

## Key points

- Acute and chronic rhinosinusitis are common disorders that can adversely affect patient quality of life.
- Most patients with mild acute rhinosinusitis can be treated expectantly using analgesics in conjunction with oxymetazoline hydrochloride or intranasal corticosteroids.
- Antibiotics are indicated in patients with severe acute rhinosinusitis or with mild acute rhinosinusitis not responding to treatment with nasal sprays.
- Chronic rhinosinusitis is treated with a protracted course of saline irrigations and intranasal corticosteroid therapy.
- Referral is indicated when severe acute and chronic rhinosinusitis do not respond to appropriate medical therapy, when acute rhinosinusitis is recurrent, and if the diagnosis is in doubt or complications are suspected.
- A sinus CT scan is recommended before referral, as patients may require functional endoscopic sinus surgery.

# Treatment decisions in adult rhinosinusitis

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Adult rhinosinusitis is one of the most commonly diagnosed conditions in Australia and patients will often present to their GP for treatment. A thorough patient history is important for the diagnosis of acute and chronic rhinosinusitis, and for guiding appropriate medical therapy.

Rhinosinusitis is one of the most commonly diagnosed conditions in Australia, with most patients presenting to their GP for treatment. Both acute and chronic rhinosinusitis adversely affect quality of life and impose significant medical costs for patients, while also creating additional indirect costs to society through loss of work and reduced workplace productivity. The aim of this article is to review the diagnosis and management of acute rhinosinusitis and chronic rhinosinusitis in adults.

## NASAL ANATOMY

The paranasal sinuses are a group of air-filled chambers in the face that are named according to the bone by which they are located (Figures 1 and 2). They include:

- maxillary sinuses – located in the maxillary bone, behind the cheeks
- frontal sinuses – located in the frontal bone, above the eyes
- ethmoid sinuses – a group of six to 12 small

sinus cells located between the orbits

- sphenoid sinus – the most posterior sinus, located in the central skull base below the pituitary gland.

The paranasal sinuses are lined by ciliated respiratory epithelium and produce about 500 mL of mucus a day that helps remove trapped dust particles and bacteria that have been inhaled. This mucus, which is normally watery thin, drains through a series of channels, eventually entering the nasal cavity through a final common drainage pathway (known as the osteomeatal complex) that is located lateral to the middle turbinate (Figure 1). The mucus then drains into the posterior nasal cavity and down the throat, where it is swallowed.

## RHINOSINUSITIS

Rhinosinusitis is defined as inflammation of the nose and paranasal sinuses and can be classified as:

- acute rhinosinusitis, in which symptoms

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- last less than 12 weeks
- chronic rhinosinusitis, in which symptoms last longer than 12 weeks
- recurrent acute rhinosinusitis, in which patients experience more than three to four episodes of acute rhinosinusitis per year, but remain free of sinus symptoms between acute exacerbations.

Various international task forces have used evidence-based methodology to provide guidelines for the diagnosis and treatment of rhinosinusitis and nasal polyps. As rhinitis nearly always coexists with sinusitis, the term sinusitis has now been replaced by the more accurate term rhinosinusitis.

### ACUTE RHINOSINUSITIS

Acute rhinosinusitis is a bacterial infection of the sinuses. Most cases of acute rhinosinusitis develop when a viral upper respiratory tract infection (URTI), usually the common cold, causes nasal congestion and impairs sinus drainage. If the mucosal oedema in the sinus drainage pathways is particularly severe, it can impede mucus transport resulting in the retention of mucus in the sinuses. This trapped mucus then becomes secondarily infected by bacteria, causing acute rhinosinusitis. It has been estimated that about 0.5 to 2% of common colds are complicated by acute rhinosinusitis.

### Diagnosis

A diagnosis of acute rhinosinusitis in general practice rests largely on a history of a common cold that persists or progresses for longer than seven to 10 days. Symptoms of acute rhinosinusitis include:

- nasal congestion
- facial pressure, especially when leaning forward
- yellow or green mucopurulent rhinorrhoea and/or postnasal drip
- facial pain, including malar pain (maxillary sinus), nasal bridge pain (ethmoid sinuses), frontal pain (frontal sinus) and occipital or vertex pain (sphenoid sinus)
- halitosis
- loss of smell
- cough, particularly at night



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- referred dental pain (the premolar tooth roots extend towards the maxillary sinus floor, hence referred dental pain is relatively common in inflammatory sinus disorders)
- a feeling of disequilibrium due to secondary Eustachian tube dysfunction.

