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# SINUSITIS

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## **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*

## **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

## **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

## **Impact of Allergic Rhinitis**

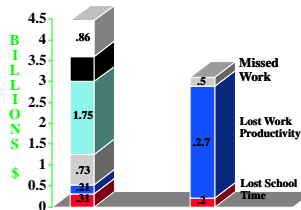
- Affects over 36 million Americans
- Fifth most common illness
- Most prevalent chronic condition in patients under 18 years of age
- Both physical and mental health status are adversely affected

## **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

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## 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
    - 134.4 cases per 1,000 Americans
  - ⊕ 11.9 million patient visits per year
  - ⊕ 645,000 ER visits last year
  - ⊕ 6% of 1° 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

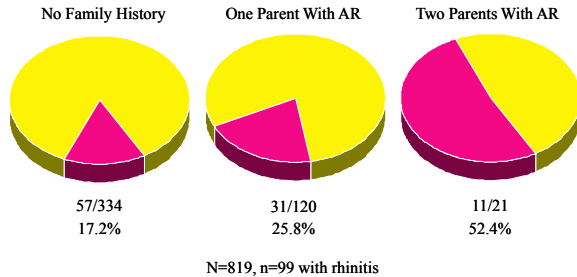
- ↗ Chronic nose spray use
  - 5 or more days
- ↗ Use intranasal steroids
- ↗ May require systemic steroids

## Vasomotor Rhinitis

- ⊗ Afebrile, clear nasal drainage
- ⊗ Allergy tests negative
- ⊗ IgE negative
- ⊗ Family history negative

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## Diagnosis of AR: Family History



Gerrard JW, et al. *Ann Allergy*. 1976;36:10-15.

## Allergic Rhinitis Symptoms

- ◊ 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

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

American Academy of Allergy, Asthma, and Clinical Immunology. Fast facts: allergies. Available at: <http://www.aaaai.org/public/fastfacts/allergies.htm>. Accessed November 6, 2001.

## 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
- ◊ Molds
  - ◊ Houseplants
  - ◊ Damp basements & crawlspaces
  - ◊ Windowsills
- ◊ Pollens, trees, weeds

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## 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
  - ⊗ Systemic
- ⊗ 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

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## 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!

## Allergy Pharmacotherapy 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

## Allergy Pharmacotherapy Decongestants

- Drugs
  - Pseudoephedrine
  - Phenylpropanolamine – No longer avail.
- Short term benefits
- Tolerance
- Trouble sleeping

## Allergy Pharmacotherapy 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



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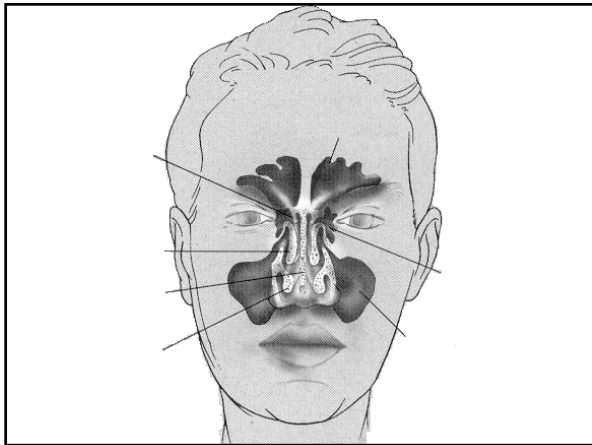
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## Allergy & Rhinosinusitis

