

Acute sinusitis

Who should we be treating?

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Background. The diagnosis of acute sinusitis has been regarded as a serious condition that requires the use of antibiotics. However the increasing incidence of resistant organisms means antibiotics need to be used carefully.

Objective. To look at the evidence available regarding antibiotic use for sinusitis, and to discuss its application to general practice.

Discussion. There have been surprisingly few randomised double blind placebo controlled trials for sinusitis, and fewer still have been based in a representative population of primary care patients. This article discusses studies relevant to general practice. Several practical clinical symptoms and signs have been shown to increase the likelihood of a patient having acute bacterial sinusitis, and therefore benefit from antibiotics. When antibiotics are used, comparative data suggest that amoxycillin should be used first line. The issue of patient experience, expectations and satisfaction is also raised.

Until recently general accepted practice has been that acute sinusitis requires antibiotic therapy. There have been nearly 100 trials considering antibiotic therapy in sinusitis, most comparing one antibiotic agent with another. Of these, less than 10 have been randomised double blind placebo controlled trials. The entry criteria of the available studies are too dissimilar to be combined for meta analysis (Table 1).

Table 1. Variations between study designs

- Different patient populations, with a variety of methods used to select patients for inclusion. Many early studies were based in ENT clinics, rather than primary care practices.
- Different symptomatic therapies.
- Different durations of therapy.

Until 1996, not one study provided convincing evidence that antibiotics improved outcome. In 1996 Lindbaek used CT scans to select patients for randomisation and demonstrated antibiotics were beneficial.

Pathogenesis

Bacterial sinusitis requires both obstruction of sinus drainage, resulting in retention of secretions, and the presence of pathogenic bacteria. When researchers have inoculated bacteria

into unobstructed sinuses, no sinusitis has occurred.

Factors contributing to obstruction include:

- mucosal swelling;
- ciliary abnormalities;
- structural abnormalities;
- overproduction of secretions.

A preceding viral infection may lead to a continuum of rhinitis with sinus involvement and purulent discharge. This causes epithelial damage, which facilitates the penetration of bacteria into the mucosa. Surprisingly, the role of allergy remains unclear. Atopic patients have not been shown to be more or less likely to have acute bacterial sinusitis.

Between 72 and 90% of sinusitis involves the maxillary sinus. Frontal sinusitis is relatively uncommon but is responsible for most of the serious complications of sinusitis and as such should be monitored more closely.

Classification

Sinusitis is divided into two groups, both clinically and for research purposes.

- Acute
 - less than 3-4 weeks duration
 - epithelial changes are usually reversible

- Chronic

➤ most studies excluded patients with symptoms of more than 30 days duration. Sinusitis lasting greater than 30 days is likely to be chronic, often with an underlying cause other than bacterial infection.

➤ more than 3 months of symptoms or more than 3-4 episodes a year usually result in irreversible mucosa changes.

The many non specific symptoms and signs in acute bacterial sinusitis make clinical differentiation from upper respiratory tract infection (URTI) and allergic rhinitis difficult. In one Danish study, patient statements that they had sinusitis were negatively associated with current acute bacterial sinusitis. Researchers have used several investigations to assist them (Table 2).

Table 2. Diagnosis of acute bacterial sinusitis

Direct sinus puncture

- the gold standard is culture of infected secretions.

X-ray

- a four view series is 75% as accurate as sinus puncture.
- for maxillary symptoms a single Waters (occipitomeatal) view is almost as good as a four view series.

CT scan

- fluid level/opacification: > 80% specificity
- > 5 mm mucosal thickening: 36-76% specificity.

The evidence for using antibiotics

Key issues in determining rational antibiotic use include:

- Does the patient have acute sinusitis?
- Is it likely to be bacterial?
- Which antibiotic should be used?

The last question is the easiest to answer. There is clear evidence that there was minimal difference between the various antibiotics used in first line therapy, even in the more recent studies where antibiotic resistant strains were noted. Amoxicillin is the drug of first choice in the non penicillin allergic patient, and cotrimoxazole is recommended as an alternative in allergic patients.

Antihistamines, corticosteroids and mucolytics are of no proven benefit in the treatment of bacterial sinusitis.

To address the first two questions it is worth discussing some of the randomised double blind placebo controlled trials.

Lindbaek in Oslo

This was the first convincing study to show antibiotics were beneficial in acute sinusitis in a primary care population. However, CT scans were used to select patients for randomisation, which is not practical in general practice. Only those with a fluid level or total opacification were

included. It is of particular interest that of 244 patients diagnosed clinically as having sinusitis, 114 (47%) were excluded after CT scan. Patients were not accepted into the CT scan group if they had high fever and strong pain or symptoms for more than 30 days.

Lindbaek found high dose penicillin V (1320 mg three times daily for 10 days) and amoxicillin (500 mg three times daily for 10 days) significantly improved outcomes.

By day 10

- 86% of patients were 'cured' with antibiotics
- 57% were 'cured' with placebo. (The definition of cure used in this study involved the patient answering 'no' to the question 'do you think you still have sinusitis today?')

It is of interest to look at the median duration of symptoms within each study group:

- 9 days with amoxicillin
- 11 days with penicillin
- 17 days in the placebo group.

In a later study, Lindbaek looked at patients with mucosal thickening of more than 5 mm on CT scan. They were randomised and given treatment as above. Interestingly he found antibiotic therapy was no better than placebo in this group.

Stalman in The Netherlands

This primary care clinically based trial selected patients using the guidelines of the Dutch College of General Practitioners (Table 3).

