement appears to be driven by global nasal resistance and regional mucosal cooling and shear stress.

Poster #B128

The evolution of outcomes in hematologic malignancy patients with acute invasive fungal rhinosinusitis (AIFRS): Systematic review

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Background:
Previous studies have suggested that patients with hematologic malignancy (HM) are at risk for developing acute invasive fungal rhinosinusitis (AIFRS). Most of the literature reports a mortality rate of 20-80% in patients with AIFRS, which includes patients with HM and concomitant AIFRS. There has been a trend toward reducing timing to diagnosis and treatment of AIFRS in the last decade. However, an analysis of whether these changes have led to better outcomes has not been reported. This study aims to determine the changes in incidence, morbidity, and mortality rates of AIFRS patients with concomitant HM over time.

Methods:
A systematic review was conducted from 1977 to 2022 to identify those observational studies (OS) describing AIFRS in HM patients. The analysis was broken down into two periods from 1983 to 2012 versus 2013 to 2022 based on several factors including increase in transplant surgeries, advancements in surgical technique, and new medications.Results
A total of 743 studies were identified and 90 abstracts were evaluated. From these, 65 studies met the inclusion criteria (39 case series, 19 cohorts, 5 case-control studies, and 2 OS systematic reviews). A total of 36,728 participants were analyzed, and 1,162 patients with AIFRS and concomitant HM were included. The incidence rate in the last decade was 6.46 compared to 0.67 in the preceding decade. Mortality and morbidity significantly decreased in the last decade from 66% to 35.4% and 79% to 41.2% ($p<0.0001$), respectively.
Conclusion
This systematic review found an increase in the AIFRS incidence over the previous decade in HM patients. In the current decade, AIFRS-attributable mortality and morbidity have significantly decreased in this population.

Poster #B129

The impact of diabetes and immunosuppression on post operative healing following lothrop

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Introduction:
Diabetes and other immunosuppressed states are known risk factors for poor wound healing. An endoscopic modified Lothrop procedure creates a common frontal sinus cavity and is used to address chronic frontal sinusitis. It creates a large amount of exposed bone typically, which can often lead to impaired healing. Our study looked to assess how postoperative healing in healthy patients undergoing modified Lothrop procedures compares to those with diabetes and other immunosuppressed states.

Methods:
At the University of Miami all rhinology cases are logged in our Redcap database. We utilized this database to assess patients that underwent Lothrop procedures from 2018-2022. 120 patients were identified as candidates for our study. Immunosuppressed to baseline control patients were compared in regard to postoperative changes in endoscopic disease severity scores, changes in SNOT-22 scores, overall number of infections requiring antibiotics, whether revision surgeries were required, and disease phenotype and endotype.

Results:
Preliminary results for our study showed that patients with diabetes and other immunosuppressed states were more likely to have less changes in SNOT-22 scores and more overall number of infections post-operatively. They were also shown to have greater need for additional in-office debridements and less changes in endoscopic disease severity scores following surgery.

Conclusion:
Our preliminary study results suggest that diabetes and other immunosuppressed have a significant impact on healing following modified Lothrop procedures. Given the more extensive nature of these procedures, extra care should be taken to ensure these patients are optimized for surgery.

Poster #B130

The impact of digital inequities on nose and paranasal sinus cancer disparities in the United States

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Background:
In the modern era, the use of technology can substantially impact care access. However, the association of “digital inequities” with nose and paranasal-sinus cancer (NPSC) outcomes remains seldom-studied. We sought to develop the Digital Inequity Index (DII), a novel, comprehensive tool that quantifies digital resource access, in order to assess its impact on NPSC disparities in the US.

Methods:
8,012 NPSC patients from 2008-2017 in SEER were assessed for significant regression trends in long-term follow-up period and treatment receipt across NPSCs with increasing overall digital inequity, as measured by DII. DII was developed based on 17 census-tract level variables derived from the US Census and Federal Communications Commission. Variables were categorized as infrastructure-access (i.e., electronic device ownership, internet provider availability, income-broadband subscription ratio) or sociodemographic (education, income, age, disability), ranked, and then averaged into a composite score.

