

# Acute and Chronic Rhinosinusitis

## Objectives:

1. To know how to diagnose these diseases clinically and to offer acute and long-term management.
2. To know the complications of these diseases and to be able to start immediate treatment and referral.
3. To be able to explain the best technique to using nasal sprays

## Definitions

Acute rhinosinusitis (ARS) is an acute infection causing nasal obstruction, rhinorrhoea, loss of smell and postnasal discharge. Facial pain can become evident after a few days. The symptoms last less than 12 weeks but generally only a week or so.

Chronic rhinosinusitis (CRS) is diagnosed when the symptoms have been present for greater than 12 weeks. Again nasal obstruction, nasal discharge, reduction in smell, and facial discomfort. Two or more of these must be present for more than 12 weeks to make a diagnosis and the clinician should preferably have seen pus draining from the middle meatus, or nasal polyps, or oedema in the middle meatus too.

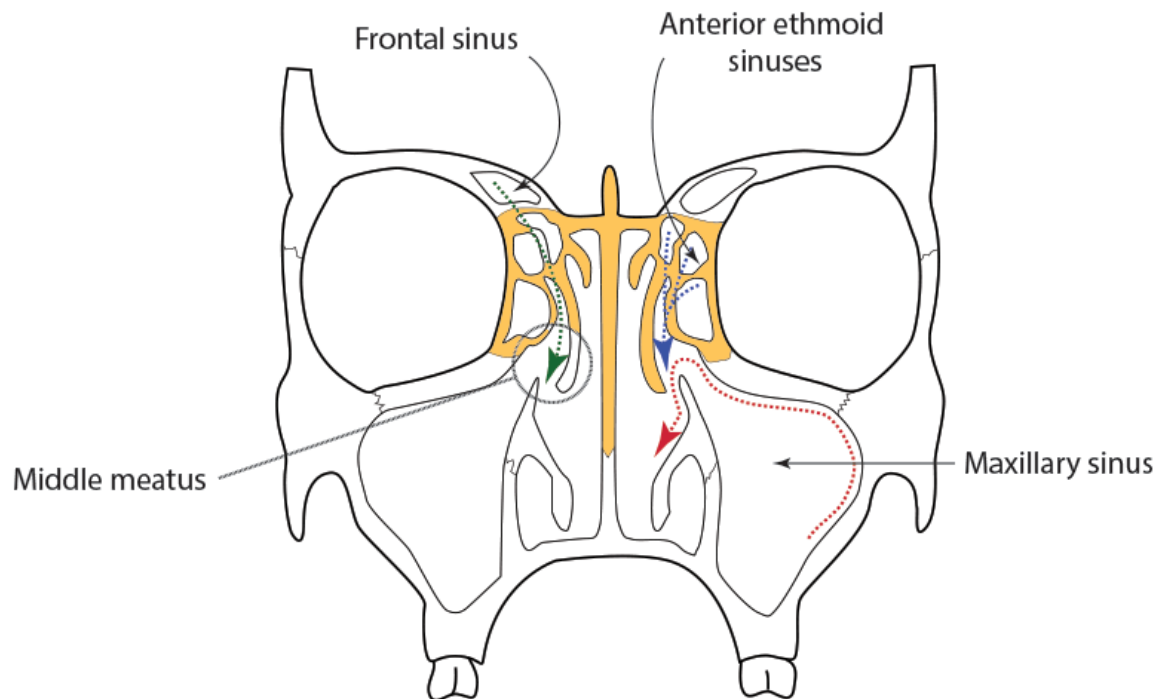
CRS may present with or without polyps.

## Relevant Anatomy

Sinuses are air filled spaces within the bones of the face and skull. Their function is uncertain but many theories exist. Some suggest that they act as a crumple zone, others that they lighten the face. A plausible theory has it that they produce nitric oxide which is inhaled with air into the lungs where it acts as a smooth muscle relaxant.

