Chronic Rhinosinusitis (CRS)

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Speaker Disclosure

• None

Rhinitis

• Rhinosinusitis
  – 200 million ARS annually; 30-40 million CRS
  – Incidence of CRS ~12%
• Allergic rhinitis
  – Incidence U.S. 8.4% and rising (~30 million)
  – 90% of children & 50-70% of adults with asthma
• Non-allergic Rhinitis
  – 20 million U.S.

Significant Impact on QoL

Rudmik, L. Curr Asthma Allergy Rep. 2017
Akinbami LJ et al. National Center for Health Statistics 2012
Pleis J et al. Summary health stats for US adults 2008
Economic Burden of Chronic Rhinosinusitis

- Direct annual costs for CRS: $10-$13B
  - 4.8% of overall healthcare expenses in US
  - Office & ED visits
  - Prescriptions
  - Sinus Surgery (250,000 – 500,000 ESS/yr in U.S.)

Health Utility Value

Economic Burden of Chronic Rhinosinusitis

- Indirect annual costs (productivity loss) from CRS: $12-20B
  - Absenteeism
  - Presenteeism
  - Lost Leisure Time


2. Figure adapted from: Rudmik L, Smith TL, Schlosser RJ, et al. Productivity costs in patients with refractory chronic rhinosinusitis. Laryngoscope. 2014

\[ \text{Health Utility Score by Health State} \]

\[ \text{Perfect healthy} = 1 \]

\[ \text{US Norms} = 0.71 \]

\[ \text{COPD (mod)} = 0.73 \]

\[ \text{Chronic Rhinosinusitis} = 0.67 \]

\[ \text{Asthma (mod)} = 0.65 \]

\[ \text{ESRD with HD} = 0.64 \]

\[ \text{HIV} = 0.64 \]

\[ \text{Death} = 0 \]

\[ \text{MCID} = 0.03 \]
Acute Rhinosinusitis: Time Course

AVRS (Acute Viral Rhinosinusitis)
ABRS (Acute Bacterial Rhinosinusitis)

DIAGNOSIS of CRS

SUBJECTIVE: ≥ 2 Symptoms
- Nasal Obstruction/Concentration
- Nasal Discharge (anterior/posterior)
- Facial Pain/Pressure
- Loss of Smell

In Pediatric CRS: Cough instead of Loss of Smell

OBJECTIVE (and/or):
- CT
- Endoscopy

Absence of Polyps: CRSwNP
Presence of Polyps: CRSsNP
Chronic Rhinosinusitis in Children

- Cough in ~50%
- Adenoids
  - Reservoir for bacteria
  - Correlation of adenoid and lateral nasal wall cultures in 89%
- Consider Immunodeficiency (IgG, IgA)
- Polyps: Think Cystic Fibrosis

Physical Exam: Polyp vs Turbinate Hypertrophy

Endoscopic Exam: Chronic Rhinosinusitis
CT Imaging: Timing

>80% of patients with minor URIs will have abnormal findings on CT.

*Must correlate patient’s history and symptoms.*
24 year old female referred for “sinus issues”. Admission 2 months ago with bad asthma flare.

... 2 months later

Other systemic dz:
• GPA, EGPA
• Sarcoidosis

Adapted from Cho et al., JAO Pract 2021
CRS Endotypes

<table>
<thead>
<tr>
<th>Type</th>
<th>T-Cell</th>
<th>Biomarker</th>
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<tbody>
<tr>
<td>1</td>
<td>Th 1</td>
<td>IF-gamma, TNF-alpha</td>
</tr>
<tr>
<td>2</td>
<td>Th 2</td>
<td>IL-4, IL-5, IL-13, ECP, P-gp</td>
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<tr>
<td>3</td>
<td>Th 17</td>
<td>IL-17A</td>
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</tbody>
</table>

Adapted from: Stevens WW, et al. Associations Between Inflammatory Endotypes and Clinical Presentations in CRS. JACI Pract 2019
Inflammatory subtypes

Inflammatory endotypes of CRSwNPs and their geographic predominance:

- Type 2 inflammation (IL-4, IL-5, IL-13) most prominent in US, Australia and Europe
- Type 1 (IFNγ, IL-12), Type 3 (IL-17, IL-22), or untypeable inflammation more common in Asia

Evidence-Based Treatment of CRS

- Saline
- Steroids
  - Topical
  - Systemic
- Antibiotics
  - PO, Topical, IV
  - Short/Long course
  - Macrolide/Non-Macrolide
- Biologics
- Surgery

CRS Treatment: Saline

**Recommendation** for CRSsNP (Grade B Evidence)
- High volume >60mL
- Room temp ok
- Hypertonic more effective than isotonic with congestion, but may cause increased irritation
- Benefits:
  - Improve symptoms
  - Improve QoL scores >8 weeks