Table 3. Diagnostic guidelines of the Dutch College of General Practice

To diagnose acute sinusitis the patient should have either three main symptoms:

- complaint after recent URTI or influenza.
- purulent nasal discharge.
- pain in the maxillary sinuses on bending forward.

OR

two main symptoms and one other symptom:

- predominantly unilateral maxillary pain.
- upper jaw toothache.
- pain when chewing.

This trial found no significant difference between doxycycline (200 mg stat and then 100 mg daily for 10 days) and the placebo group. It is important to note that both groups received xylometazoline (Otrivin) 0.1% nose drops and steam inhalation for 15 minutes three times daily for as long as the patients had complaints.

Patients with complaints lasting more than 3 months or severe illness were excluded.

By day 4

- 50% of the antibiotic group were 'cured'

By day 5

- 50% of the placebo group were 'cured'

By day 10

- 60% of both groups 'cured'
- 85% of all patients reported improvement.

('Cured' means resolution of facial pain and resumption of daily activities.)

van Buchem in The Netherlands

This was a primary care based trial using patients suspected of having acute maxillary sinusitis who also had an abnormal radiograph (with a fluid level, opacity, or more than 5 mm mucosal thickening).

Acute sinusitis was diagnosed using the criteria of:

- acute onset of URTI
- headache
- nasal obstruction
- discharge
- tapping pain on the maxillary sinus.

A total of 488 patients with these symptoms were recruited, and 272 (56%) had radiographic abnormalities.

van Buchem found no significant difference between the placebo and the treatment arms (amoxicillin 750 mg three times daily for 7 days). Both arms received xylometazoline (Otrivin) 0.1% and steam inhalation.

By day 14

➤ symptoms had improved substantially or disappeared in 83% of the amoxicillin group and 77% of the placebo group ($p = 0.2$).

➤ there were no symptoms in 68% and 52% respectively ($p = 0.06$).

The proportion of relapses after 1 year was larger (though not significantly) for those treated with antibiotics (21% vs 17% for placebo).

Selecting patients who may benefit from antibiotic therapy

Who has acute bacterial sinusitis?

Several studies have looked at this issue with variable results. It is worth noting that severe cases were excluded from most trials. In an acute episode, the longer the duration of sinusitis (more than 7 days), the greater the likelihood of bacterial infection.

Hansen used CT scans and antral puncture to confirm diagnosis. He found symptoms and signs were not helpful, but a raised erythrocyte sedimentation rate (ESR) and C reactive protein were independently associated with acute bacterial maxillary sinusitis.

Lindbaek used CT imaging to diagnose sinusitis. He found a specificity of 0.81 and a sensitivity of 0.66 for three of four of:

- two phase illness
- purulent nasal discharge
- purulent secretions in nasal cavity
- ESR > 10.

Williams used sinus radiographs. He noted a positive association with the following:

- maxillary toothache
- transillumination of maxillary sinuses
- poor response to nasal decongestants
- coloured nasal discharge
- mucopurulence seen during examination
- the overall clinical impression (likelihood ratio (LR) high 4.7; intermediate - LR 1.4, and low likelihood - LR 0.4).

Patient satisfaction

Patients with respiratory infections may seek medical care with expectations that frequently include obtaining a prescription for antibiotics. It is possible doctors over-prescribe antibiotics in response to patients' expectations, both perceived and real. However, an association between patient satisfaction and antibiotic prescribing has not been clearly established. In fact, the quality of the doctor-patient interaction has greater impact on patient satisfaction. A number of studies have demonstrated that satisfaction strongly correlates with the patient believing that the physician had spent sufficient time explaining the illness, and with the patient understanding the physician's choice of treatment.

Conclusions

'(One of the) classic dilemmas of clinical practice - how to practise good medicine when there imperfect information and how to balance the responsibilities of the doctor to the individual patient and to the community.'

Bacterial sinusitis is difficult to diagnose clinically. Several researches reported that almost half the clinical diagnoses were not confirmed on further investigation (Table 4). Most patients will recover well without antibiotics, and nasal decongestants appear to confer benefit; hylometazoline 0.1% (Otrivin) nasal spray (or similar agent) three times per day can be prescribed for 3-5 days. Longer use may lead to rebound congestion.

Table 4. Therapeutic Guidelines - Antibiotic 10th Edition recommends treatment in patients with:

- severe cases with purulent discharge of > 7 days.
- facial pain.
- tender sinuses.
- headache.
- prolonged fever.

Given the above studies one could consider using antibiotics in patients with:

- severe illness
- illness lasting > 7 days
- a two phase illness
- purulent secretions reported or seen on examination
- maxillary toothache
- poor response to decongestants
- a combination of symptoms and signs resulting in a 'gut feeling' that the patient is likely to have acute bacterial sinusitis.

In patients believed to have a high likelihood of having acute bacterial sinusitis, amoxicillin is the preferred first line agent. Cotrimoxazole is the recommended therapy for penicillin allergic patients. In cases not responding to first line therapy add amoxicillin/clavulanic acid.

Summary of Important Points

- Bacterial sinusitis is difficult to diagnose clinically.
- Most patients will recover well without antibiotics.
- Nasal decongestants appear to confer benefit; xylometazoline 0.1% nasal spray three times daily can be prescribed for 3-5 days.
- Antibiotics should be considered in severe cases with purulent discharge > 7 days, facial pain, tender sinuses, headache and prolonged fever.
- Amoxicillin is the drug of choice, with cotrimoxazole or doxycycline for the penicillin allergic patient.