The sinuses are lined with ciliated respiratory epithelium and all mucus created within them is wafted towards the ostium of the sinus and then into a meatus within the nose.

The majority of sinuses open into the middle meatus and drain as shown. The posterior ethmoids open into the superior meatus and the sphenoid sinus opens into the sphenoid recess.



Coronal section through the sinuses showing their relationships and drainage pathways.

## **Acute Rhinosinusitis**

### *Epidemiology.*

10% of population. Most occur in the winter and follow an acute viral infection. Patients with nasal allergy, who are exposed to tobacco smoke and who live in polluted areas are more likely to suffer with ARS.

### *Pathophysiology.*

An acute viral infection in the nose is the usual trigger for ARS. The infection affects cilia function and causes swelling of mucosa. These combine to cause occlusion of the small sinus ostia and stasis of mucus. In turn this allows for bacterial infection usually from *Strep pneumoniae*, *Moraxella catarrhalis* and *Haemophilus influenzae* – the usual respiratory pathogens.

Other infectious organisms can cause ARS such as infections from the upper teeth and fungi. Fungal ARS is managed differently and may require emergency surgical debridement.

### *Presentation.*

The symptoms of ARS are presented above under definitions. Examination will reveal an oedematous nasal mucosa with secretions that are clear or mucoid. Pus may be seen draining into the postnasal space or oropharynx.

Immunosuppressed patients may have a fulminant course with rapid deterioration of symptoms and consciousness.

### *Investigations.*

Generally, ARS is a clinical diagnosis. X-rays have no real place in diagnosis but CT scanning is indicated if complications of ARS or CRS are suspected (see below).

If available a nasendoscopic assessment of the middle meatus is valuable and will show draining pus or mucosal oedema. Blood tests have little to offer but will show a raised CRP and a leucocytosis.

#### *Treatment.*

For the majority of patients with ARS no treatment is required apart from simple pain relief and a nasal decongestant. The infection is self-limiting.

If symptoms persist or cause a greater systemic upset, then oral antibiotics are appropriate and are directed at the usual respiratory pathogens. Amoxicillin is a good first choice and should be used for ten days to a fortnight. Nasal decongestants and analgesia should also be used in this situation.

If complications of ARS are suspected, then systemic treatments are needed alongside investigation and management as outlined below.

Acute fungal sinusitis requires systemic antifungals e.g. amphotericin B. Emergency surgical debridement is also needed in more aggressive cases.

## **Chronic Rhinosinusitis**

#### *Epidemiology.*

CRS affects about 10% of the European population and may present in one of two forms: CRS with polyposis and CRS without polyposis. It is more common in smokers and in women. There is a section on polyps at the end of the tutorial.

#### *Pathophysiology.*

A number of different mechanisms have been adduced to explain the chronic changes in the nasal and sinus epithelium. These include, allergy, environmental factors, genetic predisposition or a combination of these.

#### *Presentation.*

The symptoms required to make a diagnosis of CRS are listed above under definitions. Endonasal examination is very helpful and probably essential in establishing a diagnosis and will show changes in the middle meatus, mucosa swelling, polyposis or pus trails coming from the sinuses.

It is noteworthy that CS is rarely a painful condition and even patients with massive polyposis don't usually complain of pain.

#### *Investigation.*

This is largely a clinical diagnosis in Primary Care but endoscopic evaluation is required for a definitive diagnosis. For those without access to endoscopy the main differential for CRS is the situation where a patient has rhinitis plus non-sinogenic pain (i.e. two different conditions in the same person)

Rhinitis is common and produces nasal blockage, discharge, and loss of smell. Put these together with facial pain from, say, facial arthromyalgia (temporomandibular pains) and it is tempting to make a diagnosis of CRS.

The challenge for the clinician in these situations is to be open to the possibility of dual pathology and to treat each separately. Occam's razor does not always apply.

CT scanning is not very helpful in diagnosing CRS as about 40% of a normal population will have radiological signs of mucosal abnormality even though they don't have symptoms of CRS. CT is used in surgical planning.