- 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

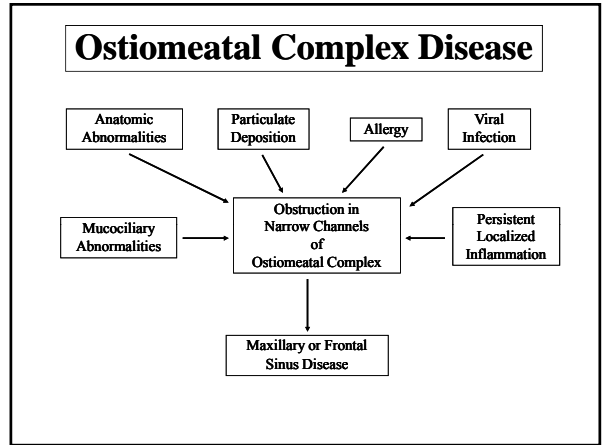
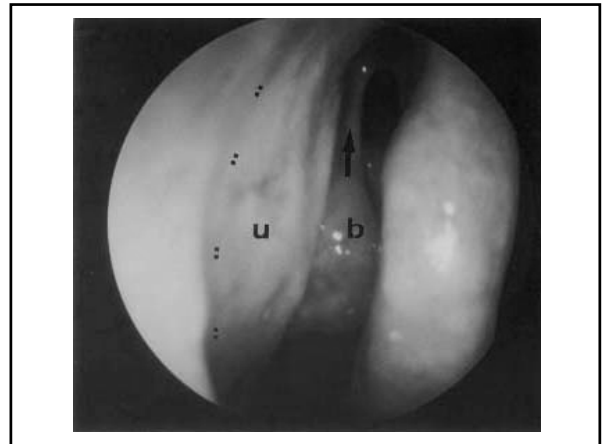
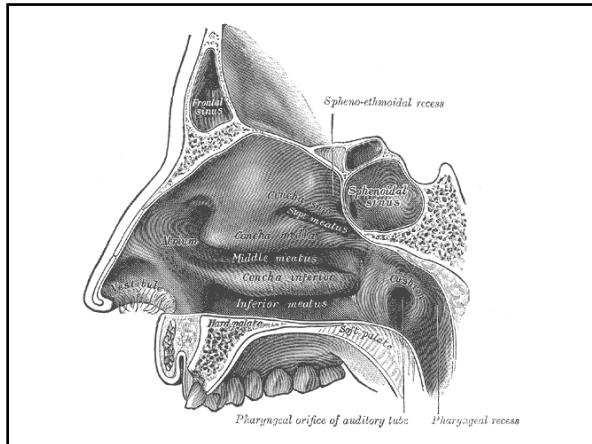
## Sinus Development

- 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

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**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

**Factors for Diagnosis of Rhinosinusitis**

<u>Major Factors</u>	<u>Minor Factors</u>
◊ Facial pain/pressure	◊ Headache
◊ Facial congestion/fullness	◊ Fever (nonacute)
◊ Nasal obstruction/blockage	◊ Halitosis
◊ Nasal discharge/purulence / discolored postnasal drainage	◊ Fatigue
◊ Hyposmia/anosmia	◊ Dental pain
◊ Purulence in nasal cavity on exam	◊ Cough
	◊ Ear pain/pressure/fullness

Lanza DC., Kennedy DW et al. Adult rhinosinusitis defined. Report of the Rhinosinusitis Task Force Committee Meeting. Otolaryngol Head Neck Surg 1997; 117: S4-S5.

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# SINUSITIS

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## **Acute Rhinosinusitis: Diagnosis**

- ◊ Symptoms  $\leq$  4 weeks duration
- ◊  $\geq$  2 major factors, or  
1 major factor & 2 minor factors, or  
nasal purulence on examination
- ◊ In differential if:
  - 1 major factor or  $\geq$  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  $\geq$  7-10 days
- ◊ Resolution of symptoms between episodes
- ◊ History same as acute
- ◊ Evaluate for predisposing factors  
Allergy, septal deformity, polyps, etc.

## **Chronic Rhinosinusitis: Diagnosis**

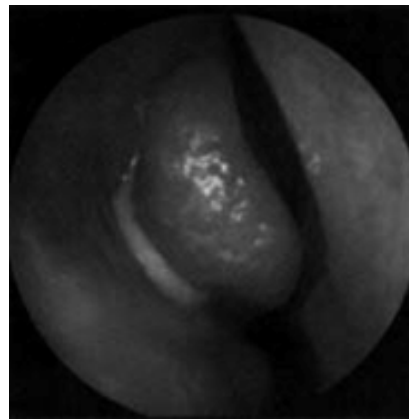
- ◊ Symptoms  $\geq$  12 weeks duration
- ◊  $\geq$  2 major factors, or  
1 major factor & 2 minor factors, or  
nasal purulence on examination
- ◊ In differential if:
  - 1 major factor or  $\geq$  2 minor factors
- ◊ Facial pain not enough!
- ◊ Previous history of acute sinusitis