Physical examination of the nose and sinuses is limited in general practice. Possible physical signs of acute rhinosinusitis may include tenderness over the affected sinuses and observation of purulent discharge on anterior rhinoscopy (best achieved using an otoscope inserted into the anterior nasal cavity).

Radiographic imaging of the sinuses is unnecessary for patients who meet the diagnostic criteria for acute rhinosinusitis, unless a complication or alternative diagnosis is suspected. CT scanning remains the gold standard imaging modality for evaluating the sinuses and has replaced standard x-rays.

### Treatment

Treatment options for acute rhinosinusitis include analgesia, topical decongestants, intranasal corticosteroids and antibiotics.

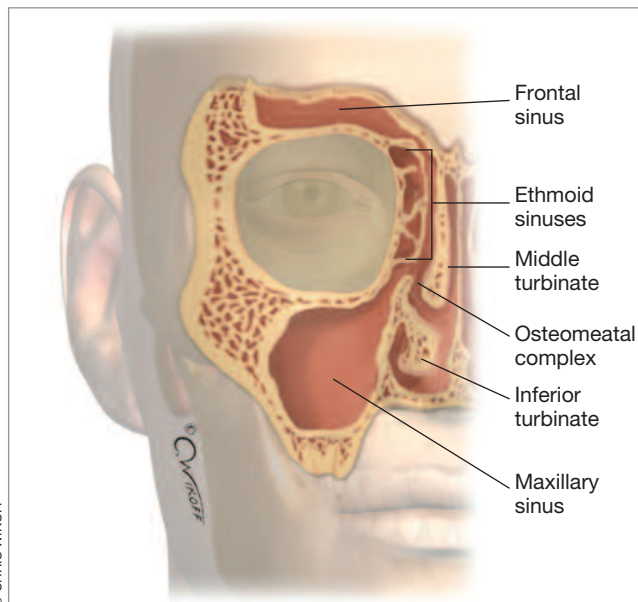


Figure 1. Sinus anatomy – coronal view.

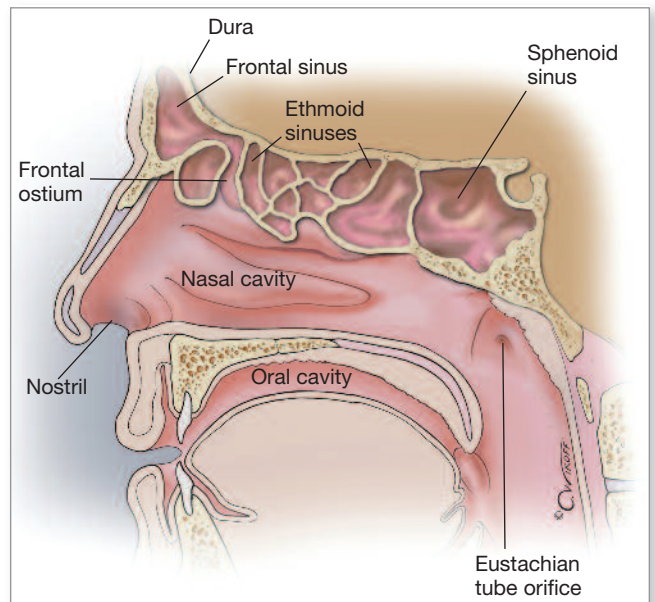


Figure 2. Sinus anatomy – profile view.

### Topical decongestants

Commercially available topical decongestants, such as oxymetazoline hydrochloride nasal spray for a duration of three to five days, help to decongest the nasal mucosa and open the sinus drainage pathways. This, in turn, facilitates sinus drainage and improves sinus ventilation. However, use of oxymetazoline hydrochloride decongestants for longer than a week should be discouraged, as prolonged use can lead to significant rebound nasal congestion which can be difficult to treat (rhinitis medicamentosa).

