Medical Management of Chronic Rhinosinusitis

Michael A Kaliner, MD

Medical Director, Institute for Asthma and Allergy
Wheaton and Chevy Chase, MD
Professor of Medicine, George Washington University
School of Medicine
1. Maxillary
2. Ethmoidal bulla
3. Ethmoidal cells
4. Frontal sinus
5. Uncinate process
6. Middle turbinate
7. Inferior turbinate
8. Nasal septum
9. Ostiomeatal complex
The signs and symptoms of chronic sinusitis

(symptoms persisting >12 weeks):

**Prerequisite symptoms**
- Purulent nasal and posterior pharyngeal discharge
- Plus:
  - Facial pain/pressure
  - Persistent nasal obstruction
  - Cough/post-nasal drip/throat clearing

**Supporting symptoms**
- Hyposmia, anosmia
- Sore throat
- Malaise
- Fever
- Headache, facial pressure, dental pain
- Halitosis
- Sleep disturbance
- Fatigue
Infections may obstruct the OMC

Key

B: bulla ethmoidalis
IT: inferior turbinate
MT: middle turbinate
MS: maxillary sinus
Underlying Causes of Chronic Rhinosinusitis

- Allergy
  - Seasonal AR
  - Perennial AR
  - Nonallergic rhinopathy
- Infection
  - Acute
  - Chronic: Bacterial, fungal
    - Consider host defense deficiency
- Structural
  - Ostiomeatal complex:
    - Deviated nasal septum
    - Hypertrophic turbinates
- Others
  - Dental, periapical abcess
  - Underlying diseases, cystic fibrosis, ciliary immotility
  - Occupational irritants and allergens
  - Drug induced, rhinitis medicamentosa
  - Irritant-induced rhinitis
  - Atrophic rhinitis

*After International Consensus Report on the diagnosis and management of rhinitis. Allergy Suppl 19,49,1994*
Sinus Cycle Leading to Sinusitis

- Secretions thicken, pH changes
- Mucosal gas metabolism changes
- Cilia and epithelium are damaged
- Change in host milieu creates culture medium for bacterial growth in closed cavity
- Retained secretions cause tissue inflammation
- Mucosal congestion (often due to viral rhinitis) or anatomic obstruction blocks air flow and drainage
- Ostium is Closed
- Mucosal thickening creates further blockage
- Bacterial infection develops in the sinus cavity

The Signs and Symptoms of Acute Sinusitis

Acute sinusitis (symptoms persisting 10-28 days):

• Prerequisite symptoms:
  – Persistent URI (>10 days)
  – Persistent muco-purulent nasal or post-pharyngeal discharge
  – Cough

• Supporting symptoms:
  – Congestion
  – Facial pain/pressure
  – Post-nasal drip
  – Fever
  – Headache, facial pressure, tenderness
  – Anosmia, hyposmia
  – Ear pain, pressure
  – Halitosis
  – Upper dental pain
  – Fatigue
  – Sore throat
Does this patient have sinusitis?

- **Must have congestion and purulent drainage**
  - Green, not yellow secretions
- **Most patients lose their sense of smell**
  - Rate your sense of smell between 0 and 10, 0 is zero; 10 is normal; same scale for taste
- **Headache and facial pressure:**
  - Over sinus area
  - Steady, not throbbing
  - Lasts for hours
  - Worsens if head is moved
    - Have patient touch chin to chest or shake head “no”
  - Tenderness over sinus when tapped with finger
Does patient have sinusitis?

• **PE:**
  – Congestion
  – Sometimes erythematous mucosa
  – Purulent drainage -middle meatus
    • Stranding?
    • History of green secretions?
      – Green, yellow-green, gray
  – Asymmetric transillumination
  – Tenderness over sinus by percussion
Does patient have sinusitis?

- **CT Scan**
  - Gold standard
  - Limited cut, coronal plane
- **MRI**
  - Very sensitive
  - Useful for fungal sinusitis
  - Cold T2 weighted image
Does patient have sinusitis?

• Culture of middle meatus
  – Cotton swab is generally useless
  – Use Calgiswab
    • Pediatric urethral culture swab
    • Calcium alginate on a wire
    • Allows direct culture from meatus

• Overall: of some use, some of the time
Bacterial Rhinitis
(local nasal infection)

• Doc: I got sinus!
• Sick all the time, congestion, headache, green drainage, gets sick a few days after last antibiotic, 5-10 antibiotics per year
• But… Normal sense of smell, normal CT
• ENT evaluation and they did NOT recommend surgery
Bacterial Rhinitis
(Local nasal infection)

- Not currently recognized as specific disease
- Local Staph or Strept infections
  - Crusting, green secretions
  - Excess drainage
    - Throat clearing, cough, runny nose
  - Often young, constantly or recurring sick
  - *But normal CT*
    - No anosmia (often a keen sense of smell)
- Culture positive for Staph or Strept species
- High degree of suspicion
- Often with contact points (septum-turbinate, spurs)
Treatment of Bacterial Rhinitis

