Acute sinusitis and treatment strategies
by Steven Pray, PhD, RPh

Sinus infections are caused by a variety of pathogens and can lead to serious complications if not treated properly.

Purpose of the sinuses
Why is the human skull riddled with holes? Medical experts cannot find any compelling evidence that sinuses serve a useful purpose, but theories abound. For instance, the mucus secreted by sinuses may aid in air cleansing. Perhaps inspired air is further humidified and warmed by the sinuses. The sinuses may help absorb the shock of a blow to the face or skull. It may be that sinuses help prevent neck trauma by lessening the weight of the head. Finally, the sinuses may exist only to give the voice its resonant quality, although it is difficult to envision an evolutionary advantage to bolster this theory.

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Anatomy
Sinus is the general medical term for a cavity. However, as understood by the lay public, a sinus is one of a set of cavities in the cranial bones. Medical professionals more properly refer to these cranial cavities as the paranasal sinuses, since they are accessory to the nose.

There are four sets of paranasal sinuses: the maxillary, frontal, ethmoid and sphenoid sinuses. Each is connected to the nasal cavity by a narrow drainage tube (ostium), which is one to three millimetres in diameter. These tubes drain directly into the lateral walls of the interior nose through the intricate tissues of the inner nose, known as the turbinates or conchae. The sinuses are lined with a ciliated mucous membrane known as the mucoperiosteum.

Normal sinus self-cleansing
The sinuses are intended to be self-cleansing. The process by which this occurs is essentially identical to the mechanism of mucokinesis that cleanses the lungs. In both areas, ciliated cells lining the outermost layers of the mucous membrane sweep mucus, entrapped particles and other foreign material toward the ostia. In healthy individuals, this waste merges with the materials that are cleansed from the lower respiratory passages. The secretions move down the pharynx for eventual digestion.

The genesis of sinusitis
The primary defect in the genesis of sinusitis is obstruction of the ostia, resulting in decreased efficiency of mucociliary drainage. Obstruction may be a result of a bony abnormality or inflammation of the nasal mucosa. When drainage is impaired, secretions are retained in the sinuses and oxygen content drops, impairing local defence responses such as phagocytosis and bacterial lysis. The decrease in oxygen tension also promotes bacterial growth.

Microbiology
Attempting to discover which pathogen is causing a sinus infection is difficult. Nasal swabs yield such organisms as coagulase-negative staphylococci, Staphylococcus aureus, Corynebacterium species, and Propionibacterium acnes. These are usually misleading contaminants as they seldom cause sinus infections. For this reason, sinus aspiration is better able to reveal the actual cause, which is most likely to be Haemophilus influenzae or Streptococcus pneumoniae in cases of acute sinusitis, or various species of Peptostreptococcus, Fusobacterium, and Prevotella in cases of infected chronic sinusitis. Paediatric patients with acute sinusitis are more likely to be infected with Moraxella (Branhamella) catarhalis.

Manifestations of sinusitis
No single symptom can conclusively establish a diagnosis of acute sinusitis. This is the crux of the argument for referral of all patients with suspected sinus infection. Manifestations of acute sinusitis include a history of biphasic illness or double sickening, in which the patient who has experienced a common cold seems to be improving but then notices a relapse. Pain that is more prominent on one side of the head is typical with unilateral sinus infections.
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The patient often complains of purulent nasal secretions that are present in the nostrils when they are visually examined. The nose is congested, and rhinorrhea is often prominent. Nasal congestion can decrease the sense of smell. Purulent pharyngeal drainage is also possible, brought up by cough (which is often worse at night). Facial pain above or below the eyes worsens if the patient leans forward, and is usually worse early in the day. The teeth may ache if a maxillary sinus is involved. Sore throat, halitosis, earache, headache and wheezing may all occur.

Complications

Patients must seek care when sinusitis is suspected. If untreated, a sinus infection can result in severe complications. These include intracranial problems such as meningitis, brain abscess, and epidural or subdural empyema. Extracranial complications include orbital cellulitis, blindness, orbital abscess, and osteomyelitis. Intracranial complications are more common with frontal and ethmoid infections than infections of other sinuses; extracranial complications are more likely in ethmoid infections than infections of other sinuses because of the thin orbital wall and its proximity to the ethmoid sinuses.

Medical diagnosis

In performing the differential diagnostic steps for sinusitis, the doctor must rule out temporomandibular joint involvement and conditions such as migraine, cluster headache, dental pain, and trigeminal neuralgia. A combination of tests can be utilised to confirm acute sinusitis, including palpation, transillumination, sinus x-rays, computed tomography (CT) scanning, and anterior rhinoscopy. Patients who self-treat with an OTC product for sinus risk masking more serious conditions.

Treatment

If the patient has bacterial sinusitis, treatment must include an appropriate antibiotic/antibacterial agent to prevent the development of complications and reduce the risk of chronic sinusitis. Doctors usually prescribe empirically, based on the most common organisms. They recommend such products as amoxicillin, amoxicillin/clavulanate, cefaclor, trimethoprim/sulfamethoxazole, clarithromycin, and cefuroxime. The duration of therapy is controversial. Therapies lasting ten to 14 days are considered the standard, but some studies seem to show success with regimens as short as three days for trimethoprim/sulfamethoxazole. The quinolones are also used for successful treatment of acute sinusitis. Antibiotics/antibacterial therapy achieves success in only 75-90% of patients, however. The balance may require a second-line agent. Occasionally, patients develop chronic sinusitis, which is not as likely to respond to

to reduce the risk through the prompt administration of decongestants at the first sign of a viral respiratory infection. This assumes greater importance if the patient has a history of sinusitis.

Decongestants are useful in acute sinusitis. Oral products (eg pseudoephedrine) act systemically, and should be able to reach the congested tissues of the sinuses better than sprays or drops. However, topical nasal vasoconstrictors (eg oxymetazoline, phenylephrine) also hasten flow of secretions through the ostia by decongesting the nasal passages. Doctors may prescribe guaifenesin to thin secretions in acute sinusitis. OTC guaifenesin does not carry this indication, however.

Several authors consider steam therapy important in the adjunctive treatment of acute sinusitis through its ability to increase mucociliary clearance. It may also decrease facial pain and improve nasal congestion. The most effective methods of achieving optimal airway humidity are with the use of vaporisers (for steam) or humidifiers (for a cool mist).

Acute sinusitis is not a condition in which histamine release plays a role. Therefore, the use of antihistamines in acute sinusitis is without foundation. Further, antihistamines with anticholinergic activity inhibit secretions, which is counterproductive in acute sinusitis. The drying effect of antihistamines on mucous membranes may result in the formation of crusts that block the ostia, hampering sinus drainage.