### Intranasal corticosteroids

A course of an intranasal corticosteroid (two to six weeks) provides an alternative treatment option to oxymetazoline hydrochloride. A recent Cochrane review supports the use of intranasal corticosteroids as monotherapy or as an adjuvant therapy to antibiotics in treating acute rhinosinusitis.<sup>1</sup>

### Antibiotics

There is moderate evidence that antibiotics provide only a small benefit in

patients who are not immunosuppressed with community-acquired uncomplicated acute rhinosinusitis. Routine antibiotic treatment can reduce the duration of symptoms; however, 80% of patients treated without antibiotics will improve within two weeks. The small benefit to the patient from treatment with antibiotics should be balanced against their potential for adverse side effects.<sup>2</sup> However, there are some situations when antibiotic treatment is clearly indicated. These include:

- patients presenting with severe symptoms
- acute rhinosinusitis that remains refractory to other, more conservative treatment measures
- patients who are immunosuppressed
- when complications are suspected (e.g. periorbital cellulitis)

The most common bacteria isolated from the maxillary sinuses of adults with acute rhinosinusitis are *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis*. Amoxicillin (seven to 14 days) is appropriate first-line therapy for adults with acute

rhinosinusitis. For patients with penicillin hypersensitivity, antibiotic treatment options include sulfamethoxazole-trimethoprim, cefaclor monohydrate or doxycycline. If patients fail to respond to first-line antibiotic therapy within three to five days, second-line therapy should be considered. Appropriate antibiotic choices include amoxicillin clavulanate, cefaclor monohydrate or cefuroxime axetil.

### Recurrent acute rhinosinusitis

Recurrent acute rhinosinusitis is diagnosed when upwards of three to four episodes of acute rhinosinusitis occur per year, without signs or symptoms of rhinosinusitis between these episodes. Factors that may increase the risk of recurrent acute rhinosinusitis include allergic rhinitis, immunodeficiency and anatomical variations in sinus drainage pathways that may predispose to sinus obstruction and inflammation (e.g. septal deviation, pneumatization of middle turbinate [concha bullosa], hypoplasia of maxillary sinus and narrowing of the osteomeatal complex region).

Treatment strategies to prevent recurrent acute rhinosinusitis include smoking cessation, optimising the management of allergic rhinitis and daily nasal saline irrigations. Functional endoscopic sinus surgery (FESS) is also effective in reducing the frequency of recurrent acute sinusitis; patients should have a CT scan performed prior to referral.

### Referral

Most patients with acute rhinosinusitis are managed by the GP, but referral is indicated when:

- patients are not responding to medical therapy – a sinus CT scan is recommended before referral to confirm the diagnosis. ENT surgeons can perform a nasal endoscopy to confirm the presence of pus draining out of the osteomeatal complex region and a pus swab can be taken for culture to guide further antibiotic therapy
- acute rhinosinusitis is recurrent
- a complication of acute rhinosinusitis is suspected, such as periorbital cellulitis, meningitis, localised osteomyelitis or oroantral fistula.

### Differential diagnosis

The symptoms of acute rhinosinusitis overlap with other conditions, making the diagnosis difficult at times. Differential diagnoses to consider for acute rhinosinusitis include:

- viral URTI – these commonly cause nasal congestion and clear rhinorrhoea, but rarely cause purulent rhinorrhoea or facial pain
- allergic rhinitis
- sinonasal or nasopharyngeal tumours – these rare tumours can cause progressive nasal obstruction and sometimes epistaxis, but typically do not cause pain or purulent rhinorrhoea
- acute migraine – classic migraine symptoms include photophobia, aura, unilateral headache with pain usually associated with visual disturbance. Some patients may experience migraine without classic symptoms but instead may present with mid-facial pain
- atypical facial pain syndrome – this refers to pain within the territory of the trigeminal nerve. Facial pain is usually unilateral, poorly localised and deep-seated, and often described as a severe ache or a crushing or burning sensation. Clinical examination and imaging studies are normal. Depression and anxiety are prevalent in this population
- dental infection – a periapical infection involving the upper molar or premolar teeth will typically cause unilateral facial symptoms similar to acute rhinosinusitis. Pain and fevers are common. In severe dental infections facial swelling can result (it is very rare for acute rhinosinusitis to cause facial swelling). Sometimes a periapical dental

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abscess can cause secondary acute rhinosinusitis, particularly when the infected tooth root extends into the maxillary sinus.