Results:
With increasing digital inequity, significant decreases in length of long-term follow-up were observed with nasopharyngeal ($p<0.001$) and maxillary sinus carcinomas ($p=0.032$), with decreases as high as 19% (35.2 to 28.5 months, nasopharynx). Electronic device and service availability inequities largely contributed to these decreases while income-broadband ratio contributed less. Significantly decreased odds of receiving indicated surgery and radiation for several NPSCs were also observed.

Conclusions:
Digital inequities contribute to detrimental NPSC-care trends in the US, which presents discourse for modern targets of alleviating disparities while contextualizing national sociodemographics of online access.

Poster #B131

The organizational impact of implementing single-use rhinolaryngoscopes in the UK and Ireland compared with reusable rhinolaryngoscopes

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Background and objective:
Rhinolaryngoscopes (RLSs), used for rhinolaryngoscopy, are classified as a semi-critical medical device. Reprocessing and repairs are not necessary with single-use RLSs since they are disposed after each procedure. This study aimed to investigate the organizational impact (OI) of reusable RLSs compared to single-use RLSs.

Method:
OI was investigated through three questionnaires sent to managers, clinicians, and nurses at five hospitals in the UK and Ireland. The percentage of participants who preferred a particular RLS, or were indifferent, within each category of OI were illustrated. A Chi-square test was conducted to investigate if there was a statistically significant difference between participant preferences.

Results:
A total of 155 participants responded to the survey. The results demonstrated that single-use RLSs had a better OI in nine out of ten categories. Of these seven categories showed statistically significant results (p-value < 0.05) in favour of the single-use device. These categories were: 1) Patient pathway 2) Type and level of involvement of the patient/carer 3) Training requirement and skills 4) Cooperation and communication mode 5) Vigilance and monitoring method 6) Working conditions and safety, and 7) Logistics. Categories that were not statistically different included 1) Patient flow 2) Budget allocation and 3) Work process or health care production

Conclusion:
This study shows the organizational benefit associated with single-use RLSs.

Poster #B132

The relationship between eosinophilic chronic rhinosinusitis and IgG-4 related disease

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We describe a patient with long standing chronic rhinosinusitis (CRS) and immunoglobulin G4-related disease (IgG4-RD) with orbital and sinus involvement. Interestingly, both orbital and sinus contents included IgG4-positive plasma cells. Additionally, the sinus contents were notable for eosinophilic inflammation. This patient had undergone orbital decompression and biopsy with pathology consistent with IgG4-RD one year prior. Years prior to that, he had undergone multiple cervical lymph node biopsies, submandibular gland biopsy and functional endoscopic sinus surgery for CRS without definitive diagnosis. Despite appropriate management with oral and topical steroids as well as monoclonal antibody, his chronic sinus symptoms returned, and he underwent revision functional endoscopic sinus surgery. He has since been doing well and continues to use topical nasal steroid rinses. Our case suggests that sinus content biopsies might be useful for the histological diagnosis of IgG4-RD. We also explore the relationship between IgG4-RD and eosinophilic CRS. Based on both our experience and the current literature, IgG4-RD should be considered in the differential diagnosis with refractory chronic sinusitis.

Poster #B133

Toasted: Burnout in otolaryngology residents and fellows affecting career choices

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Background:
Burnout amongst faculty and residents is prevalent in Otolaryngology, but no study to date has focused on the impact of burnout experienced by Otolaryngology residents and fellows, or observed burnout of faculty, on future career choices.

Methods:
A cross-sectional anonymous survey was distributed via program directors and coordinators to all current US Otolaryngology-Head and Neck surgery residents and fellows in associated programs. The survey was built and distributed using Qulatrics software.

