Project: Ghana Emergency Medicine Collaborative

Document Title: Acute Sinusitis

Author(s): Jim Holliman, MD, (George Washington University), 2012

License: Unless otherwise noted, this material is made available under the terms of the Creative Commons Attribution Share Alike-3.0 License:

http://creativecommons.org/licenses/by-sa/3.0/

We have reviewed this material in accordance with U.S. Copyright Law and have tried to maximize your ability to use, share, and adapt it. These lectures have been modified in the process of making a publicly shareable version. The citation key on the following slide provides information about how you may share and adapt this material.

Copyright holders of content included in this material should contact **open.michigan@umich.edu** with any questions, corrections, or clarification regarding the use of content.

For more information about **how to cite** these materials visit http://open.umich.edu/privacy-and-terms-use.

Any **medical information** in this material is intended to inform and educate and is **not a tool for self-diagnosis** or a replacement for medical evaluation, advice, diagnosis or treatment by a healthcare professional. Please speak to your physician if you have questions about your medical condition.

Viewer discretion is advised: Some medical content is graphic and may not be suitable for all viewers.





OJOCIN.michigan Attribution Key

for more information see: http://open.umich.edu/wiki/AttributionPolicy

Use + Share + Adapt	
{ Content the copyright holder, author, or law permits you to use, share and adapt. }	
PD-GOV	Public Domain – Government: Works that are produced by the U.S. Government. (17 USC § 105)
PD-EXP	Public Domain – Expired: Works that are no longer protected due to an expired copyright term.
PD-SELF	Public Domain – Self Dedicated: Works that a copyright holder has dedicated to the public domain.
(cc) ZERO	Creative Commons – Zero Waiver
(cc) BY	Creative Commons – Attribution License
CC) BY-SA	Creative Commons – Attribution Share Alike License
CC BY-NC	Creative Commons – Attribution Noncommercial License
CC) BY-NC-SA	Creative Commons – Attribution Noncommercial Share Alike License
SNU-FDL	GNU – Free Documentation License

Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }

Public Domain – Ineligible: Works that are ineligible for copyright protection in the U.S. (17 USC § 102(b)) *laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }



Fair Use: Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (17 USC § 107) *laws in your jurisdiction may differ

Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.

To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.

Acute Sinusitis

Diagnosis, Management, and Complications

Jim Holliman, M.D., F.A.C.E.P.

Professor of Military and Emergency Medicine Uniformed Services University of the Health Sciences Clinical Professor of Emergency Medicine George Washington University Bethesda, Maryland, U.S.A.

Acute Sinusitis Lecture Outline

- Classification
- Etiology
- Presentation
- Diagnostic tests
- Treatment
- Follow-up
- Complications

Sinusitis Classification

- Definitions
 - Acute
 - Sx & signs of infectious process < 3 weeks duration
 - Subacute
 - Sx & signs 21 to 60 days
 - Chronic
 - > 60 days of sx & signs
 - Or, 4 episodes of acute sinusitis each > 10 days in a single year

General Contributors to Chronic Sinusitis

- Resistant infectious organisms
- Underlying systemic illness (esp. diabetes)
- Immunodeficiency
- Irreversible mucosal changes
- Anatomic abnormality

Sinusitis Incidence

- Reportedly > 31 million cases in U.S.
- ? most common chronic illness
- Is in 17 % of patients > age 65
- May occur in 0.5 to 1.0 % of all URI's

Sinusitis Pathogenesis

- Basic cause is osteomeatal complex (the middle meatal region & the frontal, ethmoid, & maxillary sinus ostia there) inflammation & infection
 - Sinus ostia occluded
 - Colonizing bacteria replicate
 - Ciliary dysfunction
 - Mucosal edema
 - Lowered PO2 & pH



Development of the maxillary sinus (numbers are age in years)

Paranasal Sinuses: Anterior View



Location of Sinuses



(cc) BY Patrick J. Lynch (Wikimedia Comomns)

- **1. Frontal Sinuses**
- 2. Ethmoid Sinuses (Ethmoidal Air Cells)
- 3. Sphenoid Sinuses
- 4. Maxillary Sinuses



ion of the Nose

IBA

A. Technique: index finger rests on tip of nose for examination of left side, on cheek for right side

Middle turbinate _____ Middle meatus _____ Septum ____

Inferior turbinate -

Nasal airway (clear area to see nasopharynx)-



Sinusitis

Etiologic Organisms (& % incidence)

