**SINUSITIS**

**RHINITIS OR SINUSITIS: HOW CAN YOU TELL?**

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**What is Rhinitis?**

- Inflammation of the nasal membranes from ANY cause
- Hard to differentiate from sinusitis
- Now considered part of the spectrum of rhinosinusitis

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**Rhinosinusitis Host Factors**

- Allergy
- Septal deformity: Inhibits drainage of sinuses into the middle meatus
- Molar tooth abscess:
  - Leads to unilateral maxillary sinusitis
- Immunocompromised: leukemia, chemotherapy, diabetes, AIDS
- Aspirin sensitivity
- Intranasal foreign body
- Polyposis, nasal tumors

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**Definition of Allergic Rhinitis**

IgE-mediated reaction to airborne allergens
- Results in inflammation of the nasal mucosa
Characterized by:
- Nasal congestion
- Episodic rhinorrhea
- Paroxysmal sneezing
- Nasal itching
- Itchy, watery eyes

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**Impact of Allergic Rhinitis**

- Affects over 36 million Americans
- Fifth most common illness
- Most prevalent chronic condition in patients under 18 years of age
- Both physical and mental health status are adversely affected

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**Impact of Allergic Rhinitis**

Yearly Impact
- 10 million office visits
- 28 million days of restricted activity
- 2 million days of missed school
- 10 million missed work days
- 10,000 children absent from school on a typical school day
Economic Effects of Allergic Rhinitis

What is the Significance of Rhinosinusitis?
- Acute maxillary sinusitis
  - 31 million cases per year
  - 2 million patient visits per year
  - 87% go to primary care physicians
- Chronic sinusitis
  - 35 million cases per year
  - Most common chronic ailment in US
  - 13.4 cases per 1,000 Americans
  - 11.9 million patient visits per year
  - 645,000 ER visits last year
  - 6% of 1st care MD visits annually

Allergic Rhinitis Associated Conditions
- Asthma (38% have AR)
- Chronic sinusitis (25% have AR)
- Allergic conjunctivitis
- Otitis media w/ effusion (35% have AR)
- Nasal polyps (29% have AR)
- Atopic dermatitis

Etiology of Rhinitis
- Viral
- Allergy
- Non-Allergic (Vasomotor)
  - Medication related
  - Hormone related
  - Disuse
  - Abuse

Rhinitis Medicamentosum
- Chronic nose spray use
  - 5 or more days
- Use intranasal steroids
- May require systemic steroids

Vasomotor Rhinitis
- Afebrile, clear nasal drainage
- Allergy tests negative
- IgE negative
- Family history negative
### Diagnosis of AR: Family History

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Family History</td>
<td>57/334, 17.2%</td>
</tr>
<tr>
<td>One Parent with AR</td>
<td>31/120, 25.8%</td>
</tr>
<tr>
<td>Two Parents with AR</td>
<td>11/21, 52.4%</td>
</tr>
</tbody>
</table>


### Allergic Rhinitis

- Nasal obstruction
- Clear nasal drainage
- Itchy, watery eyes
- Facial pressure & pain
- Headaches
- Sneezing
- Asthma

### Seasonal Allergy

- **Seasonal causality**
  - Pollen
  - Grasses
  - Weeds
  - Trees

- **Ideal for Medical Therapy**
  - Antihistamines/Decongestants
  - Nasal Steroid Spray

### Distinguishing Allergic Rhinitis from the Common Cold

<table>
<thead>
<tr>
<th>Symptom/Characteristic</th>
<th>Allergic Rhinitis</th>
<th>Common Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Rhinorrhea or congestion, sneezing, watery and itchy eyes</td>
<td>Same as allergic rhinitis, can also include fever, aches, and pains</td>
</tr>
<tr>
<td>Warning time</td>
<td>Symptoms begin almost immediately after exposure</td>
<td>Symptoms most severe after a few days</td>
</tr>
<tr>
<td>Duration</td>
<td>Symptoms last as long as exposure continues and until the reaction triggered by the allergen ends</td>
<td>Symptoms resolve within several days to a week</td>
</tr>
</tbody>
</table>

