

Rhinosinusitis

Anatomy Recap:

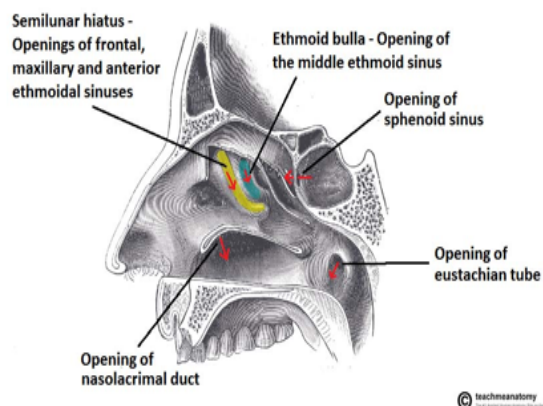
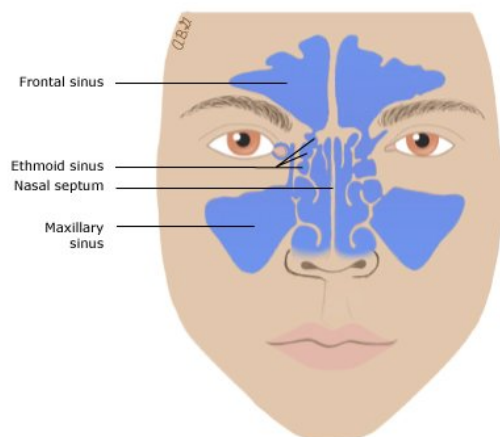
The paranasal sinuses are air-filled spaces located within the bones of the skull and facial bones, there are four sets of paired sinuses: maxillary, frontal, sphenoid, and ethmoid.

Each of the sinuses has an ostium (a distinct bony opening through which it drains):

All sinus ostia drain into the nares at locations beneath the middle and superior turbinates.

- The posterior ethmoid and sphenoid sinuses drain into the superior meatus below the superior turbinate.
 - The ostia of the maxillary, anterior ethmoid, and frontal sinuses share a common site of drainage within the middle meatus.
- This region is called the **ostiomeatal complex** which is a series of narrow, bony openings and clefts along the lateral wall of the nose and includes the middle turbinates, uncinate process, hiatus semilunaris, ethmoid bulla, and natural ostium of the maxillary sinus.

The paranasal sinuses are lined with respiratory mucosa composed of pseudostratified ciliated columnar epithelium.



Definition of Rhinosinusitis:

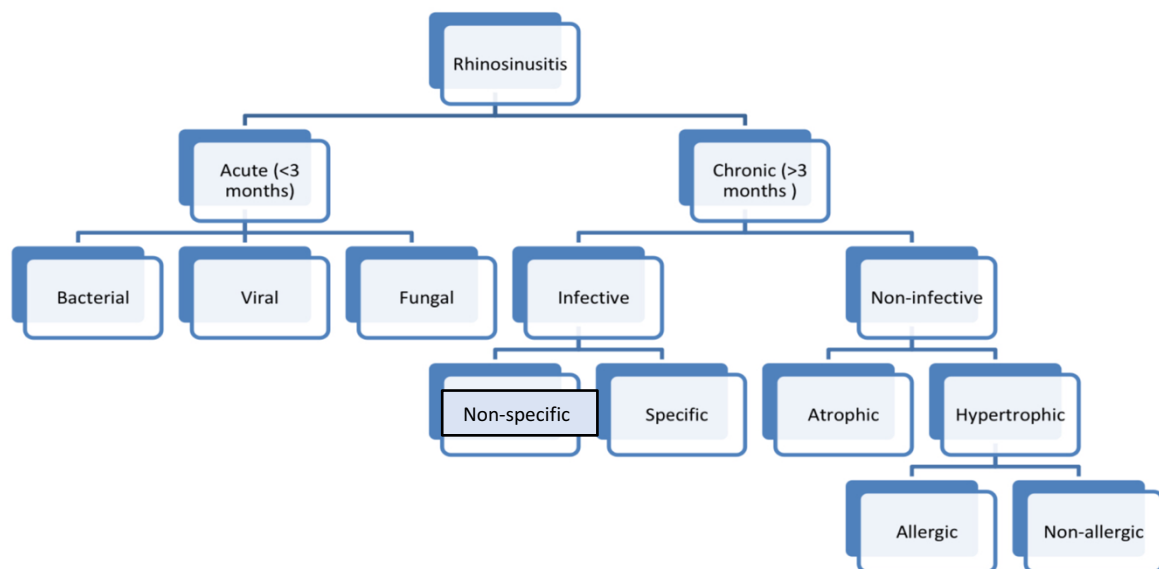
It is characterized by inflammation of the lining of the paranasal sinuses; because the nasal mucosa is *simultaneously* involved and because sinusitis rarely occurs without concurrent rhinitis, **rhinosinusitis** is now the preferred term for this condition.