### *Treatment.*

CRS is treated by avoidance of environmental irritants and allergens, stopping smoking, long term nasal steroid sprays and nasal douching with saline solutions. With proper adherence and good technique this almost always reduces symptoms to a satisfactory level.

Nasal steroid sprays need to be used in a particular way: looking downwards towards the floor and every day.



In cases of nasal polyposis oral steroid can be used for a short period. These will very effectively reduce the size of polyps and patients can then change to topical steroid sprays.

Three months of low-dose macrolide antibiotic such as Erythromycin can also be very effective if other medical management fails.

Failing medical management surgery is planned to improve nasal airflow, remove polyps and open up the normal sinus outflow tracts.

### **Complications of sinusitis**

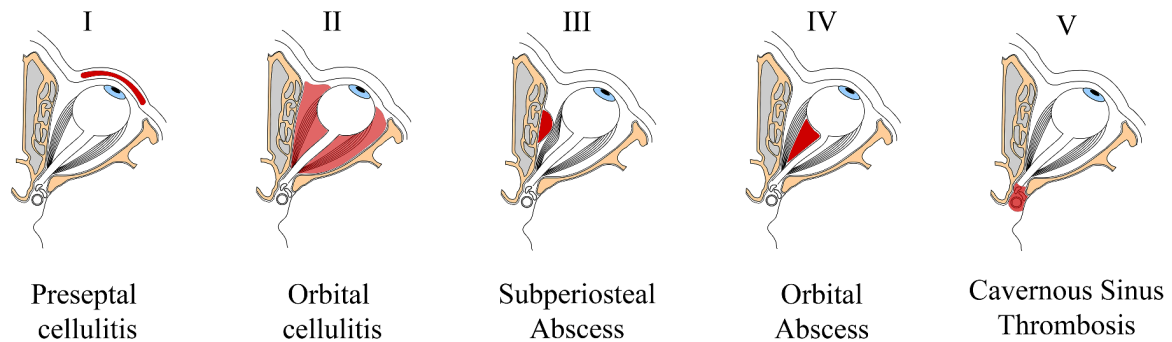
Complications are rare but serious. In essence the infection within the sinus can spread outside the sinus via direct or haematogenous spread. In either case it helps if you are familiar with the anatomy of the sinuses when thinking about complications. The most significant complications are listed here:

1. Orbital sub-periosteal abscess
2. Intracranial abscess – usually in frontal lobe
3. Osteomyelitis – aka Pott's puffy tumour

Intracranial abscesses are dealt with in collaboration with neurosurgeons.

### *Orbital complications.*

Infection can easily spread through the lamina papyracea of the ethmoid bone into the orbit, especially in children. Once inside the orbit it causes a variety of problems depending upon in which part of the orbit they arise and how extensive they are.



Chandler's Classification

Chandler's classification is a way to categorise orbital complications of sinus disease according to their severity.

By far the most common that we see in ENT is sub-periosteal orbital abscess. In this, pus collects under the periosteum of the medial wall of the orbit (over the lamina papyracea) and causes an increase in orbital pressure with proptosis of the globe, diplopia, and loss of vision in extreme circumstances.

*S. pneumonia*, *H. influenza* and *S. aureus* are common pathogens. CT scanning is used to diagnose the problem.

Treatment is by draining the abscess which is generally done by making an incision between the eye and the nose, dissecting down to bone and then elevating periosteum posteriorly until the abscess is found and drained. In adults the abscess can be drained from inside the nose using the endoscopic sinus surgery techniques used for chronic sinus disease.

### *Osteomyelitis.*

This usually presents as a firm pitting lesion under the skin of the forehead. This is an important complication as intracranial complications may occur. CT scanning will confirm the underlying disease.

Treatment is by surgery for the underlying sinus disease (either endoscopic or via open incision) and by intravenous antibiotics.