## **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





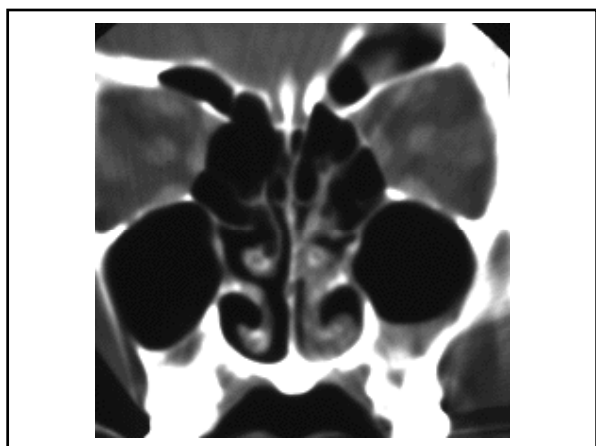
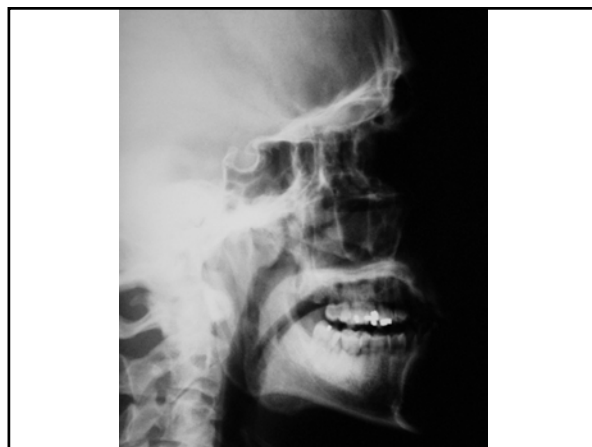
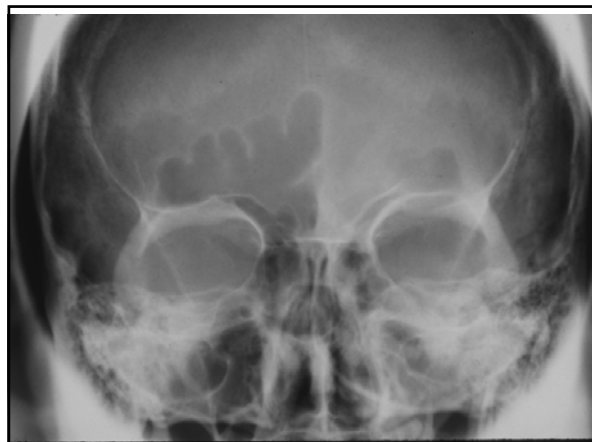
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## Imaging in Acute Sinusitis

- ⊙ 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

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## Bacteriology of Acute Rhinosinusitis

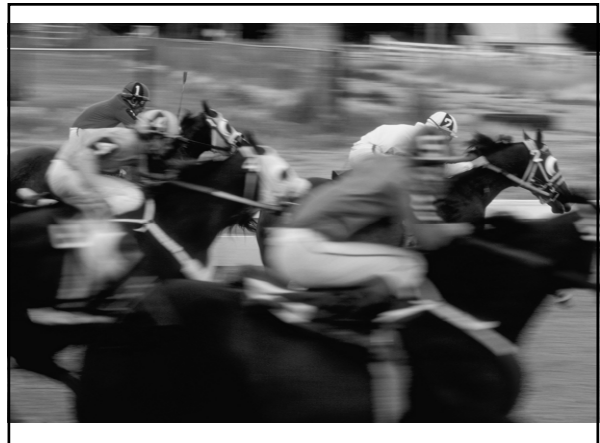
<u>Adults</u>	<u>Children</u>
<i>S. pneumoniae</i>	<i>S. pneumoniae</i>
<i>H. influenzae</i>	<i>H. influenzae</i>
<i>M. catarrhalis</i>	<i>M. catarrhalis</i>
Others	
Anaerobes	
<i>S. pyogenes</i>	

## 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



# SINUSITIS



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

## Chronic Rhinosinusitis: Signs and Symptoms

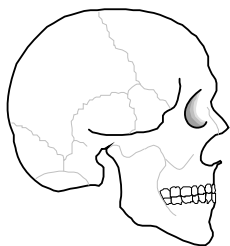
- ⊗ Postnasal drainage
- ⊗ Nasal congestion
- ⊗ Facial discomfort
- ⊗ Frontal headaches
- ⊗ Previous history of acute sinusitis
- ⊗ Sometimes hard to differentiate from chronic rhinitis