- Aerobic bacteria
 - Strep. pneumoniae (30)
 - Alpha & beta hemolytic Strep (5)
 - Staph. aureus (5)
 - Branhamella catarrhalis (15 to 20)
 - Hemophilus influenzae (25 to 30)
 - Escherichia coli (5)
- Anerobes (10 % acute, 66 % chronic)
 - Peptostreptococcus, Propionobacterium, Bacteroides, Fusobacterium
- Fungi (2 to 5)
- Viruses (5 to 10)

Acute Sinusitis Predisposing Conditions

- Local
 - URI
 - Allergic rhinitis
 - Nasal septal defects
 - Barotrauma (diving)
 - Nasal foreign bodies
 - Nasal tubes
 - Dental infections
 - Overuse of topical decongestants
 - Nasal polyps or tumors
 - Aspiration of infected water
 - Smoking

Acute Sinusitis Predisposing Conditions (cont.)

- Systemic
 - Diabetes
 - Immunocompromise (AIDS)
 - Malnutrition
 - Blood dyscrasias
 - Cystic fibrosis
 - Chemotherapy
 - Long term steroid Rx

Normal Functions of the Components of the Sinuses

- Ostia
 - Drain secretions from sinuses
 - Allow pressure equalization
 - Diameter 2 to 5 mm (maxillary), 1 mm (ethmoid)
- Cilia
 - Beat at frequency 1000 strokes/min. toward ostia
 - Push secretions out of sinus
- Sinus secretions
 - 2 layered mucus
 - Contain IgA & IgG
- Patency of ostiomeatal complex required for sinusitis resolution

Acute Sinusitis Usual Clinical Presentation

- Symptoms progress over 2 to 3 days
- Nasal congestion & discharge (usually thick & colored, not clear)
- Localized pain +/- referred pain
- Tenderness or pressure sensation over sinuses
- Headache
- Cough due to postnasal drip
- Halitosis
- Malaise

Usual Physical Findings With Acute Sinusitis

- Erythematous edematous nasal mucosa
- Purulent secretions in middle meatal area
 - May be absent if ostia completely blocked
- Percussion tenderness
 - Over the involved sinuses
 - Over the maxillary molar +/- premolar teeth
- Halitosis
- +/- fever

Pain Patterns with Acute Sinusitis

- Maxillary sinusitis
 - Unilateral pain over cheekbone
 - Maxillary toothache
 - Periorbital pain
 - Temporal headache
 - Pain worse if head upright
 - Pain better if head supine

Pain Patterns with Acute Sinusitis (cont.)

- Ethmoid sinusitis
 - Medial canthal pain
 - Medial periorbital or temporal headache
 - Pain worsened by Valsalva or if supine
- Sphenoiditis
 - Retroorbital, temporal, or vertical headache
 - Often deep seated headache with multiple foci
 - Pain worse supine or bending forward
- Frontal
 - Frontal headache
 - Pain worse supine



(cc) BY Patrick J. Lynch (Wikimedia Comomns)

Paranasal sinuses and locations of referred pain (shaded orange) 23

Signs of Potentially Dangerous Complications of Acute Sinusitis

- Periorbital, frontal, or cheek edema
- Proptosis
- Ophthalmoplegia
- Ptosis
- Diplopia
- Meningeal signs
- Neuro deficits of cranial nerves II to VI

Acute Sinusitis Use of Cultures

- Routine culture of nasal secretions not useful
- Poor correlation between non-directed nasal or nasopharyngeal culture isolates & sinus aspirate cultures
- Sinus aspirate cultures useful only for protracted or nonresponsive sinusitis
 - Require endoscopy or needle puncture of sinus

Use of Paranasal Sinus Transillumination to Diagnose Sinusitis

- First remove patient's dentures
- Use darkened room
- Shield light source from observer's eyes
- Use Welch Allyn transilluminator or Mini-Mag Lite
- Shine light over max. sinus & observe light transmission thru hard palate
- Report results as opaque, dull, or normal for either side
- Not useful for frontal sinuses since they often have developed asymmetrically



In order to transilluminate the maxillary sinus, shine a light at the midpoint of the infraorbital ridge. Locate the transmitted light through the hard palate.

Sensitivity of Transillumination to Diagnose Sinusitis

- Different studies have reached opposite conclusions on its usefulness ("Highly predictive" versus "criminal negligence")
- Some studies have indicated it is useful if sinus is completely opaque (c/w Dx of sinusitis) or is completely normal (c/w absence of sinusitis), but has poor predictive value & correlation if transmission is "dull"
- Can't be done in about 25 % of children due to poor cooperation

Acute Sinusitis Radiography

- Plain films not as sensitive as CT
- Radiographic signs of sinus pathology :
 - Air fluid levels
 - Partial or complete opacification
 - Bony wall displacement
 - 4 mm or more of mucosal wall thickening
- Single Water's view has high concordance with 4 view sinus series (Caldwell, Water's, lateral, & submental vertex views)



Water's view with airfluid level in left maxillary sinus



Water's view showing air-fluid level in right maxillary sinus and mucosal thickening in left maxillary sinus



Lateral view of normal frontal and sphenoid sinuses

Source undetermined

32



Which sinus has an air-fluid level ?