### *Intracranial Abscess.*

This is an uncommon complication of sinus disease and can present with very few symptoms or signs. It is important to bear it in mind in any patient with sinusitis who are not making the progress that one would expect while on intravenous antibiotics.

Headache, drowsiness, inattention, declining mental status are important features to watch for. Hemiparesis and speech disorder will make the diagnosis more obvious.

CT scanning with contrast will show the classic rim enhancing lesion in most recent onset cases. There may be a zone of brain oedema. MRI is more sensitive in diagnosing the problem.

Management of the abscess takes into account a number of features. Small abscesses can be aspirated for diagnosis and appropriate antibiotics given. Larger abscesses can be excised or aspirated.

Empiric management with antibiotics is appropriate while culture and sensitivity is awaited and the drug of choice will be decided by local protocol. Penicillin G is commonly prescribed as is Metronidazole. Vancomycin, imipenem and cefotaxime are also used<sup>1</sup>.

1. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, Updated Edition, Eighth Edition 2015, Saunders.

## Nasal Polyps

### Introduction

Nasal polyps are pedunculated swellings within the nasal cavity. They are almost always benign and a result of inflammatory swelling within the nose or paranasal sinuses. The nature of the inflammation varies: chronic infective, allergic and intrinsic rhinitis are the usual causes. Of these intrinsic rhinitis is by far the commonest cause.

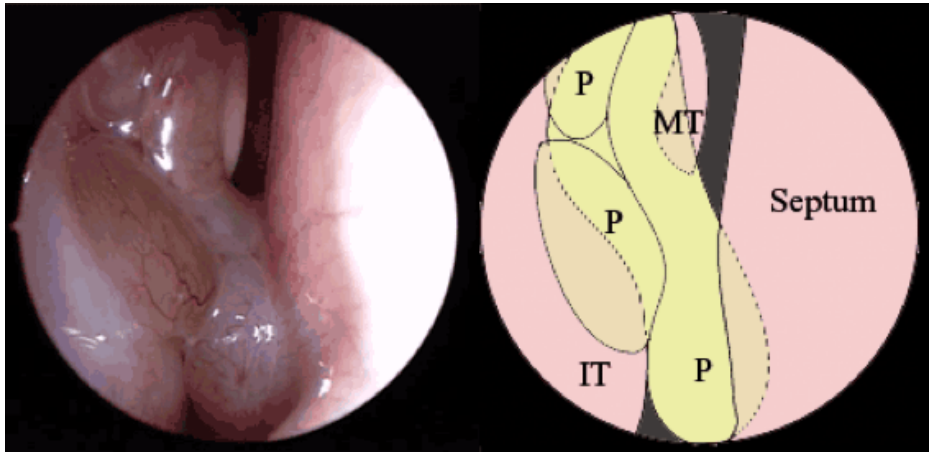
Ten percent of nasal polyps are not inflammatory in nature and are considered neoplastic (but very rarely malignant). Inverting papilloma, malignant melanoma, adenocarcinoma, squamous cell carcinoma, olfactory neuroblastoma are all possibilities but are not discussed here.

### Pathology

Macroscopically polyps are smooth, yellow-grey and shiny. They resemble grapes but individual polyps can become very large. Polyps are usually multiple especially if they come from the ethmoid sinuses.

Microscopically polyps are covered in respiratory epithelium and beneath this a markedly oedematous connective tissue stroma. Within the stroma will be found eosinophils (even when it is not a polyp of allergic origin) and histiocytes.

The image shows polyps (P) arising from the middle meatus on the patient's right side. The middle meatus is the space medial to the middle turbinate (MT). Note that the septum and inferior turbinate (IT) are partly obscured by the polyps. To the right is a schematic of the clinical image.



