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Head and Neck Surgery Foundation  
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## **Chapter 9: Rhinology, Nasal Obstruction and Sinusitis**

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## Chapter 9: Rhinology, Nasal Obstruction and Sinusitis

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Dr. Gregory Staffel first authored this short introduction to otolaryngology for medical students at the University of Texas School for the Health Sciences in San Antonio in 1996. Written in conversational style, peppered with hints for learning (such as "read an hour a day"), and short enough to digest in one or two evenings, the book was a "hit" with medical students.

Dr. Staffel graciously donated his book to the American Academy of Otolaryngology—Head and Neck Surgery Foundation to be used as a basis for this primer. It has been revised, edited and is now in the second printing. This edition has undergone an extensive review, revision and updating. We believe that you, the reader, will find this book enjoyable and informative. We anticipate that it will whet your appetite for further learning in the discipline that we love and have found most intriguing. It should start your journey into otolaryngology, the field of Head and Neck Surgery.

Enjoy!

Mark K. Wax, MD

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## Chapter 9: Rhinology, Nasal Obstruction, and Sinusitis

Patients present to the primary care practitioners with a variety of nasal complaints, ranging from **rhinorrhea** and **postnasal drainage** to obstruction and pain. Rhinorrhea and post nasal drainage can result from allergic rhinitis, nonallergic rhinitis (the patient tests negative for allergies) vasomotor rhinitis (typically worsens with eating, change in temperature, or bright light) and acute and chronic rhinosinusitis. Nasal obstruction can be caused by anatomic deformities such as **septal and external nasal deviation**, **turbinate hypertrophy**, nasal polyps, and inflammatory changes resulting in **mucosal edema**.

Successful treatment of the varying causes of rhinorrhea and obstruction is based on an accurate diagnosis of the underlying cause. Allergic rhinitis and viral rhinosinusitis are the 2 most common nasal problems encountered. Allergic rhinitis can be differentiated from acute viral respiratory infection by history and physical examination. Patients with allergic rhinitis have a history of **atopy**, sneezing, watery eyes, possible **seasonal predilection**, and prolonged symptoms in comparison to patients with viral disease. Allergic patients have congested, pale nasal mucosa with clear drainage and are afebrile.

The 2nd-generation **antihistamines** such as cetirizine, fexofenadine, or loratadine are very well tolerated and effective in allergic rhinitis. Decongestants taken alone or in combination with antihistamines taken orally will help



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many patients with drainage and congestion. They are often helpful to people who have symptoms for only several weeks out of the year. Patients who have symptoms for longer periods generally do better on one of the **intranasal steroid sprays**. Topical intranasal steroid sprays are considered the first line of treatment for allergic rhinitis. Note they do not reach their full effectiveness until 6 continuous weeks of therapy, and patients should take them for 6 weeks before deciding whether they are working. Cromolyn sodium and azelastine sprays are also available as treatment for allergic rhinitis. If your patients don't respond to these treatments, **specific desensitization therapy (allergy shots)** is indicated. These patients sometimes have very large turbinates and can benefit from **surgical reduction of the intranasal structures**. Vasomotor rhinitis and nonallergic rhinitis can **mimic** allergic rhinitis. In both, patients present with clear rhinorrhea and no other allergic symptoms or history. The allergy tests are negative. Vasomotor rhinitis is often triggered by eating, temperature change, or sudden bright light. Intranasal steroid sprays are the best treatment for non-allergic and vasomotor rhinitis.