PD-INEL Source undetermined



Opacification of the frontal sinuses



Which sinus has an air-fluid level ?

PD-INEL Source undetermined





Hypoplastic left frontal sinus and nosocomial right maxillary sinusitis
Limitations of Plain Film Radiography for Sinusitis

- Poor visualization of ethmoid air cells
- Difficulty distinguishing between infection, tumor, or polyp if sinus is completely opacified

Use of Ultrasound for Diagnosis of Sinusitis

- Less sensitive than 4 view X-ray
- Shown to not correlate well with sinus cultures
- Accuracy is operator dependent
- CT preferred for evaluation of complications



Another diagnostic modality for sinusitis is nasal endoscopy



Nasal endoscopic view showing uncinate process (U) displaced against middle turbinate (T) & closed off opening to frontal recess (arrow) from acute sinusitis



Nasal endoscopic view showing Aspergillus fungal mass arising from the sphenoid sinus

PD-INEL Source undetermined

Use of Computed Tomography (CT) for Diagnosis of Sinusitis

- Advantages of CT :
 - Visualizes ethmoid air cells
 - Evaluates cause of opacified sinus
 - Differentiates bony changes of chronic inflammation from osteomyelitis
- Indicated only if complications suspected or if diagnosis uncertain (not needed initially for most cases)



CT scan showing fluid with pockets of air in frontal air cells from frontal sinusitis in a six year old male

PD-INEL Source undetermined

43



Coronal CT scan showing left sphenoid sinusitis ⁴⁴



CT scan showing right maxillary sinusitis







Coronal MRI scan showing maxillary sinusitis



Infectious and Granulomatous Diagnoses to Consider in the Differential Diagnosis of Sinusitis

- Nasopharyngitis / adenoiditis
- Dental abscess
- Vestibulitis / furunculosis
- Sarcoidosis
- Tuberculosis
- Rhinosporidiosis
- Syphilis
- Leprosy
- Wegener's Granulomatosis
- Midline (lethal) granuloma
- Nasopharyngeal cancer

Lab Work for Diagnosis of Acute Sinusitis

• Not helpful !

Goals of Medical Therapy for Acute Sinusitis

- Control Infection
- Facilitate sinus ostial patency and drainage
- Provide relief of symptoms
- Evaluate and treat any predisposing conditions to prevent recurrences

General Treatment for Acute Sinusitis

- Oral antibiotic
- Topical and systemic decongestants
- Pain medications
- Optional or secondary medications:
 - Guaifenesin (1200 mg po q 12h)
 - warm nasal saline irrigations qid
 - Antihistamine orally : only in the small % of patients with true allergic component

First - Line Antibiotic Therapy for Acute Sinusitis

- Treatment duration should be 10 to 14 days (one recent study indicated 3 days may be OK)
- Amoxicillin 500 mg po q 8 h
- Augmentin 500 mg po q 8 h
- Trimethoprim / Sulfamethoxazole DS one po bid
- Azithromycin 500 mg po then 250 mg po q d x4
- Pediazole (Erythromycin sulfisoxazole) QID may be best choice in kids

Antibiotic Therapy in Acute Sinusitis if Staph. aureus is suspected

- Also useful if patient fails Rx with antibiotics on previous slide
 - Cefuroxime axetil 500 mg po q 12h
 - Cefprozil 500 mg po q 12h
 - Cefpodoxime 200 mg po 12h
 - Loracarbef 400 mg po q 12h

Precautions Regarding Medication Interactions in Rx of Acute Sinusitis

- Remember that ciprofloxacin and clarithromycin are contraindicated if any of the nonsedating antihistamines (terfenadine, astemizole, and loratidine) are used as they cause prolonged QT syndrome and ventricular arrhythmias
- Also oral decongestants may cause problems in patients on TCA's, MAO inhibitors, and alpha blockers

Use of Topical Decongestants for Rx of Acute Sinusitus

- Ephedrine sulfate 1 % 2 sprays each nostril q 4h
- Phenylephrine HCI 0.25 to 0.5 % 2 sprays q 4h
- Oxymetazoline HCI 0.05 % 2 sprays q 12h

Limit use to 3 to 5 days to avoid rebound vasodilatation and "rhinitis medicamentosa"