### Seasonal Symptoms

- **Ideal for Medical Therapy**
  - Antihistamines/Decongestants
  - Nasal Steroid Spray

### Perennial Allergy: Avoidance of Allergens

- Dust
  - Bedding
  - Carpets
  - Stuffed animals
  - Ductwork
- Pet dander
- Cockroach
- Mold
  - Houseplants
  - Damp basements & crawlspaces
  - Windowsills
- Pollens, trees, weeds

Perennial Allergy Control
- Animals outside
- No smoking in the house
- Molds are found in:
  - House plants
  - Basements
  - Showers
  - Humidifiers (also increases house mites)
- Minimize use of rugs

Allergy Evaluation & Therapy
- Avoidance of allergens (Testing?)
  - Environmental
  - Food
- Symptom relief
  (Congestion, PND, Systemic Sx)
  - Nasal steroid sprays
  - Antihistamines
  - Mast cell stabilizers
  - Leukotriene inhibitors
  - Immunotherapy

Allergic Rhinitis Pharmacotherapy
OTC Treatments
- Intranasal cromolyn sodium
- Intranasal decongestants
- Intranasal saline
- Oral antihistamines
- Oral decongestants

Rx Treatments
- Antihistamines
  - Intranasal
  - Systemic
- Decongestants
- Intranasal ipratropium bromide
- Leukotriene inhibitors

Antihistamines for Allergic Rhinitis
- Most common OTC medication
- Relieve sneezing, itching, rhinorrhea, & ocular symptoms
- Oral & intranasal formulations available
- Generally not effective for relieving congestion

Allergy Pharmacotherapy
Antihistamines
- First generation
  - OTC
  - CNS side effects
  - TID, QID
- Second generation
  - Selective action
  - Less side effects
  - QD dosing

Intranasal Corticosteroids
Mechanism of Action in Allergic Rhinitis
- Precise mechanism of action not known
- Intranasal therapy
  - Administration directly to inflamed tissues
  - Adverse effects limited to local administration
- Reduce inflammatory cell infiltration of nasal mucosa
- Suppress eosinophil, lymphocyte, mast cell & basophil function
- Reduce vascular permeability
- Reduce edema of nasal mucosa
- Effective against early and late phase reactions
**Allergy Pharmacotherapy**

**Intranasal Corticosteroids**
- Indicated for ages 3 & up
- Low bioavailability with newer meds
- High safety profile
- No HPA suppression at recommended doses
- No rebound effects
- Growth suppression?
- Cataract formation?
- Teach correct usage!

**Cromolyn Sodium**
- OTC, dosed QID
- Only for allergic rhinitis
- Reduces degranulation of mast cells
- Best results when started before pollen exposure and continued through allergy season

**Decongestants**
- Drugs
  - Pseudophedrine
  - Phenylpropanolamine – No longer avail.
- Short term benefits
- Tolerance
- Trouble sleeping

**Antihistamine/Decongestant Combos**
- Helps in reducing the congestion of allergic rhinitis
- One pill for both symptoms
- Easier to titrate BID dosing
- Can take the “D” prep in the AM & the plain capsule at night

**Surgical Management of Allergic Rhinitis**
- Steroid injection of turbinate
- Turbinate surgery
- Septoplasty
Allergy & Rhinosinusitis

- Increased sinus mucous
- Decreased mucociliary function
- Nasal mucous membrane edema with inflammation
- Obstruction of sinus ostia
- Early allergy treatment may prevent chronic rhinosinusitis

What Do Paranasal Sinuses Do?