## **CHRONIC RHINOSINUSITIS**

Chronic rhinosinusitis is inflammation of the sinuses that persists for longer than 12 weeks. The condition is commonly seen in general practice. Some patients with chronic rhinosinusitis may experience mild symptoms for years without seeking medical advice. However, other patients may have chronic fluctuating symptoms that can exert a substantial negative impact on health and which can be associated with a reduced quality of life.

Although acute rhinosinusitis is considered to be primarily a bacterial infection, the pathogenesis of chronic rhinosinusitis remains poorly understood. There is an enormous amount of ongoing research examining the immunological mechanisms underlying chronic rhinosinusitis. Aetiological factors that are thought to play a role in chronic rhinosinusitis include:

- mucosal inflammation secondary to chronic allergic rhinitis or smoking that leads to congestion in the osteomeatal complex region
- immunodeficiency disorders, including immunoglobulin IgA and IgG subclass deficiency
- mucociliary disorders such as cystic fibrosis
- nasal polyps obstructing the sinus drainage pathways
- anatomical factors, such as a septal deviation, which may impinge onto the lateral nasal wall and exacerbate congestion around the osteomeatal complex region. Similarly, paradoxical lateral curving middle turbinates can also cause obstruction in the osteomeatal complex region.

## **Diagnosis**

The diagnosis of chronic rhinosinusitis in general practice is determined largely by the patient's clinical history. Symptoms, in order of prevalence, include:

- nasal congestion or obstruction
- facial pain, fullness or pressure
- mucopurulent rhinorrhoea or postnasal drip – often associated with a cough, especially at night
- reduced smell
- headaches
- referred dental pain
- halitosis
- intermittent ear pain due to secondary Eustachian tube dysfunction
- fatigue and chronic mild disequilibrium.

Chronic rhinosinusitis is defined as two or more symptoms for 12 or more weeks, either:

- nasal congestion/blockage/obstruction or nasal discharge (anterior rhinorrhoea or posterior post-nasal drip); and

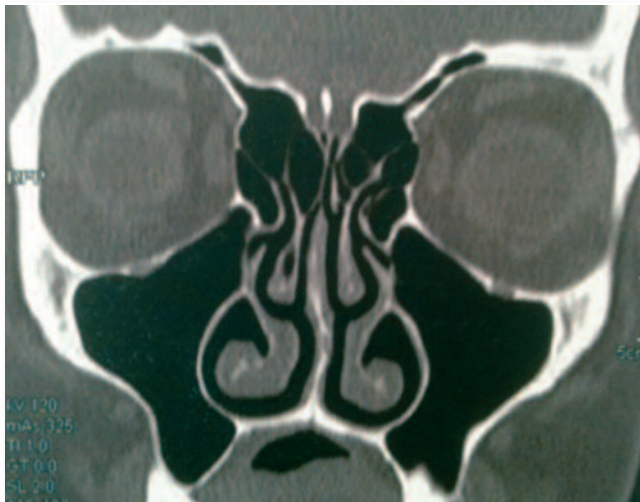


Figure 3. CT scan demonstrating well aerated sinuses with no mucosal thickening (normal CT scan).



Figure 4. CT scan demonstrating mucosal thickening throughout the ethmoid and maxillary sinuses in a patient with chronic rhinosinusitis.

- facial pain/pressure or reduction/loss of smell.

Empirical treatment can be commenced when the diagnosis is suspected. A sinus CT scan is currently the most sensitive imaging modality and can be used to confirm the diagnosis before beginning treatment or when patients treated empirically fail to respond to appropriate medical therapy (Figures 3 and 4).

### Treatment

The mainstays of medical management for chronic rhinosinusitis include nasal saline irrigations, intranasal corticosteroids, oral antibiotics and FESS. Smoking cessation is important in the management of chronic rhinosinusitis, as smoking has been shown to exacerbate the condition.