## Clinical Features

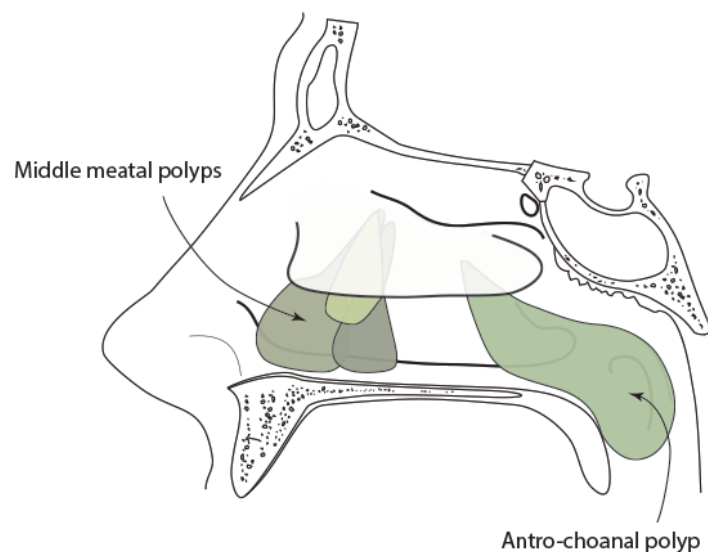
When thinking about the symptoms remember that polyps are caused by inflammation of the nasal and sinus lining and, therefore, there will be the symptoms of rhinitis as well as of the polyps.

Small polyps confined to the middle meatus (the cleft found lateral to the middle turbinate) probably will not cause nasal obstruction while large polyps that fill the nasal cavity will. However, even small polyps can predispose to recurring sinusitis by blocking off sinus ostia and causing a buildup of mucus secretion within the sinus.

Other symptoms include a loss of the senses of smell and taste, 'pressure' sensation in the forehead and headache.

In extreme cases, the polyps may appear at the nostril and even widen the nose and intercanthal distance. This is uncommon.

In this diagram the polyps are coloured green. Polyps start as a small swelling within the lining of an ethmoid sinus (remember there may be between 5 and 15 on each side). As the swelling increases the mucosa starts to bulge out of the sinus and into the middle meatus. Ultimately the polyp appears in the nasal fossa.



## Investigations

Very little is required. Tests for underlying allergy are useful in the long term management of the underlying cause.

CT scanning of the paranasal sinuses is only useful as a planning tool for surgery and plain radiology of the sinuses is unhelpful in all but rare cases.

## Management

There are two main options: Medical treatment or Surgical removal.

Medical treatment is usually tried first. Topical nasal steroids are the mainstay of early management and they are helpful when the polyps are small or moderate in size. If they become massive then oral steroid for a short period will help. Antihistamines are only of help if there is an underlying allergy (and this is uncommon). For more information on nasal sprays please consult our [pharmacology section](#) on the topic

Surgical treatment is performed when: medical management has failed; the polyps are too large for topical steroids; and when the polyp is unilateral (because of the small risk of malignancy). The operation may be a simple polypectomy or may be combined with septal and sinus surgery e.g. ethmoidectomy.

FESS is the modern approach to sinus and polyp surgery. It utilizes rigid endoscopes to give an exceptional view of the nose and sinus cavities and is often combined with the use of television monitoring and powered nasal instruments for removal of disease.

It simply aims to return sinus functional to normal with the absolute minimum of surgery.

Polyps are prone to recur. This may happen within months or many years later. They recur because the conditions that created them (rhinitis) are chronic conditions. Long-term treatment of rhinitis by topical steroids and/or antihistamines is needed for many patients. If the polyps return very frequently then an ethmoidectomy may be advisable.

## Antrochoanal Polyp

This is an uncommon, benign, solitary polyp that arises in the maxillary sinus (unlike typical nasal polyps that arise in the ethmoids). As it gets bigger it starts to protrude out of the maxilla and into the nose. Further growth occurs and the polyp enlarges backwards towards the choana and may eventually become so large that it is visible through the mouth. As it begins in the maxillary antrum and enlarges towards the choana it is called an antrochoanal polyp.

The treatment is by surgical removal but these polyps are sometimes so large that they have to be 'delivered' through the mouth after removal from the antrum.