- Provide secretions & lubrication for the nasal membranes
- Lighten the skull
- Provide resonance to the voice
- Keep Otolaryngologists busy

Paranasal Sinuses
Normal Physiology

- Pseudostratified, ciliated, columnar epithelium
- Goblet cells
- Biphasic mucous blanket
  - Upper layer thick and viscid
  - Deep layer contacts cilia
- Mucous blanket moves in spiral pattern to and through the ostium
- Complete clearing every 10 minutes

Sinus Development

- Maxillary: Birth
- Ethmoid: Birth
- Frontal: 4-7 years of age
- Sphenoid: 7-10 years of age

Ostiomeatal Complex

- Most common site of sinus blockage
  (Hajek, Herrman, Messerklinger, Proctor, Nauman)
- Poorly visualized
- Not well seen radiographically
- Symptoms mild and overshadowed
- Minor swelling causes obstruction
Rhinosinusitis Classifications

- **Acute**: ≤ 4 weeks
- **Subacute**: 4-12 weeks
- **Recurrent Acute**: > 4 episodes/yr, each lasting 7-10 days, resolution of symptoms between episodes
- **Chronic**: ≥ 12 weeks

Ostiomeatal Complex Disease

- Anatomic Abnormalities
- Particulate Deposition
- Allergy
- Viral Infection
- Obstruction in Narrow Channels of Ostiomeatal Complex
- Macular Abnormalities
- Maxillary or Frontal Sinus Disease
- Persistent Localized Inflammation

Factors for Diagnosis of Rhinosinusitis

**Major Factors**
- Facial pain/presence
- Facial congestion/fullness
- Nasal obstruction/blockage
- Nasal discharge/purulence/dischored postnasal drainage
- Hyposmia/anosmia
- Purulence in nasal cavity on exam

**Minor Factors**
- Headache
- Fever (nonacute)
- Halitosis
- Fatigue
- Dental pain
- Ear pain/presence/fullness

Acute Rhinosinusitis: Diagnosis
- Symptoms ≤ 4 weeks duration
- ≥ 2 major factors, or
  - 1 major factor & 2 minor factors, or nasal purulence on examination
- In differential if:
  - 1 major factor or ≥ 2 minor factors or
  - Sx worsen after 5 days or
  - Sx persist > 10 days or
  - Sx out of proportion to typical viral infection
- Fever +/- or facial pain not enough!

Recurrent Acute Rhinosinusitis: Diagnosis
- > 4 episodes/yr.
- Each lasting ≥ 7-10 days
- Resolution of symptoms between episodes
- History same as acute
- Evaluate for predisposing factors
  - Allergy, septal deformity, polyps, etc.

Chronic Rhinosinusitis: Diagnosis
- Symptoms ≥ 12 weeks duration
- ≥ 2 major factors, or
  - 1 major factor & 2 minor factors, or nasal purulence on examination
- In differential if:
  - 1 major factor or ≥ 2 minor factors
  - Facial pain not enough!
  - Previous history of acute sinusitis

Acute Rhinosinusitis: Symptoms & Signs
- Moderate to severe facial pain/pressure
- Fever
- Purulent nasal discharge
- Tearing
- Facial tenderness

Rhinosinusitis: Diagnosis
- Anterior rhinoscopy
- Nasal endoscopy
- Transillumination
- Palpation
- Imaging
Imaging in Acute Sinusitis

- Not necessary for diagnosis
- Plain films:
  - Caldwell view
  - Waters view
  - Lateral skull view
- A/F level or complete opacification
- CT can reveal similar findings

Indications for Sinus Aspiration / Irrigation

- Clinically unresponsive to adequate conventional therapy
- An immunocompromised patient
- Symptoms of severe facial pain
- Impending or presenting complications (intraorbital or intracranial)
- Surface cultures of nose & nasopharynx do not usually correlate with sinus aspirates; directed cultures may be helpful
Bacteriology of Acute Rhinosinusitis

<table>
<thead>
<tr>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. pneumoniae</td>
<td>S. pneumoniae</td>
</tr>
<tr>
<td>H. influenzae</td>
<td>H. influenzae</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>M. catarrhalis</td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Anaerobes</td>
<td></td>
</tr>
<tr>
<td>S. pyogenes</td>
<td></td>
</tr>
</tbody>
</table>