#### Nasal saline irrigations

Nasal saline irrigations (sprays and solutions) can be administered once or twice a day. Saline sprays moisten the nasal and sinus mucosa, which improves mucosal ciliary function and facilitates mucus drainage from the sinuses. Saline irrigations using a syringe or commercially available devices have the additional benefit of achieving more effective mechanical

debridement of the crusts and inspissated mucus that often collect in the nasal cavity. Patients can mix their own saline solutions using a simple recipe of one and a half teaspoons of sea or rock salt added to 500 mL of water. Most commercially available saline irrigation products can be refilled. Saline is safe, cheap and a natural product with no side effects. Patients can use saline treatments for short periods or indefinitely, as needed.

Antibiotics and corticosteroids are sometimes added to saline irrigations (when prescribed by ENT specialists); however, there is currently no evidence to support use of saline additives in patients with chronic rhinosinusitis.

#### Intranasal corticosteroids

Treatment with intranasal corticosteroids can address underlying allergic rhinitis and help to reduce congestion in the osteomeatal complex region. Intranasal corticosteroids should be continued for at least two to three months. If patients achieve significant symptom resolution after several months of taking intranasal corticosteroids, treatment can be discontinued and nasal saline irrigations continued indefinitely. Intranasal

corticosteroids are occasionally associated with minor nose bleeding but studies show no detrimental structural effects to the nasal lining following long-term use.

#### Antibiotics

The role of antibiotics is controversial in chronic rhinosinusitis. Patients may require short-term treatment with antibiotics to address acute exacerbations of chronic sinusitis. Amoxicillin potassium clavulanate for 14 days is appropriate. Macrolide antibiotics are sometimes prescribed because of their combined antibacterial and anti-inflammatory properties, but the appropriate treatment duration remains unclear (varying from two to eight weeks). Currently, there are no adequate placebo-controlled studies to justify the routine use of long term antibiotics in patients with chronic rhinosinusitis.

#### Functional endoscopic sinus surgery

Referral for FESS is indicated when chronic rhinosinusitis remains refractory to a prolonged trial of medical therapy. The aims of FESS are twofold:

- to enlarge the osteomeatal complex region by creating larger openings into the maxillary and ethmoid

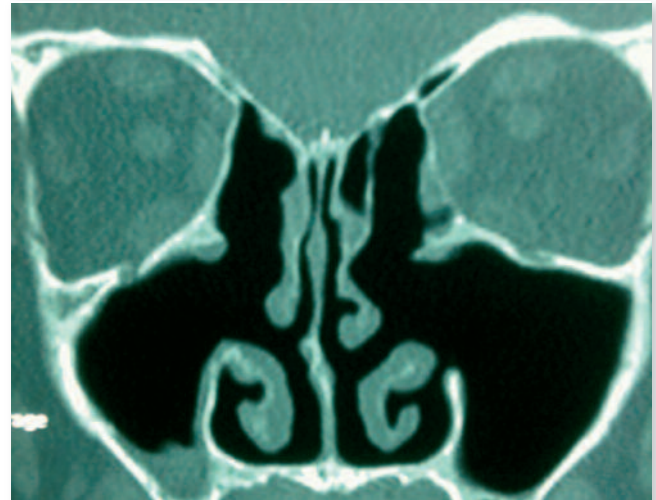
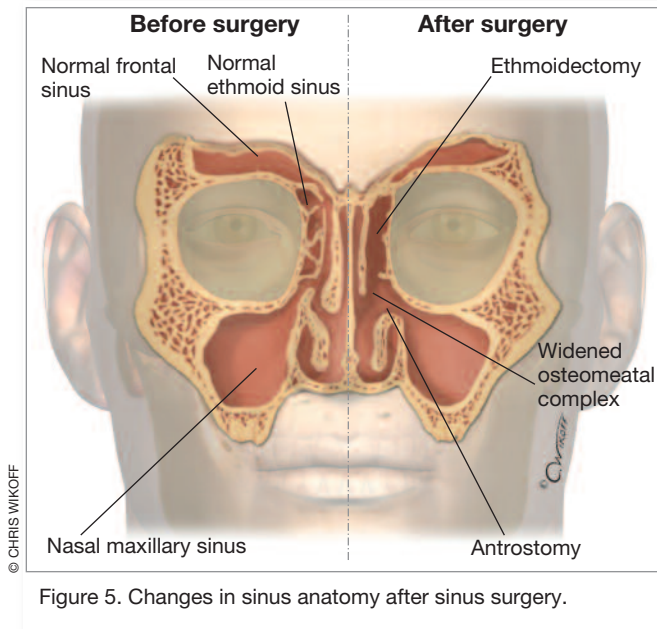