Use of Oral Decongestants for Rx of Acute Sinusitis

- Phenylpropanolamine HCI 12.5 mg po q 4h or 75 mg q 12h (now not available in U.S.A.)
- Pseudoephedrine HCI 60 mg po q 6h or 120 mg q 12h

Usually should be continued for 4 weeks

Treatment of Frontal Sinusitis

- Usually should be admitted for initial IV antibiotic Rx
- Higher incidence of intracranial complications
- Give IV Cefuroxime 2 gm IV q 8h or Ceftriaxone 2 gm IV q d and decongestants
- If not resolving in 24 to 48 hours of Rx may need surgical intervention (frontal sinus trephination or external sinusectomy)

Fungal Sinusitis

- Increasing incidence in both immunocompetent and immunocompromised patients
- 3 types
 - Fulminant infection with soft tissue invasion
 - Progressive indolent invasive disease
 - Noninvasive localized disease (mycetoma or allergic fungal sinusitis)

Fungal Sinusitis

- Causative fungi:
 - Aspergillus (most common)
 - Rhizopus (mucormycosis)
 - Candida
 - Histoplasma
 - Blastomces
 - Coccidioides
 - Cryptococcus

Fungal Sinusitis

- Major risk factors:
 - Granulocytopenia
 - multiple prolonged courses of antibiotics or steroids
 - DKA
 - AIDS

Presentation of Invasive or Acute Fulminant Fungal Sinusitis

- Facial soft tissue tenderness
- Cloudy rhinorrhea
- Fever
- Gray, friable, anesthetic nasal tissue
- May have necrotic black tissue
- May have bloody rhinorrhea



Mucormycosis involves the sinuses, brain, or lungs as the areas of infection. Internationally, mucormycosis was found in 1% of patients with acute leukemia.

- Adapted from Wikipedia

Treatment of Invasive Fungal Sinusitis

- Always should be admitted
- Correct metabolic abnomalities
- High dose Amphotencin B +/fluconazole
- Surgical debidement

General Management of Complications of Acute Sinusitis

- Hospitalization
- CT scan of sinuses (+/- cranial CT)
- IV antibiotics with anerobic coverage
- ENT consult

List of Complications from Acute Sinusitis

- Mucocele or mucopyocele
- Osteomyelitis
- Facial cellulitis
- Oroantral fistula
- Orbital cellulitis
- Cavernous sinus thrombosis
- Septic thrombophlebitis
- Meningitis
- Epidural, subdural, or intracerebral abscess

Sinusitis Complications : Mucocele

- Most common in frontal sinus
- Expansive mucus accumulation causes progressive pressure necrosis
- Signs:
 - soft tissue mass over sinus
 - proptosis
 - ophthalmoplegia



Coronal CT scan showing left maxillary sinus mucocele66

Sinusitis Complications : Signs of Cavernous Sinus Thrombosis

- Abrupt high fever
- Toxicity
- Progressive obtundation
- Cranial nerve palsies (III VI)
- Trigeminal anesthesia
- Visual loss



Axial CT scan with contrast showing cavernous sinus thrombosis

PD-INEL Source undetermined

68



CT scan showing orbital & brain abscesses from ethmoid sinusitis

69



PD-INEL Source undetermined

70

CT scan showing epidural abscess from frontal sinusitis (six year old male with headache, emesis, and fever)



PD-INEL Source undetermined

Coronal CT scan showing left ethmoid opacification and displacement of globe by intraorbital mass (patient was a 2 year old male presenting with fever, proptosis, and left orbital cellulitis)

Antibiotics to Consider for Rx of Sinusitis Complications

- Ceftriaxone 1 gm IV q 12h
- Cefotaxime 2 gm IV q 4h
- Ceftizoxime 4 gm IV q 8h + metronidazole 30 mg/Kg/d
- Ampicillin / sulbactam 3 gm IV q 6h
- Vancomycin 500 mg q 6h + aztreonam 1 gm q 8h or chloramphenicol (for PCN - allergic patients)
Follow-up for Acute Sinusitis

- If not resolved in 10 days, continue antibiotics for 3 weeks
- If not resolved at 3 weeks consider further workup (CT +/- sinus cultures)
- Secondary antibiotics to consider:
 - Clindamycin, ciproflaxacin, metronidazole
- Consider topical intranasal steroids

Management of Sinusitis Summary

- Diagnosis by clinical presentation
- Evaluate for complications
- Admit to hospital if complications present
- Treat for 10 to 14 days
- Extend Rx if not resolved in 10 days
- Workup and consult if not resolved in 3 weeks