Treatment of: Acute (Uncomplicated) Rhinosinusitis

- Antibiotics for 7-10 days
- Topical decongestants
- Oral decongestants
- Mucolytic agents
- Humidification & hydration
- Pain medication
- Avoid drying agents if possible

Management

Pearls and Principles

- Most episodes of rhinosinusitis can be successfully treated by oral antibiotics
- Beware of cancer, dental infection, and foreign bodies when unilateral sinusitis is encountered
- Recurrent rhinosinusitis in children may indicate the presence of cystic fibrosis
- Immunocompromised, including AIDS, patients: Beware of mucormycosis
- Ophthalmic veins or other veins in the ethmoid area are valveless and afford extension of infection to the cavernous sinus
- CT scans are helpful in resolving diagnostic dilemmas

Treatment of: Recurrent Acute Rhinosinusitis

- Endoscopic nasal exam
- Radiologic evaluation
- Treat underlying precipitating factors
- Drainage procedure w/ cultures
- Targeted antibiotic and surgical therapy
Chronic Rhinosinusitis

- Symptoms
- Physical Examination
- CT Evaluation
- Management
  - Medical
  - Surgical

Factors for Diagnosis of Rhinosinusitis

**Major Factors**
- Facial pain/pressure
- Facial congestion/fullness
- Nasal obstruction/blockage
- Nasal discharge/purulence/discolored postnasal drainage
- Hyposmia/anosmia
- Purulence in nasal cavity on exam

**Minor Factors**
- Headache
- Fever (nonacute)
- Halitosis
- Fatigue
- Dental pain
- Cough
- Ear pain/pressure/fullness

Chronic Rhinosinusitis: Diagnosis

- Symptoms ≥ 12 weeks duration
- ≥ 2 major factors, or
  1 major factor & 2 minor factors, or
  nasal purulence on examination
- In differential if:
  1 major factor or ≥ 2 minor factors
- Facial pain not enough!
- Previous history of acute sinusitis

Chronic Rhinosinusitis: Signs and Symptoms

- Postnasal drainage
- Nasal congestion
- Facial discomfort
- Frontal headaches
- Previous history of acute sinusitis
- Sometimes hard to differentiate from chronic rhinitis

Bacteriology of Chronic Rhinosinusitis

- Aerobes
  - Staph 51%, S. aureus 20%
  - Streptococcus viridans 4%
- Anaerobe isolates in >8%
  - Bacteroides sp.
  - Anaerobic gram positive cocci
  - Veillonella
  - Fusobacterium
Imaging in Chronic Sinus Disease

- Plain radiographs poor for visualizing ostiomeatal complex
- MRI has high false positive rate and is expensive
- CT is best tool for confirming diagnosis

Sinus CT

- 2-3 mm cuts
- Coronal projection
- Bone windows, no contrast
- “Cone down” on sinuses
- Mini-sinus CT excellent screening tool
  - 4 axial cuts through sinuses
  - Cost is same as plain radiographs
SINUSITIS

Medical Treatment of Chronic Rhinosinusitis

- Antibiotics for 3-6 weeks
  Geared towards anaerobes, Staph
  (Consider IV home therapy in selected cases)
- Allergy therapy when appropriate
- Nasal steroid spray
- Oral steroids in chronic hyperplastic sinusitis
- F/U in 6-8 weeks with CT scan

Follow Up Algorithm

- Patient better, CT sinuses normal
- Patient better, CT abnormal
- Patient unimproved, CT normal
- Patient unimproved, CT abnormal
Correct underlying etiology
- Septal deformity
- Turbinate hypertrophy
- Nasal polyps
- Restore drainage and ventilation using functional endoscopic sinus surgery (FESS) when medical therapy fails

All frontal or sphenoidal sinusitis
All immunocompromised patients
All patients with complications of sinus disease
Acute recurrent sinusitis
Chronic sinusitis unresponsive to medical management