Epidemiology:

It is considered an URTI which is the most common acute illness of human beings. In average the young adult has 4-6 attacks of URTI each year, it occurs more in infants and decreases with age.

Classification:

Old classification.



New Classification (USA)

Based on symptom duration:

- Acute rhinosinusitis – for less than 4 weeks.
- Subacute rhinosinusitis –for 4 to 12 weeks this is only a description of the duration not an actual type.
- Chronic rhinosinusitis –persist greater than 12 weeks.

Pathophysiology:

The pathophysiology of rhinosinusitis is related to **3** factors:

1. Obstruction of sinus drainage pathways (sinus ostia)
The ostia can be blocked by mucosal swelling or certain inflammation-associated systemic disorders and immune disorders, mechanical (nasal polyps)
2. Ciliary impairment.
Due to cold air ,exposure to bacterial toxins, genetic factors, etc.
3. Altered mucus quantity or quality.
Mucus becomes more viscous as in cystic fibrosis, overproduction of mucus can overwhelm the mucociliary clearance system, resulting in retained secretions within the sinuses.

This will impair the normal mechanism of mucus clearance resulting in **stagnation** of the mucus which will provide the suitable conditions for bacterial growth and inflammation.

Acute Rhinosinusitis (ARS)

Definition: symptomatic inflammation of the nasal cavity and paranasal sinuses lasting less than four weeks.

Etiology:

- Acute viral rhinosinusitis (AVRS) – ARS with viral etiology
- Uncomplicated acute bacterial rhinosinusitis (ABRS) – ARS with bacterial etiology **without** clinical evidence of extension outside the paranasal sinuses and nasal cavity (eg, without neurologic, ophthalmologic, or soft tissue involvement)
- Complicated acute bacterial rhinosinusitis – ARS with bacterial etiology **with** clinical evidence of extension outside the paranasal sinuses and nasal cavity.
- Acute Fungal Rhinosinusitis caused by aspergillus or candida.

Acute Viral Rhinosinusitis:

The vast majority of cases of (ARS) are due to a viral infection.

The most common viruses that cause AVRS are **rhinovirus**, influenza virus, and parainfluenza virus, also adenovirus and RSV to a lesser extent , **Rhinovirus** being the **Most** common.

Clinical presentation and Diagnosis:

No specific clinical symptom or sign is sensitive or specific for acute sinusitis, it is **diagnosed clinically** when patients have <10 days of symptoms consistent with ARS that are *not* worsening, although symptoms may persist for more than 10 days; there is typically some improvement by day 10.

Symptoms are divided into either:

- **Local** symptoms which include nasal congestion, sneezing, rhinorrhea, clear discharge, hyposmia (decreased smell sensation).
- **Systemic** symptoms are vague and include headache, fatigue, malaise, anorexia and low grade fever.

On physical examination:

Non specific findings of redness, swelling of the mucosa and congestion of the nose, patients typically do not have fever, if present, it generally disappears within the first 24 to 48 hours, regarding nasal discharge mostly it starts clear, becomes purulent, and then becomes clear again.

Management and Treatment:

Symptomatic therapies: aims to relieve symptoms of nasal obstruction and rhinorrhea as well as the systemic signs and symptoms such as fever and fatigue.

- **Bed rest.**
- **Analgesics and antipyretics** — NSAIDs and acetaminophen can be used for pain and fever relief as needed, they are the corner stone of the treatment.
- **Topical Decongestants** such as phenylephrine, ephedrine, oxymetazoline but might cause addiction if used repetitively.
- Saline irrigation — mechanical irrigation with buffered, physiologic, or hypertonic saline may reduce the need for pain medication and improve overall patient comfort, particularly in patients with frequent sinus infections.

Acute Bacterial Rhinosinusitis:

It occurs in only 0.5 to 2.0 percent of episodes of ARS, and *usually* as a secondary infection of an already inflamed sinus cavity (complication of ARS)

Causative organisms:

- ***Streptococcus pneumoniae*** (20 to 43%)
- *Haemophilus influenzae* (22 to 36%)
- *Moraxella catarrhalis* (2 to 16%)
- *Staphylococcus aureus* (10 to 13%)
- *Streptococcus pyogenes* (3%)

Clinical presentation and Diagnosis:

Criteria for bacterial rhino sinusitis:

- 1) **Duration** of symptoms persists for >7 days.
- 2) **Worsening** of symptoms after 4 days (In viral rhino sinusitis, symptoms will start decreasing after the 3rd day)
- 3) **Change** in the nature of the discharge or nature of the symptoms
 - Discharge begins watery then becomes mucopurulent.
 - Fever low grade then becomes high grade.
 - Pain becomes more intense and localized.

Symptoms are generally *similar* to those of AVRS , only differ in nature as mentioned above.

