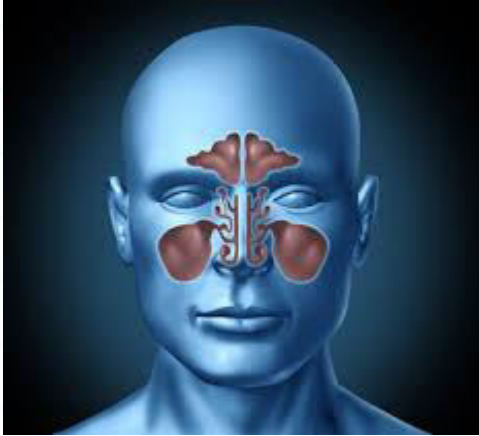


Sinusitis



Sinusitis, also known as a sinus infection or rhinosinusitis, is inflammation of the sinuses resulting in symptoms. Common signs and symptoms include thick nasal mucous, a plugged nose, and pain in the face. Other signs and symptoms may include fever, headaches, poor smell, sore throat, and cough. The cough is often worse at night. Serious complications are rare. It is defined as acute rhinosinusitis (ARS) if it lasts less than 4 weeks and as chronic rhinosinusitis (CRS) if it lasts for more than

12 weeks.

It can be due to infection, allergies, air pollution, or structural problems in the nose. Most cases are due to a viral infection. A bacterial infection may be present if symptoms last more than ten days or if a person worsens after starting to improve. Recurrent episodes are more likely in people with asthma, cystic fibrosis, and poor immune function. X-rays are not typically needed unless complications are suspected. In chronic cases confirmatory testing is recommended by either direct visualization or computed tomography.

Conditions that can cause sinus blockage include the common cold, allergic rhinitis (swelling of the lining of the nose), nasal polyps (small growths in the lining of the nose), or a deviated septum (a shift in the nasal cavity).

There are different types of sinusitis, including:

- Acute sinusitis: A sudden onset of cold-like symptoms such as runny, stuffy nose and facial pain that does not go away after 10 to 14 days, Acute sinusitis typically lasts 4 weeks or less
- Subacute sinusitis: An inflammation lasting 4 to 8 weeks
- Chronic sinusitis: A condition characterized by sinus inflammation symptoms lasting 8 weeks or longer
- Recurrent sinusitis: Several attacks within a year

Causes of Sinusitis

Both smoking and second hand smoke are associated with chronic rhinosinusitis. Maxillary sinusitis may also be of dental origin ("odontogenic sinusitis"), and constitutes a significant percentage (about 20% of all cases of maxillary sinusitis), given the close proximity of the

teeth and the sinus floor. The cause of this situation is usually a periapical or periodontal infection of a maxillary posterior tooth, where the inflammatory exudate has eroded through the bone superiorly to drain into the maxillary sinus. Once an odontogenic infection involves the maxillary sinus, it is possible that it may then spread to the orbit or to the ethmoid sinus. Complementary tests based on conventional radiology techniques and modern technology may be indicated, based on the clinical context.

Chronic sinusitis can also be caused indirectly through a common but slight abnormality within the auditory or eustachian tube, which is connected to the sinus cavities and the throat. This tube is usually almost level with the eye sockets but when this sometimes hereditary abnormality is present, it is below this level and sometimes level with the vestibule or nasal entrance.

Acute

Acute sinusitis is usually precipitated by an earlier upper respiratory tract infection, generally of viral origin, mostly caused by rhinoviruses, coronaviruses, and influenza viruses, others caused by adenoviruses, human parainfluenza viruses, human respiratory syncytial virus, enteroviruses other than rhinoviruses, and metapneumovirus. If the infection is of bacterial origin, the most common three causative agents are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. Until recently, *Haemophilus influenzae* was the most common bacterial agent to cause sinus infections. However, introduction of the H. influenza type B (Hib) vaccine has dramatically decreased H. influenza type B infections and now non-typable H. influenza (NTHI) are predominantly seen in clinics. Other sinusitis-causing bacterial pathogens include *Staphylococcus aureus* and other streptococci species, anaerobic bacteria and, less commonly, gram negative bacteria. Viral sinusitis typically lasts for 7 to 10 days, whereas bacterial sinusitis is more persistent. Approximately 0.5% to 2% of viral sinusitis results in subsequent bacterial sinusitis. It is thought that nasal irritation from nose blowing leads to the secondary bacterial infection.

Acute episodes of sinusitis can also result from fungal invasion. These infections are typically seen in patients with diabetes or other immune deficiencies (such as AIDS or transplant patients on immunosuppressive anti-rejection medications) and can be life-threatening. In type I diabetics, ketoacidosis can be associated with sinusitis due to mucormycosis.