Results:
A total of 104 trainees responded to the survey, with a response rate of 6%. 10 of the 104 respondents were fellows, while the remaining 94 were residents. 37 of 74 respondents (50%) who were residents were planning to or have applied for a fellowship. For 33 of 80 respondents (41.3%) burnout was a factor in whether or not to pursue a fellowship. For 38 of 81 respondents (46.9%) burnout was a factor in whether or not to pursue academic medicine. 50 out of 82 respondents (61%) reported that witnessing burnout among their training programs' faculty members affected their future career decisions. Qualitative explanations included themes such as less desire to pursue academics, seeing a lack of autonomy in faculty, and the burnout noted in head and neck faculty, specifically.

Conclusion:
Personal burnout and observed burnout among faculty impacts career decision-making in a significant percentage of residents and fellows. Efforts to mitigate burnout are crucial to avoid determent of career path choices within otolaryngology.

Poster #B134

Traumatic ear avulsion repaired successfully without microsurgery

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Aim:
Traumatic ear amputation either partial or complete is challenging for ENT surgeons. In absence of excessive tissue loss, direct reattachment of the pinna can yield successful outcomes even in clinical settings without microvascular expertise. It is a valuable opportunity for young ENT surgeons to develop surgical skills and produce cosmetically acceptable results.

Case Report:
We present a case of a patient with ear trauma resulting in oblique full-thickness laceration of the right pinna resulting in a small inferior portion and a larger superior part attached to the helix through a narrow pedicle. Life-threatening injuries were ruled out and the patient was shifted to the operating room. After a thorough assessment, the repair was planned under local anesthesia, and wound suturing was completed within two hours of the presentation. The patient was kept in close outpatient follow-up and had an uneventful recovery over the next week till the sutures were removed. The patient has had no complications over his eight-month follow-up.

Conclusion:
Trauma to the external ear can cause a variety of injuries and is challenging given the complex anatomy and the apparent deformity which can result in significant long-term psychological sequelae. A primary repair or direct reattachment can yield aesthetic results but is possible only in cases in which tissue loss is not excessive and a good pedicle is present. In establishments where microsurgery is not easily available, a meticulous primary repair may be sufficient and cost-effective treatment on a case-to-case basis.

Poster #B135

Treatment outcome of endoscopic sinus surgery for visual acuity deterioration related to sphenoid sinus diseases

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Background:
Visual impairment complicated by isolated sphenoid sinus lesions is rare. This study aims to analyze these patients' clinical characteristics and explore the therapeutic effect and prognostic factors of endonasal endoscopic surgery on visual acuity improvements.

Methods:
Data on patients with visual acuity impairments related to sphenoid sinus in a single referral institute from 2010 to 2022 were retrospectively reviewed. The demographic features include age, gender, time from onset to surgery, initial visual acuity, simultaneous ocular-related manifestations, ophthalmologic examinations, and the characteristics of the sphenoid sinus diseases. LogMAR presented the preoperative and postoperative visual acuity, and the Mann-Whitney U test analyzed the related aspects of prognosis.

Results:
We identified 13 patients with 14 eyes (six male, mean age: 65.2 +/- 13.9 years). There are four inflammatory disease (sphenoiditis) whereas the other nine being mucocele (n = 4), organized hematoma(n=1), aspergilloses (n = 6). After EES, 12 out of 14 (85.7%) lesions had VA improvements, with an overall LogMar improved by 0.65±0.39. A worse initial visual acuity was associated with a poorer prognosis (LogMAR cut-off: 2.1, p = 0.03) and the presence of other ocular disorders, represents a negative predictor (p = 0.038). By contrast, optic nerve neuropathy and time to surgery were not significant prognostic factors.

Conclusion:
Despite delayed presentation or diagnosis of isolated sphenoid sinus disease, visual disturbances in these patients improved well with intensive treatment, despite the interval of onset to surgery. Presentations of other occulomotor symptoms and poor initial visual acuity showed poorer prognosis.

Poster #B136

Trends in electronic cigarette use among patients with sinusitis in the U.S.

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Background:
While early data suggest an association between electronic cigarette (e-cigarette) use and sinonasal pathology, literature describing this relationship remains sparse. We aim to characterize epidemiologic trends in e-cigarette use among patients with a recent diagnosis of sinusitis in the US.