On physical examination:

Findings may include erythema or edema over the involved cheekbone or periorbital area, Anterior rhinoscopy- may show diffuse mucosal edema, narrowing of the middle meatus, inferior turbinate hypertrophy, and copious rhinorrhea or purulent discharge.

- ❖ **Sinus puncture with aspiration** of purulent secretions is considered the gold **standard** for **diagnosis** of ABRS.
- Imaging, nasal cultures, sinus aspirates, and other microbiologic testing are not indicated for patients with clinically diagnosed uncomplicated ABRS ;these tests are reserved for patients with suspected complications.
- *If* obtained images, findings on (CT) include air-fluid levels, mucosal edema, and air bubbles within the sinuses .However, these findings are *nonspecific*, Plain films are also *unhelpful* due to poor sensitivity and specificity.

Management and Treatment:

Symptomatic management of ABRS is similar to that of (AVRS), bed rest, analgesics, decongestants and the following:

Antibiotics

Started if the criteria mentioned previously are present.

Initial Oral Therapy, most patients with ABRS do **not** have culture data to guide antibiotic therapy, and treatment is initiated **empirically**.The choice of antibiotic is based on the *most common* bacteria associated with ABRS.

- Either **amoxicillin** (500 mg orally three times daily or 875 mg orally twice daily) or **amoxicillin-clavulanate** (500 mg/125 mg orally three times daily or 875 mg/125 mg orally twice daily) another option is 2nd generation cephalosporines ,if allergic go for clarithromycin , after 3 days if the patient improved continue regimen if not improving we check the culture , fluoroquinolones might also be used.

- **Complications:**

Rare, they occur in patients with *bacterial* infection when the infection spreads beyond the paranasal sinuses and nasal cavity into the *central nervous system, orbit, or surrounding tissues*, *examples*: otitis media, lower airways (laryngitis, bronchitis, pneumonia)

Complication	Clinical features
Preseptal cellulitis	Ocular pain, eyelid swelling, and erythema
Orbital cellulitis	Ocular pain, eyelid swelling, and erythema plus pain with eye movements, proptosis, or visual changes suggesting involvement of the orbital tissue
Subperiosteal abscess	Displacement of the globe, in addition to symptoms of orbital cellulitis
Intracranial abscess	Headache with or without altered mental status, fever, or nausea/vomiting
Meningitis	Fever, neck stiffness, and/or altered mental status
Septic cavernous sinus thrombosis	Cranial nerve palsies (CN III, IV, VI) with or without headache and fever
Osteomyelitis	Dull pain at involved site often with overlying tenderness, erythema, or swelling

Chronic Rhinosinusitis:

Broadly **defined** as a chronic inflammation of the **mucoperiosteal** lining of the nose and paranasal sinuses lasting for more than 12 weeks.

Epidemiology:

It affects around 2-16% of adults in USA ,it is also associated with bad quality of life and has a huge economic burden.

Predisposing Factors:

Polyps, allergies, cystic fibrosis, ciliary dyskinesia, large uncinate process, dental infections, trauma, etc.

Causative Organisms:

- **Coagulase negative Staphylococci** , *most* common
- Staph.Aureus
- Streptococci Species
- G(-) bacilli
- Anaerobes

Pathogenesis:

The causative organism *damages* the cilia leading to *impairment* of ciliary function and **stagnation** of mucus further damaging the cilia so further stagnation occurs causing a **vicious cycle** and *irreversible* damage.

Clinical presentation and Diagnosis:

Symptoms:

Discharge, nasal obstruction, postnasal drip, hyposmia, headaches ,cough ,halitosis, dental pain, malaise, cough, chronic sore throat.

On physical examination:

There will be redness, discharge, swelling mainly over the osteomeatal complex.

Investigations:

- **CT scanning** is considered the imaging *standard* for evaluation of chronic sinusitis.
- **Nasal endoscopy** is recommended in most cases prior to obtaining imaging because it demonstrates the condition of the nasal mucosa and evaluates for purulent drainage.
- Recent literature has supported the use of ***endoscopically directed culture of the middle meatus*** (the primary drainage system of the anterior ethmoid, maxillary, and frontal sinuses) with the use of either a suction trap or a swab.
- ***Routine blood cell counts*** and ***sedimentation rates*** are generally *unhelpful*; however, these may be elevated in patients with fever.

Management and Treatment:

The goals of medical therapy for chronic rhinosinusitis (CRS) are to reduce mucosal edema, promote sinus drainage, and eradicate infections that may be present.

- Symptomatic treatment as mentioned previously.
- Antibiotics for 4-6 weeks as mentioned previously.
- Topical corticosteroids may be used to reduce mucosal swelling.
- Other medications; Mucolytics ,herbal medicine.
- Management of predisposing factors.
- Surgery (functional endoscopic sinus surgery- FESS)