## 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*

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## RADIOLOGY

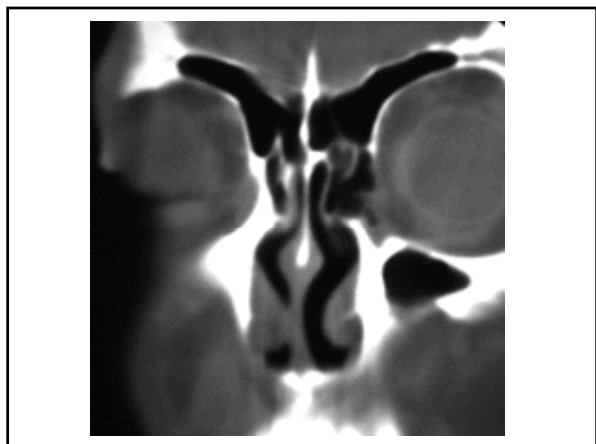
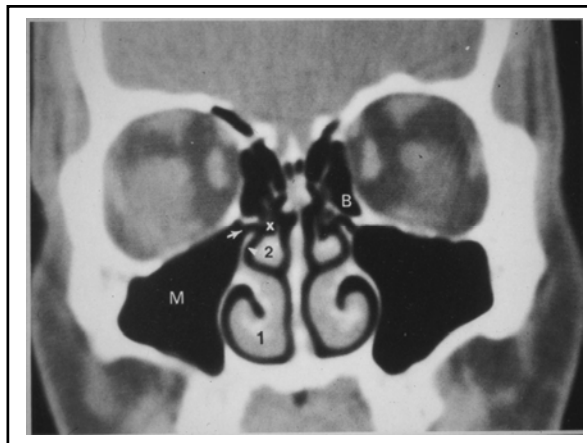


## Imaging in Chronic Sinus Disease

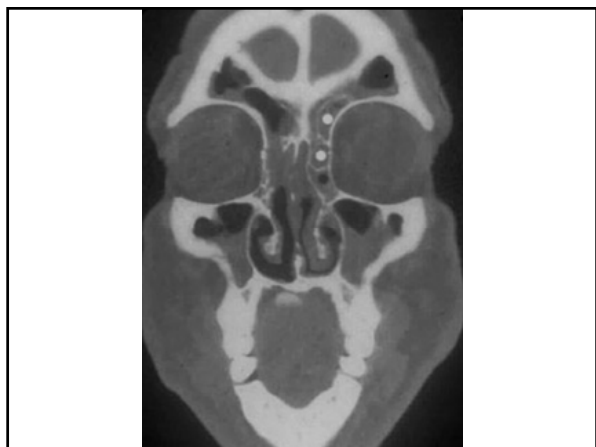
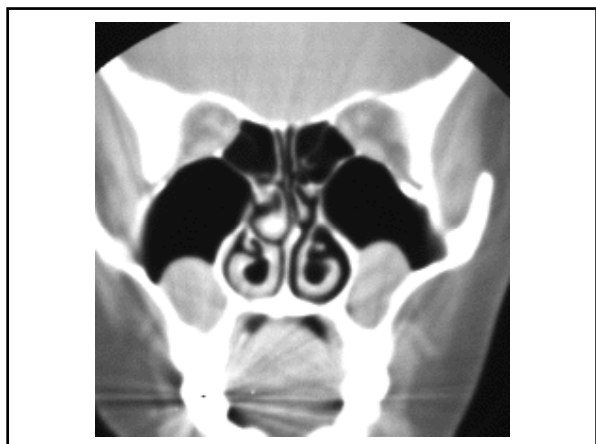
- ✦ Plain radiographs poor for visualizing ostiomeatal complex
- ✦ MRI has high false positive rate and is expensive
- ✦ CT is best tool for confirming diagnosis