Chemical irritation can also trigger sinusitis, commonly from cigarette smoke and chlorine fumes. Rarely, it may be caused by a tooth infection.

Chronic

By definition chronic sinusitis lasts longer than three months and can be caused by many different diseases that share chronic inflammation of the sinuses as a common symptom. Symptoms of chronic sinusitis may include any combination of the following: nasal congestion, facial pain, headache, night-time coughing, an increase in previously minor or

controlled asthma symptoms, general malaise, thick green or yellow discharge, feeling of facial 'fullness' or 'tightness' that may worsen when bending over, dizziness, aching teeth, and/or bad breath. Each of these symptoms has multiple other possible causes, which should be considered and investigated as well. Often chronic sinusitis can lead to anosmia, the inability to smell objects. In a small number of cases, acute or chronic maxillary sinusitis is associated with a dental infection. Vertigo, lightheadedness, and blurred vision are not typical in chronic sinusitis and other causes should be investigated.

Chronic sinusitis cases are subdivided into cases with polyps and cases without polyps. When polyps are present, the condition is called chronic hyperplastic sinusitis; however, the causes are poorly understood and may include allergy, environmental factors such as dust or pollution, bacterial infection, or fungus (either allergic, infective, or reactive).

Chronic rhinosinusitis represents a multifactorial inflammatory disorder, rather than simply a persistent bacterial infection. The medical management of chronic rhinosinusitis is now focused upon controlling the inflammation that predisposes patients to obstruction, reducing the incidence of infections. However, all forms of chronic rhinosinusitis are associated with impaired sinus drainage and secondary bacterial infections. Most individuals require initial antibiotics to clear any infection and intermittently afterwards to treat acute exacerbations of chronic rhinosinusitis.

A combination of anaerobic and aerobic bacteria are detected in conjunction with chronic sinusitis. Also isolated are *Staphylococcus aureus* (including methicillin resistant *S. aureus*) and coagulase-negative *Staphylococci* and Gram negative enteric organisms can be isolated.

Attempts have been made to provide a more consistent nomenclature for subtypes of chronic sinusitis. The presence of eosinophils in the mucous lining of the nose and paranasal sinuses has been demonstrated for many patients, and this has been termed eosinophilic mucin rhinosinusitis (EMRS). Cases of EMRS may be related to an allergic response, but allergy is not often documented, resulting in further subcategorization into allergic and non-allergic EMRS.

A more recent, and still debated, development in chronic sinusitis is the role that fungi play in this disease. It remains unclear if fungi are a definite factor in the development of chronic sinusitis and if they are, what the difference may be between those who develop the disease and those who remain free of symptoms. Trials of antifungal treatments have had mixed results.

Recent theories of sinusitis indicate that it often occurs as part of a spectrum of diseases that affect the respiratory tract (i.e., the "one airway" theory) and is often linked to asthma. All forms of sinusitis may either result in, or be a part of, a generalized inflammation of the airway, so other airway symptoms, such as cough, may be associated with it.

Pathophysiology

It has been hypothesized that biofilm bacterial infections may account for many cases of antibiotic-refractory chronic sinusitis. Biofilms are complex aggregates of extracellular matrix and inter-dependent microorganisms from multiple species, many of which may be difficult or impossible to isolate using standard clinical laboratory techniques. Bacteria found in biofilms have their antibiotic resistance increased up to 1000 times when compared to free-living bacteria of the same species. A recent study found that biofilms were present on the mucosa of 75% of people undergoing surgery for chronic sinusitis.

Symptoms of Sinusitis

A symptom is any subjective evidence of disease, while a sign is any objective evidence of disease. Therefore, a symptom is a phenomenon that is experienced by the individual affected by the disease, while a sign is a phenomenon that can be detected by someone other than the individual affected by the disease. For examples, anxiety, pain, and fatigue are all symptoms. In contrast, a bloody nose is a sign of injured blood vessels in the nose that can be detected by a doctor, a nurse, or another observer.

Common symptoms of sinusitis include:

- Postnasal drip
- Discolored nasal discharge (greenish in color)
- Nasal stuffiness or congestion
- Tenderness of the face (particularly under the eyes or at the bridge of the nose)
- Frontal headaches
- Pain in the teeth
- Coughing
- Fever
- Fatigue
- Bad breath

Sinus disease is often confused with rhinitis, a medical term used to describe the symptoms that accompany nasal inflammation and irritation. Rhinitis only involves the nasal passages. It could be caused by a cold or allergies.