• Topical Bactroban (mupiricin) 2%
  – Instilled locally (finger, Q-tip) and massaged back
  – Alternative: Dissolve BB in sinus rinse
    • Add ½-1 inch strip of BB, add 1 Oz hot water, shake and dissolve BB, QS to 4-8 Oz, add salt, shake and then wash nose and sinuses
Rhinologic Headaches

• Recurring headache and secretions in young, healthy patient (usually female)
• Headache is nasal/sinus in location
  – Steady, lasts hours to days, not affected by head movement
• Secretions are yellow or clear; not purulent
Rhinologic Headaches

• PE:
  – Septal deviation with septum-turbinate contact
    • Septal spur with spur-turbinate contact
  – Turbinate-turbinate contact
  – Posterior valve
    • Turbinate-turbinate-septal contact
  – Clear secretions
  – Adequate middle meatus/ostiomeatal complex
Rhinologic Headaches

• Diagnosis is by high index of suspicion
  – Headaches and non-purulent secretions and normal sense of smell
  – Normal CT scan
• Apply nasal decongestant
  – Spray or swab
• Apply 4% Xylocaine
  – Spray or swab
Rhinologic Headaches

- Treatment:
  - Nasal saline washes
  - Nasal corticosteroids +/-
  - Nasal antihistamine
    - azelastine or olopatadine
  - PRN topical nasal decongestant
  - PRN topical nasal Xylocaine

Use to prevent headaches from occurring
Use to treat headaches as they occur
Association Between Viral and Bacterial Sinusitis Infections

- Viral infections
  - Self-limiting
  - 2 to 3 acute viral respiratory infections per year (6-8 in children)
  - >80% symptoms resolve in 7-10 d
  - Often inciting event for development of sinusitis and other RTIs
  - 0.5%–2% of cases complicated by acute bacterial infection (>20 million cases)

RTI=respiratory tract infections.

Definition of Acute Nonviral Rhinosinusitis

Increase in symptoms after 5 days or persistent symptoms after 10 days
Inflammation Is Responsible for Cardinal Symptoms of Acute Rhinosinusitis

- Underlying inflammation leads to...
  - increased vascular permeability and mucosal oedema
  - impaired mucociliary function
  - increased mucus production
2010 Approach to the Treatment of Acute Rhinosinusitis

1. Hydration (6 - 8 glasses of water per day)
2. Long-acting topical nasal decongestant, BID X 3-7 days (oxymetazoline)
3. Nasal saline applied with nasal irrigation device, BID
4. Topical nasal CCS, 2 sprays EN BID
5. If symptoms persist past 7-10 days: Antibiotics X 7-14 days (until asymptomatic +5-7 days). Choices: amoxicillin/clavulanate, cephalosporin, clarithromycin
Antibiotics in acute rhinosinusitis?

- Don’t treat common viral cold with antibiotics
- Use symptomatic treatment in mild acute rhinosinusitis
  - saline
  - topical decongestant
  - NCCS
  - Analgesics
- Use topical steroids in acute and chronic sinusitis (evidence A)
- Reserve antibiotics for severe, acute, presumably bacterial rhinosinusitis
Recommended antibiotic choices - 2010

First choice:
- Amoxicillin/clavulinate or cephalosporin
- Good second choice: Clarithromycin (Zithromycin, 5-0-(5), may also be quite useful)

Back-ups:
- Quinalones
- Use metronidazole plus one of the above or clindamycin when gram negative is suspected
- Topical mupiricin very useful in select cases
Unilateral Sinusitis

- Dental abscess  
  - Foul smelling, evidence of periapical abscess
- Fungal sinusitis
- Polyp
- Mucocoele
- Tumor of the sinus/nose  
  - Inverted papilloma
- Congenital aplasia/hypoplasia
Odontogenic Sinusitis
(Dental Periapical Abscess)

• Unilateral sinusitis
  – Nearly always in maxillary sinus above the site of the abscess or perforation through the floor of the sinus after dental procedure

• Foul smelling
  – Microaerophilic Strept species

• Persistent or recurring
Odontogenic Sinusitis
(Dental Periapical Abscess)

• Diagnosis is by dental x-ray and confirmation of presence of periapical abscess
• Treat by root canal and drainage of abscess
• Requires penicillin-type antibiotic
Chronic Rhinosinusitis: Why?

- Chronic inflamed mucosa
  - Neutrophils and mononuclear cells in CRSsNP
  - Eosinophils in CRSwNP
- Possible chronic infection
  - Bacteria
  - Fungi
- Superantigens
- Biofilms
- Osteitis
Bacteria in Biofilms

- May be antibiotic resistant
- May be hard to culture
- Found in surgical specimens from CRS (44%+)
  - S aureus, P aeroginosa, H Influenza, S pneumonia
- Clinical implications
  - Saline sinus washes
  - BKC?
  - Zwitterionic surfactant? JBS
Superantigens or superallergens

- Bacterial Superantigens
  - Staph aureus enterotoxins: SEA, SEB, SEC, SED, SEE, TSST-1
  - *Strep. pyogenes*,
  - *Mycoplasma arthritidis*,
  - *Yersinia pseudotuberculosis* ……
- Highly potent immune stimulators
- Interact with T-cell R and MHC class II
- 20% of all T-cells are activated by SEA
S. aureus colonization and IgE antibodies to S. aureus enterotoxin mix in mucosal tissue

![Bar chart showing patients with S. aureus colonization and SAE-IgE+ in different groups.](chart)

*P<0.05 vs. CRS.