Figure 6. Postoperative CT scan demonstrating widely patent maxillary and ethmoid sinus drainage pathways with well aerated sinuses.

sinuses, which promotes more effective mucus drainage (Figures 5 and 6)

- to create larger sinus drainage pathways, which facilitates the use of long-term medical treatment to prevent chronic rhinosinusitis recurring.

FESS is carried out under general anaesthesia and can be performed as day surgery or as an overnight hospital stay. Sinus surgery has been shown to benefit patients with chronic rhinosinusitis in over 100 published case series. Major complications are rare, but revision surgery is required within five years in 5 to 10% patients. It is important that patients understand that long-term medical therapy is often required after sinus surgery to prevent chronic rhinosinusitis recurrence. Medical therapy usually includes daily nasal saline irrigations combined with the appropriate medical management of allergic rhinitis.

### Specific subtypes of chronic rhinosinusitis

#### Nasal polyps

Chronic rhinosinusitis associated with nasal polyps is relatively common. Most

patients with nasal polyps have allergic rhinitis but the reason why patients with allergic rhinitis go on to develop polyps is unknown. Inflammatory nasal polyps slowly enlarge over many years resulting in progressive nasal obstruction, obstruction of the olfactory fossa – which inevitably leads to a reduced sense of smell – and obstruction of sinus drainage pathways resulting in secondary rhinosinusitis (Figure 7).

Treatment options for patients with benign inflammatory nasal polyps include a trial of corticosteroids. A short course of reducing-dose oral prednisone (for 10 to 14 days), followed by an intranasal corticosteroid spray (for three to four months), often results in dramatic shrinkage of nasal polyps leading to symptomatic improvement. An example of a simple reducing-dose regimen includes prednisone at a dosage of 25 mg daily for the initial five days of treatment, 12.5 mg daily for the following five days and 12.5 mg on alternate days for the last five days of treatment. Higher corticosteroid doses can be used in patients with severe nasal polyps. Such ‘medical polypectomy’ with oral corticosteroids facilitates the

use of intranasal corticosteroid sprays and nasal saline irrigations by allowing more proximal delivery into the nasal and sinus cavities.

FESS is indicated when patients present with severe obstructing nasal polyps which are unlikely to respond adequately to medical therapy alone. Polyps can descend to the anterior nasal cavity and can often be seen inside the nostrils. Debulking these severe polyps provides immediate symptomatic relief and facilitates the use of long-term medical therapy with intranasal corticosteroids. FESS is also indicated in patients with mild to moderate nasal polyps whose symptoms remain refractory to a trial of corticosteroid therapy.

#### Allergic fungal rhinosinusitis

Allergic fungal rhinosinusitis (AFRS) is considered the nasal equivalent of allergic bronchopulmonary aspergillosis and is characterised by thick mucus of a ‘peanut butter’ consistency. Most patients present with peripheral blood eosinophilia and nasal polyps; histology will confirm fungal hyphae and eosinophils embedded within the mucus

material. A characteristic radiological feature of AFRS is the presence of hyperdensities within the opacified sinuses, which represents aggregations of fungal organisms and debris (double density sign on a CT scan).

Treatment requires FESS followed by a prolonged trial of intranasal corticosteroids. The use of systemic or intranasal antifungal therapies has yet to be validated.

#### *Samter's triad*

Samter's triad is a condition characterised by asthma, severe nasal polyps and aspirin or NSAID intolerance. Patients initially experience allergic nasal symptoms, which progress to adult-onset asthma and severe nasal polyps, with aspirin intolerance developing last. An allergic reaction to aspirin or to NSAIDs in these patients may cause severe asthma exacerbations, urticaria or, rarely, angioedema.