Methods:
The National Health Interview Survey, an annual cross-sectional survey database, was queried from 2014-2018 to collect harmonized demographic data on participants reporting a diagnosis of sinusitis within the past 12 months and e-cigarette use. Multivariable regression analysis was performed.

Results:
Among 19,342 survey participants with a recent diagnosis of sinusitis, 2,902 (15%) reported having used e-cigarettes. Within this cohort, patients below age 50 were more likely to use e-cigarettes compared to those above age 50 (AOR 2.72; 95% CI, 2.50-2.96) . Smokers of conventional cigarettes were more likely to use e-cigarettes compared to non-smokers (AOR 1.14; 95% CI, 1.03-1.25). Compared to patients with sinusitis in the Northeast, those in the South (AOR 1.19; 95% CI, 1.05-1.37) and West (AOR 1.23; 95% CI, 1.06-1.42) were also more likely to use e-cigarettes. Male patients (AOR 1.13; 95% CI 1.04-1.23) and those without a high school diploma (AOR 3.51; 95% CI 2.87-4.30) were significantly more likely to use e-cigarettes.

Conclusions:
Among patients with a recent diagnosis of sinusitis, e-cigarette use is significantly associated with younger age, male sex, conventional smoking, geographic region, and level of education. Otolaryngologists should be aware of trends in e-cigarette use among patients presenting with sinonasal symptoms and consider incorporating targeted counseling into their practice when appropriate.

Poster #B137

Trends in telehealth utilization for acute and chronic rhinosinusitis: A population-based study

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Background:
Successful implementation of telehealth requires careful selection of chief concerns that can be addressed virtually. There are no widely adopted guidelines on appropriate telehealth usage for sinusitis at this time. Thus, patient preference plays a large role. This study aims to explore telehealth demographic trends for new and established diagnoses of chronic (CRS) and acute sinusitis (ARS) in the past 5 years.

Methods:
A total of 54 health care organizations were queried from TriNetX, to gather data from 01/01/2016 to 31/12/2021. Patients were ≥18 years of age and had CPT codes designating telehealth visits. Two queries were made, one for a diagnosis of ARS and one for CRS.

Results:
We identified 1,291,598 patients with a diagnosis of CRS. From those, 42,301 had a telehealth visit, and 16% (6,788) had a new diagnosis of CRS, the rest (84%) were follow-ups. Additionally, we identified 1,745,190 patients with a diagnosis of ARS. From those, 61,939 had a telehealth visit, 16.5% (10,187) had a new diagnosis of ARS, while the rest were for follow-ups. In both the CRS and ARS groups with new diagnoses, the majority of patients were white and female, with African American and Hispanic patients comprising only 8% and 4% respectively.

Conclusions:
This data suggests that telehealth is used primarily for follow-up visits in both ARS and CRS. The population undergoing initial evaluation virtually trends toward being white and female. Additionally, there are marked differences in telehealth visits when examining race and sex. More work is needed in determining factors that influence patients and providers when considering virtual visits and possible guidelines for implementing telehealth.

Poster #B138

Trends of odontogenic sinusitis rates during the COVID-19 pandemic

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Objectives:
Odontogenic sinusitis is an inflammatory condition of the paranasal maxillary sinuses related to dental pathology etiologies. This study aims to quantify trends in odontogenic sinusitis incidence before and after the COVID-19 pandemic onset.

Methods:
A retrospective chart review of patients who underwent maxillary antrostomies at a tertiary referral center was performed. The patients were divided into two cohorts: 'pre-COVID' (March 2018 to February 2020) and 'COVID' (March 2020 to February 2022). Data on demographics, comorbidities, and treatment interventions were collected and analyzed.