T. Van Zele, P. Gevaert et al. JACI 2004
Recommended approach to the treatment of chronic rhinosinusitis 2010

- Hydration (6 - 8 glasses of water per day)
- Antibiotics only if clear evidence of infection: use X 14-21+ days (until asymptomatic +7 days).
- Long-acting nasal decongestant, BID X 3-7 days (oxymetazoline)
- Nasal saline applied with nasal irrigation device, BID
- Topical nasal CCS (only Mometasone has FDA approval):
  - 2 sprays BID, until symptoms resolved
  - Reduce to lowest effective dose, to maintain remission
  - Aim towards the eye and away from the nasal septum
Next recommended approaches

- Switch antibiotics (only if evidence of ongoing bacterial infection)
- CT scan; limited cut, coronal plane
  - Treat bacterial rhinitis
  - rarely MRI – fungal or possible tumors
- Add metronidazole or clindamycin (especially with foul smell – gram negatives)
- Consider fungal Rx (itraconazole, not amphotericin)
- Oral CCS (Daily followed by QOD)
- Topical antibiotics (tobramycin rarely, mupirocin nasal ointment)
Chronic rhinosinusitis
With and without nasal polyps

The spectrum of sinus disease

Rhinosinusitis
- Eosinophils +

Nasal Polyps
Nasal polyposis

Prevalence approx. 2-4%, 25% of CRS

Asthma in approx. 40-65%

Aspirin sensitivity in 10-15%

Mixed cellular infiltrate with prominent eosinophilia in 90%

Inflammation with
- local IgE production
- increased IL-5, eotaxin, cys-LTs and ECP
Treatment of Nasal Polyps

• Treatment of underlying condition
• Continue treatment of sinusitis
• Topical corticosteroids (Mometasone only current INS approved by FDA in USA)
  – Flovent
  – Pulmicort
• Systemic corticosteroids
• Polypectomy

Preliminary Results of Intranasal Flovent Treatment

- Retrospective chart review of 73 patients with polyps and sinusitis who failed initial therapy
- 64.4% of patients treated with intranasal Flovent were also started on 2-3 weeks of oral CCS.
- The combination of long-term intranasal Flovent and short term oral CCS resolved polyps in 77.4% of patients (p=0.0045) at 7-9 months
- There was significant reduction in polyp size within 1-2 months: 75% significantly reduced at 1 month, >80% at 2 months
Polyp Resolution

$p = 0.0045$

Polyp Resolution 77.4%

Polyps did not resolve 22.60%
Budesonide use, 2010

- Dilute budesonide solution (Pulmicort Respules), 500-1000 ug in 2-4 Oz saline and irrigate the sinuses BID

- Have head positioned to the side so that gravity helps get washings into the sinuses; turn head as if to put the ear on knee

- Has resolved polyp resistant to nasal fluticasone sprays
Mupiricin use

- Use mupiricin with
  - Recurrent crusting, particularly anterior
  - Congestion, headache, green secretions & normal CT – contact points, spurs
  - Polyps
- Mupiricin (Bactroban 2%) anteriorly with finger or Q tip, blot nose
- Dissolved in saline, irrigate nose and sinuses with sinus rinse, along with budesonide for nasal polyps
Polyp treatments - 2010

- Anticipate 25+% improve with sinus Rx + nasal CCS
- Another 25-50% improve with sinus Rx + high dose nasal CCS (FP MDI or nasal lavages with budesonide)
- The remainder improve with oral CCS + FP or nasal lavages with budesonide solution

Overall medical treatment can get close to 100% success

- Mupiricin appears to help prevent polyp regrowth, especially with crusting
- Add ½-1 tsp of betadine to sinus wash
- Surgery, properly done, is successful short-term but polyps can and do recur and repeated surgery gets progressively more difficult and dangerous!
Polyps – recommended treatment - 2010

- Treat underlying sinusitis
- High dose nasal CCS
  - Budesonide solution (Pulmicort Respules) suspended in sinus lavage (+/- betadine)
    - Wash with the head positioned with ear turned to the knee
  - Singulair (?)
- Prednisone 20-30 mg
  - Daily x 3-4 weeks, then QOD, then taper to 0
  - Fluticasone (Flovent MDI) through nasal adapter (such as a baby bottle nipple)
- Mupiricin ointment topically or dissolved in sinus lavage
- Consider careful surgery if polyps are persistent, resistant or recur
- Consider oral or topical anti-fungal treatment
Whew!!

Thank you