Treatment for Samter's triad includes the following: asthma therapy, corticosteroid therapy, FESS for nasal polyps and management of aspirin sensitivity, which can sometimes necessitate aspirin desensitisation.

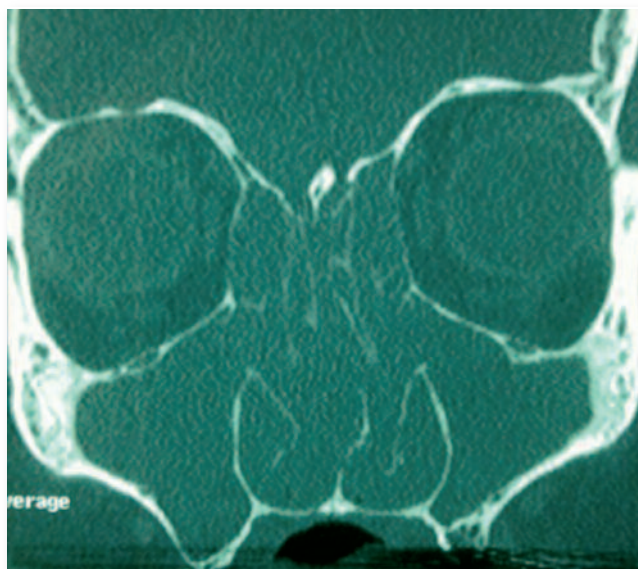


Figure 7. CT scan demonstrating severe nasal polyps completely obstructing both nasal passages resulting in widespread obstructive chronic rhinosinusitis.

#### **Differential diagnosis**

Many of the symptoms of chronic rhinosinusitis are generally nonspecific and will therefore overlap with other conditions. Differential diagnoses to consider for chronic rhinosinusitis include:

- neuralgic pain resulting from migraine, cluster or tension headaches and atypical facial pain syndrome – these patients typically present with facial pain and headaches, but have few nasal

symptoms to suggest rhinosinusitis. A sinus CT scan will help exclude chronic rhinosinusitis in these patients

- allergic rhinitis – seasonal or perennial allergic rhinitis may exist in isolation without the presence of chronic rhinosinusitis. If in doubt of the diagnosis, a prolonged trial of intranasal corticosteroids is indicated



- vasomotor rhinitis (VMR) – this is a relatively common condition, particularly in the elderly, in which the nasal secretory glands undergo autonomic deregulation, resulting in clear mucoid rhinorrhoea without any other symptoms of rhinosinusitis. Rhinorrhoea is typically exacerbated by changes in humidity, temperature and some foods and chemicals. VMR typically does not respond to intranasal corticosteroids and requires anticholinergic nasal sprays
- gastroesophageal reflux disease (GORD) – this can cause a postnasal drip sensation associated with a chronic cough. There is some evidence to suggest that GORD may contribute to the aetiology of chronic rhinosinusitis in some patients due to acid reflux into the posterior nasal cavity
- nasal obstruction as a result of adenoid hypertrophy, nasopharyngeal or nasal tumours.

### CONCLUSION

Acute rhinosinusitis and chronic rhinosinusitis are common disorders that are often seen in general practice. Acute rhinosinusitis is a bacterial infection of the sinuses that is nearly always preceded by a viral URTI. A thorough history, with emphasis on symptom duration, is important so that GPs can differentiate between a viral URTI that does not require antibiotics and acute rhinosinusitis that requires antibiotic therapy when symptoms are severe.

Chronic rhinosinusitis represents an inflammatory disorder of multifactorial aetiology. Symptoms of chronic rhinosinusitis overlap with multiple other nonsinogenic conditions, therefore an accurate history is important. Antibiotic use is controversial in chronic rhinosinusitis and therapy is aimed at addressing predisposing factors such as allergic rhinitis.

A sinus CT scan and referral to an ENT specialist are indicated when acute rhinosinusitis and chronic rhinosinusitis do not respond to appropriate medical management, when acute rhinosinusitis is recurrent or if the diagnosis is in doubt or complications of sinusitis are suspected. **MT**

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### FURTHER READING

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COMPETING INTERESTS: None.

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