Results:
Of the 763 patients who underwent maxillary antrostomy, 395 (52%) were operated on during the COVID period. Odontogenic sinusitis was found as the etiology of 23 (6.3%) and 45 (11.4%) of the pre-COVID and COVID cases, respectively ($p<0.05$). There was a trend of lower mean age of the COVID cases (57 vs. 60, $p=0.5$), with female predilection (62% vs. 43%, $p=0.2$). A trend of higher immunosuppression was found in the pre-COVID patients (13% vs. 0%, $p=0.06$), while no differences were found in Diabetes (22% vs. 18%, $p=0.9$) or obesity (26% vs. 36%, $p=0.6$) between the pre-COVID and COVID patients. Higher rates of sphenoid (35% vs. 9%, $p<0.05$) and a trend of higher frontal involvement (57% vs. 38%, $p=0.2$) were found in the pre-COVID group. However, no difference in ethmoid involvement was found between the groups (74% vs. 67%, $p=0.7$).

Conclusions:
This study found higher rates of odontogenic sinusitis incidence during the COVID-19 pandemic. Future studies should include a larger population and focus on specific etiologies and mechanisms leading to that increase to determine treatment and prevention strategies.

Poster #B139
Unique radiological findings from inverted papillomas of the frontal sinus – A case series
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Objectives:
The report aims to inform the reader of cases of inverted papilloma involving the frontal sinus presenting with a unique radiological finding.

Study design:
Case series.

Methods:
A retrospective medical record analysis was carried out to identify patients with inverted papilloma of the frontal sinus and a serpiginous pattern of neoosteogenesis on CT scan. Clinical records, including initial history, radiologic studies, and operative findings were carefully examined.

Results:
Three patients with inverted papilloma in the frontal sinus presenting with a serpiginous pattern of hyperostosis on radiologic assessment were identified. All patients had these “bony islands” findings on CT as well as complete opacification of bilateral frontal sinuses and frontal recesses. All patients had biopsy-proven inverted papilloma and underwent endoscopic resection.

Conclusions:
A serpiginous pattern of hyperostosis on CT is an unusual radiological finding of inverted papilloma of the frontal sinus. To date, this rare imaging pattern has not been described in the literature. Identification of these bony formations on imaging should raise suspicion for the diagnosis.

Poster #B140
Use of dual biologics in patients with chronic rhinosinusitis with nasal polyposis
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Background:
Several biologic therapies are now available for the treatment of chronic rhinosinusitis with nasal polyposis, including dupilumab, mepolizumab, and omalizumab. There have been no studies of use of multiple biologics for patients with refractory disease on monotherapy.

Methods:
Here we describe the experience of a single, urban, academic, tertiary care medical center with a series of three patients with CRSwNP who received dual biologic treatment, and its effect on symptom control. Data were collected retrospectively via our specialty pharmacy’s registry of patients and included periodic phone follow up regarding outcomes, side effects, and tolerability.

Results:
There was 1 man and 2 women, ranging in age from 43 to 81. Patients had a range of 1-2 surgeries. 1 was aspirin sensitive, all 3 were asthmatic and allergic. The combination of biologic therapies were dupilumab/benralizumab (2), dupilumab/mepolizumab (1). All 3 patients had improvement in nasal symptoms, including congestion, post nasal drip, sinus pressure, and headaches following initiation of dual therapy. There were no complications or side effects reported. There was a marked decline in patient phone calls requesting antibiotics and steroids for symptom flares. Interval nasal endoscopic exam revealed an improvement in polyp burden following addition of second biologic agent.

Conclusions:
In this early experience, addition of a second biologic therapy to patients with refractory CRSwNP appears to be feasible, albeit in a limited number of patients. The apparent success in improving clinical outcomes with such treatment may be due to the beneficial inhibition of T2 responses at different points in the inflammatory cascade.

Poster #B141
Utility of sinonasal outcome test (SNOT-22) in rhinological disorders
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Background:
The SNOT-22 has been used as a tool to measure sinus disease as well as other related conditions. However, there has been recent concern about its effectiveness in differentiating between CRS and other diseases.
Goal: To study the variations in SNOT-22 scores in chronic sinonasal disorders.