## 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



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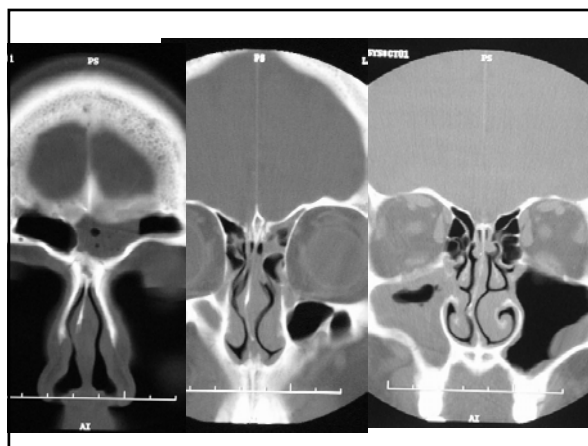


## Medical Treatment of Chronic Rhinosinusitis

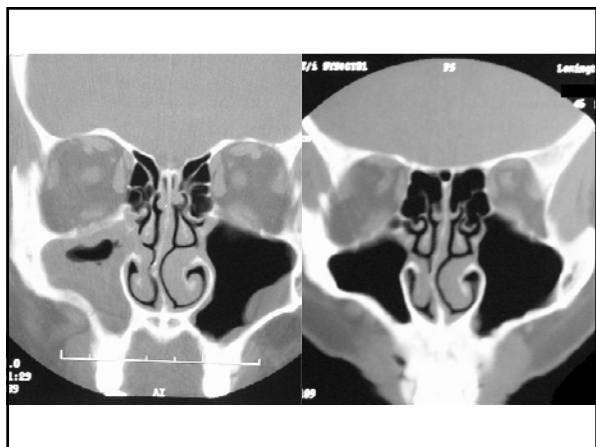
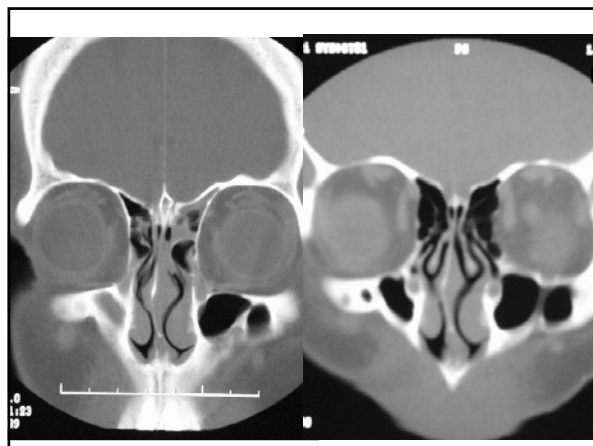
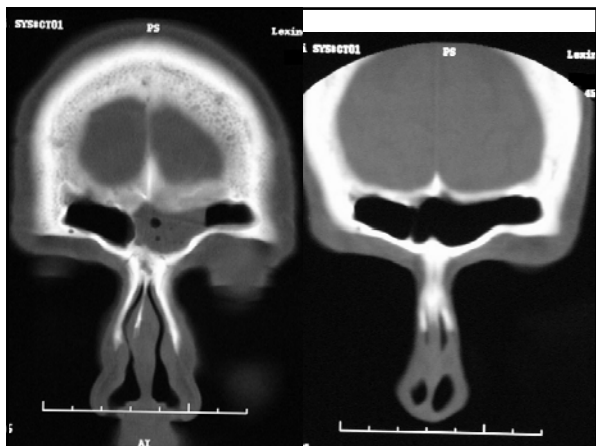
- ◊ Antibiotics for 3-6 weeks  
Geared towards anaerobes, *Staph*  
(Consider IV home therapy in selected cases)
- ◊ Allergy therapy when appropriate
- ◊ Nasal steroid spray
- ◊ Oral steroids in chronic hyperplastic sinusitis
- ◊ F/U in 6-8 weeks with CT scan

## Follow Up Algorithm

- ◊ Patient better, CT sinuses normal
- ◊ Patient better, CT abnormal
- ◊ Patient unimproved, CT normal
- ◊ Patient unimproved, CT abnormal



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## Surgical Treatment of Chronic Rhinosinusitis

- ✦ Correct underlying etiology
  - ↳ Septal deformity
  - ↳ Turbinate hypertrophy
  - ↳ Nasal polyps
- ✦ Restore drainage and ventilation using functional endoscopic sinus surgery (FESS) when medical therapy fails



## Rhinosinusitis: Otolaryngology Referral Guidelines

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

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