**Option** for CRSsNP (Grade B Evidence)
Nebulized Saline 5 mL
CRS Treatment: Topical Steroids

- **CRSwNP** (Grade A Evidence)
  - Recommendation for before or after ESS
  - Improve: Symptoms, QoL, Polyps Size, Polyp Recurrence

- **CRSsNP** (Grade A Evidence)
  - Option (especially if symptoms of rhinitis)
  - Improve: Symptoms, Endoscopy Scores

CRS Treatment: Oral Steroids

- **CRSwNP** (Grade A Evidence)
  - Strong Recommendation for **short-term use** (7-14 days)
  - Improve: Significant subjective and objective improvement

- **CRSsNP** (Grade C Evidence)
  - Option
  - Improve: Symptoms, Imaging Appearance, Need for surgery in some

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**Sinusitis=11%**

**Resp Dz=21.6%**

**Total=32.6%**
Rhinosinusitis Antibiotic Prescribing Patterns

- > 80% of Acute Rhinosinusitis
- > 50% of Chronic Rhinosinusitis

2006-2010
- Average of 9.5 million CRS visits per year = 4.75 million Rx
- Number of antibiotics FDA-approved for treatment of CRS: **ZERO**

Guidelines: Oral Antibiotics in CRSSNP

- Combine AECRS and CRS

Recommendation for Macrolide >3 weeks: **Option**

Guidelines: Oral Antibiotics in CRSwNP

- Combine AECRS and CRS

Recommendation Non-Macrolide <3 weeks: **AGAINST**
Recommendation Macrolides > 3 weeks (esp. low IgE): **OPTION**
### Guidelines: IV Antibiotics in CRSw/sNP

- **Recommendation **_AGAINST_ for Uncomplicated CRS
  - High rate (~35%) of Adverse Events
  - High rate of relapse within 3 months

  **Evidence Grade: C**

<table>
<thead>
<tr>
<th>Study</th>
<th>IV</th>
<th>Oral</th>
<th>Direct</th>
<th>Topical</th>
<th>CRSw/sNP</th>
<th>Adverse Events</th>
<th>Relapse</th>
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**Recommendation** _POOR_ Extrasinus Complications

### Guidelines: Topical Antibiotics in CRSw/sNP

- **Advantage:**
  - Direct Delivery of High Concentration Antibiotic to Mucosa
- **Subjects:** Mostly Recalcitrant Post-Surgical Patients
- **Grade B**
- **Recommend** _AGAINST_ routine use, however useful in unusual cases
  - CF
  - Recalcitrant CRS following ESS

### Surgical Treatment: When?

- Failed **appropriate** medical therapy
  - Intranasal Steroids (≥4 weeks), Saline Rinses, +/- Abx & PO Steroids
- 4 or more sinus infections per year
  - Need for culture-directed therapy
- Anatomic obstruction
  - Septal deviation, turbinate hypertrophy, nasal valve collapse
Special Considerations: Unilateral Disease

Mucus Retention Cyst

- Incidence: ~25%
- Obstruction of the ducts of mucosal serous/mucinous glands.
- Infrequently require surgical management

*If non-obstructing and asymptomatic, no need for surgical referral.*
Mucus Retention Cyst?

Odontogenic Sinus Disease

- Unilateral maxillary disease.
  - Up to 20% of maxillary sinusitis can be odontogenic in origin.
- Periapical lucency with possible bony dehiscence

32 year old female with no sinus complaints.

1. Opacified Maxillary
2. Atelectatic uncinate & maxillary sinus
3. Enophthalmus
Silent Sinus Syndrome: Enophthalmos

72 yo female with CRS and bad smell in nose.

Fungal Ball (Mycetoma)
Fungus

- Fungal Ball (Mycetoma)
- AFRS (Allergic Fungal Rhinosinusitis) – Subset of CRSwNP
- IFRS (Invasive Fungal Rhinosinusitis)

<table>
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<th>Disease Type</th>
<th>Immune Status</th>
<th>Fungal Atopy</th>
<th>Inflammation Type</th>
<th>Anti-fungal Tx</th>
<th>Immunotherapy</th>
<th>Surgery</th>
<th>Life-Threatening?</th>
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Key Summary Points

- Chronic Rhinosinusitis (CRS) represents a broad spectrum of diseases with variable endotypes.
- Better understanding of endotypes, disease markers and therapeutic targets will drive future personalized medicine approaches to CRS.
- ESS is indicated when appropriate medical therapy fails to control disease.
- Unilateral sinus disease is less likely to be inflammatory-mediated and more often requires surgery.
- CT is the radiology study of choice in CRS, and should not be obtained during an acute exacerbation unless there is concern for a complication.
Thank you

Questions?