Methods:
Cross-sectional analysis of all patients who presented to our sinus & allergy center with complaint of sinus symptoms between August 2020 and August 2022. After full diagnostic evaluation, patients were diagnosed as having chronic rhinosinusitis (CRS) versus chronic rhinitis (CR: allergic rhinitis or non-allergic).

Results:
455 patients were identified with SNOT-22 score as well as a confirmed CRS or CR diagnosis. Mean age was 46.7 years (12-90), 62.6% were female. 150 patients (33%) had CRS and 305 patients (67%) had CR. CRS patients had higher mean SNOT-22 score than CR patients (43.4 vs 37.2, $p=0.0009$) and higher endoscopy scores (3.9 vs 0.6, $p<0.0001$). Allergic rhinitis was more common in CR patients (86.2% vs 64%, $p<0.0001$), whereas asthma was more common in CRS patients (42% vs 31.2%, $p=0.022$). Allergic rhinitis did not have an effect on SNOT-22 scores in either the CRS group (43.1 vs 43.9, $p=0.784$) or the CR group (36.9 vs 38.6, $p=0.598$).

Conclusions:
Our data suggests that SNOT-22 score can differentiate CRS diagnosis from CR for patients presenting with sinonasal complaints. Allergic rhinitis is more common in patients with CR but does not affect the clinical symptoms in either group.

Poster #B142
Utilization of concurrent adenoidectomy with balloon catheter dilation in pediatric chronic rhinosinusitis
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Background:
In children with chronic rhinosinusitis (CRS) who have persistent symptoms despite maximum medical management, adenoidectomy with or without concurrent procedures may be indicated. Balloon catheter dilation (BCD) of the sinuses has been shown to be a safe and potentially effective treatment modality. The objective of our study is to examine the utilization of BCD with adenoidectomy, and the demographic and clinical characteristics of patients undergoing BCD versus adenoidectomy alone.

Methods:
This study used data obtained from the State Ambulatory Surgery Database (SASD) for California, Florida, Maryland, and New York for 2011. Patients who were >= 18 years old with CRS who underwent adenoidectomy with or without concurrent BCD were included. Logistic regression analyses were used to examine demographic and medical factors associated with BCD use.

Results:
A total of 2,386 patients with CRS underwent adenoidectomy. BCD was utilized concurrently in 3.3% of the cases (78/2386). BCD was used more frequently in patients >6 years old compared to those who were younger (8.2% vs 1.8%). In multivariate logistic regression model, factors that were associated significantly with BCD included age >6 years (OR 2.56-2.92, $p= 0.002$-4), history of asthma (OR 2.78, $p=0.014$), chronic adenoiditis (OR 7.21, $p=0.008$), and prior adenoidectomy (OR 2.50, $p=0.035$).

Conclusions:
Among pediatric CRS patients who underwent adenoidectomy, BCD was performed concurrently 3.3% of the time. Patients older than 6 years of age, or with history of asthma, chronic adenoiditis, or previous adenoidectomy were more likely to undergo a concurrent BCD, suggesting that these were likely factors contributing to treatment failure with adenoidectomy alone.

Poster #B143

Variations in research impact and productivity in academic rhinologists

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Background:
Research activity is a defining factor of academic institutions. Objective tools to evaluate research within rhinology are critical to the evaluation and progression of individuals and institutions.

Methods:
The Fellowship and Residency Electronic Interactive Database was utilized to abstract the active US academic rhinologists in 2022. Physician data (sex, location of practice, academic rank) was compiled using institutional websites, and Doximity. H-index was determined using Scopus, and publication information was inputted to iCite to calculate RCR. Mean RCR (m-RCR) measures research impact and weighted RCR (w-RCR) measures research productivity over time. The Mann-Whitney and Kruskall Willis tests (alpha=0.05) were used to determine statistical relationships between physician data and measures of research activity.