Allergies can play an important role in chronic (long-lasting) or seasonal rhinitis episodes. Nasal and sinus passages become swollen, congested, and inflamed in an attempt to flush out offending inhaled particles that trigger allergies. Pollen are seasonal allergens. Molds, dust mites and pet dander can cause symptoms year-round.

Asthma also has been linked to chronic sinus disease. Some people with a chronic nasal inflammation and irritation and/or asthma can develop a type of chronic sinus disease that is not caused by infection. Appropriate treatment of sinus disease often improves asthma symptoms.

Diagnosis of Sinusitis

Diagnosis depends on symptoms and requires an examination of the throat, nose and sinuses. Your doctor will look for:

- Redness
- Swelling of the nasal tissues
- Tenderness of the face
- Discolored (greenish) nasal discharge
- Bad Breath

If sinus disease lasts longer than eight weeks, or if standard antibiotic treatment is not working, a sinus CT scan may help your doctor diagnose the problem. An allergist or an otolaryngologist (a doctor specializing in the ear, nose and throat) may examine your nose or sinus openings. The exam uses a long, thin, flexible tube with a tiny camera and a light at one end that is inserted through the nose. It is not painful. Your doctor may give you a light anesthetic nasal spray to make you more comfortable.

Mucus cultures: If your sinus disease is chronic or has not improved after several rounds of antibiotics, a mucus culture may help to determine what is causing the infection. Most mucus samples are taken from the nose. However, it is sometimes necessary to get mucus (or pus) directly from the sinuses.

Knowing what kind of bacteria is causing the infection can lead to more effective antibiotic therapy. A fungus could also cause your sinus disease. Confirming the presence of fungus is important. Fungal sinusitis needs to be treated with antifungal agents, rather than antibiotics. In addition, some forms of fungal sinus disease—allergic fungal sinusitis, for example—do not respond to antifungal agents and often require the use of oral steroids.

Your doctor may consider ordering a sinus CT. This test can help to define the extent of the infection. Your doctor may also send you to a specialist in allergy and immunology. The specialist will check for underlying factors such as allergies, asthma, structural defects, or a weakness of the immune system.

Biopsies: A danger of more serious types of fungal sinus disease is that the fungus could penetrate into nearby bone. Only a bone biopsy can determine if this has happened. Biopsies involving sinus tissue are taken with flexible instruments inserted through the nose.

Biopsies of the sinus tissue are also used to test for immotile cilia syndrome, a rare disorder that can cause people to suffer from recurrent infections, including chronic sinusitis, bronchitis and pneumonia.

Treatment of Sinusitis

Antibiotics

Antibiotics are standard treatments for bacterial sinusitis. Antibiotics are usually taken from 3 to 28 days, depending on the type of antibiotic. Because the sinuses are deep-seated in the bones, and blood supply is limited, longer treatments may be prescribed for people with longer lasting or severe cases.

Overuse and abuse of antibiotics have been causing a major increase in antibiotic resistance. Therefore, patients with sinus symptoms should consider taking an antibiotic only if symptoms (including discolored nasal discharge) persist beyond 7-10 days.

Antibiotics help eliminate sinus disease by attacking the bacteria that cause it, but until the drugs take effect, they do not do much to alleviate symptoms. Some over-the-counter medications can help provide relief.

Nasal decongestant sprays

Topical nasal decongestants can be helpful if used for no more than three to four days. These medications shrink swollen nasal passages, facilitating the flow of drainage from the sinuses. Overuse of topical nasal decongestants can result in a dependent condition in which the nasal passages swell shut, called rebound phenomenon.

Antihistamines

Antihistamines block inflammation caused by an allergic reaction so they can help to fight symptoms of allergies that can lead to swollen nasal and sinus passages.

Nasal decongestants and antihistamines

Over-the-counter combination drugs should be used with caution. Some of these drugs contain drying agents that can thicken mucus. Only use them when prescribed by your doctor.

Topical nasal corticosteroids

These prescription nasal sprays prevent and reverse inflammation and swelling in the nasal passages and sinus openings, addressing the biggest problem associated with sinusitis. Topical nasal corticosteroid sprays are also effective in shrinking and preventing the return of nasal polyps. These sprays at the normal dose are not absorbed into the blood stream and could be used over long periods of time without developing "addiction."

Nasal saline washes

Nasal rinses can help clear thickened secretions from the nasal passages.

Surgery

If drug therapies have failed, surgery may be recommended as a last resort. It is usually performed by an otolaryngologist. Anatomical defects are the most common target of surgery. Your surgeon can fix defects in the bone separating the nasal passages, remove nasal polyps, and open up closed passages. Sinus surgery is performed under either local or general anesthesia, and patients often can go home on the same day.

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