Results:
A total of 192 academic rhinologists were evaluated. There were 144 male rhinologists and 48 female rhinologists. Male rhinologists had significantly higher h-index ($p=0.012$) and w-RCR ($p=0.043$) than female rhinologists, but no significant differences were observed in m-RCR. No differences were observed based on region of practice (Northeast, Midwest, West, South). There were significant differences based on academic rank (assistant professor, associate professor, professor). H-index ($p<0.001$), m-RCR ($p<0.001$), and w-RCR ($p<0.001$) was highest for professors and lowest for assistant professors.

Conclusion:
Within academic rhinology, males had greater h-index and w-RCR, indicating differences in research opportunity based on sex. While no differences based on US region were observed, academic rank was closely tied to increased h-index, research impact, and productivity.

Poster #B144

Washing illness away: A systematic review of nasal irrigation to prevent and treat viral upper respiratory tract infections during the COVID-19 pandemic

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Purpose:
Nasal irrigation is a common treatment for symptomatic relief during a viral upper respiratory tract infection. Recently, there has been an interest in identifying if nasal irrigation can prevent, treat, or help reduce the transmission of COVID-19, which is known to replicate in the nasopharynx. It is currently unknown if nasal rinses reduce viral load and transmissibility in patients with upper respiratory tract infections.

Methods:
A systematic review was completed with pre-defined search criteria using keywords related to nasal irrigation and viral illnesses from 1946 through August 2022. Common nasal solutions used for irrigation include saline, corticosteroid, and povidone-iodine. Searches were conducted using MEDLINE, Embase, Web of Science, Cochrane, clinicaltrials.gov and the EU clinical trials register.

Results:
Title and abstract screening was performed for 1266 unique results, 66 studies received full-text review and 12 were included in data extraction. Eight of these 12 studies looked specifically at COVID-19. Five out of 6 studies on nasal saline showed a reduction in symptoms and two out of three studies showed a reduction in viral load. One out of 3 studies found that PVP-I reduced viral load.

Conclusions:
Nasal irrigation is well-tolerated in patients with viral upper respiratory tract infections with minimal risk. The data is limited and there are conflicting results. Saline irrigation may have efficacy in reducing viral load and symptoms with minimal side effects. There is insufficient data about PVP-I and nasal corticosteroids. More studies are needed to understand the role of these interventions on COIVD-19 and other upper respiratory tract infections.

Poster #B145

What questions do patients ask about posterior nasal nerve ablation for chronic rhinitis: An online search analysis

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Objective:
In-office ablation of the posterior nasal nerve (PNN) has emerged as an effective treatment option for chronic rhinitis patients. The purpose of this study is to explore the most common questions searched online regarding this novel therapy, and the quality of available content.

Methods:
The most common search terms related to cryotherapy and radiofrequency neurolysis of the PNN were identified via Google Trends. People Also Ask (PAA) questions were identified and extracted with their associated website using a freely available program (SEO Minion). Questions were categorized according to Rothwell's criteria by two independent reviewers and organized into subtopics. Sources were evaluated for readability using the Flesch-Kincaid Grade Level (FKGL), which estimates the U.S. grade level required to read materials. Quality was assessed with the JAMA benchmark criteria which is reported on a 0-4 scale, 4 meaning all criteria are met.

Results:
A total of 102 unique questions and 97 websites were identified related to in-office PNN ablation. The most common topics were related to facts about rhinitis (19.6%) and rhinitis treatment options (18.6%). Mean JAMA criteria scores were 1.59 (SD=1.41). FKGL scores had a mean of 11.5 (SD=3.03), well above the recommended 6-8th grade level. Sources answering PAA questions were most commonly from private practices (47.6%), followed by academic (30.3%) and commercial (20.0%) sites.

Conclusion:
Patients asking questions related to PNN ablation tend to seek general information about rhinitis and the related treatment options. Physicians should be aware of these areas of interest to better inform patients, and existing online resources have substantial opportunity to improve readability.

SAVE THE DATE 2023

Online Meeting Registration: *https://cvent.me/OYE5k0*

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- Women in Rhinology, Mentorship, Residents & Fellows, and Diversity Programs
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- Fall Film FESStival
- Guest Countries

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