**The “Common Cold”:**

Acute viral rhinosinusitis is frequently attributed to one of a multitude of rhinoviruses and results in symptoms we



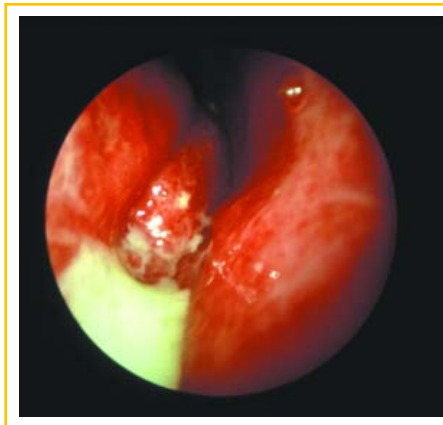
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refer to as the "common cold." The pathophysiology involves infection, inflammation, mucosal swelling, and increased mucus production. Low-grade fever, facial discomfort, and purulent nasal drainage are commonly encountered. Treatment is symptomatic. Treatment of symptoms with antipyretics, hydration, analgesics, and decongestants recommended, as needed. Spontaneous resolution occurs in 7-10 days.

Antibiotic treatment of the common cold is discouraged.

Unfortunately, patients often request (demand) antibiotics early in the course of viral illness. When

spontaneous recovery occurs, they assume that the antibiotics were responsible. This is a major cause of excessive antibiotic use and has contributed to the surge in antibiotic resistance.



**Figure 9.1.**

Acute rhinosinusitis. Note purulent drainage extending from the middle meatus over the inferior turbinate. Symptoms persisting longer than 7-10 days suggest bacterial infection, and antibiotic therapy is indicated.



**Chapter 9: Rhinology, Nasal Obstruction, and Sinusitis****Acute Bacterial Rhinosinusitis:**

Prolonged mucosal edema from whatever etiology causes sinus obstruction and retention of secretions and may lead to **acute bacterial rhinosinusitis**. Patients may exhibit several of the major symptoms (facial pressure, pain, purulent discharge, nasal obstruction, anosmia, headache) and one or more of the minor symptoms (fever, cough, toothache, halitosis). **Radiographic studies** (plain films, computed tomography [CT] scans) do not differentiate acute bacterial rhinosinusitis from a viral upper respiratory infection (URI). More than 80% of patients with a viral URI have an abnormal sinus CT scan. Time will usually differentiate a bacterial from viral infection. It usually takes 7-10 days for a viral infection to resolve. Symptoms lasting beyond 7-10 days, or worsening after 5 days, suggest that bacterial infection is being established. The organisms that cause this are similar to the organisms that cause acute otitis media and include *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. By definition, acute rhinosinusitis persists up to 30 days. **Subacute rhinosinusitis** lasts up to 3 months, and sinusitis that persists past 3 months is termed **chronic sinusitis** and usually has a different microbiology, with increased numbers of anaerobic organisms.

The treatment of choice for acute rhinosinusitis (as well as acute otitis media) has been either amoxicillin or trimetho-



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prim/sulfamethoxazole for 10 days. Resistance to amoxicillin has prompted some physicians to consider using amoxicillin/clavulanate or a 2nd-generation cephalosporin or macrolide or a quinolone instead of amoxicillin as the first-line therapy. More recently, the appearance of penicillin resistance in *S. pneumoniae* infection (which has a different resistance mechanism than beta-lactamase production) has resulted in the recommendation that higher doses of amoxicillin be used routinely. In uncomplicated rhinosinusitis, no current data suggest that 2nd or 3rd generation drugs are superior to amoxicillin or folate inhibitors. In complicated cases, recurrent sinusitis, or failure of initial treatment, however, they may be of value. Drugs that do not adequately cover *H. influenzae* are inappropriate treatment for otitis media and rhinosinusitis.

In addition to antibiotic therapy many adjunctive measures may include topical decongestants (oxymetazoline) for 3 days, mucolytics (guaifenesin) and oral decongestants. Severe or recurrent cases may require systemic steroids. Antihistamines and topical steroids are not particularly indicated unless allergy is also a major concern.

Patients with sinusitis should be **referred** to an otolaryngologist if they have **3-4 infections per year, an infection that does not respond to two three-week courses of antibiotics, nasal polyps, or complication of sinusi-**



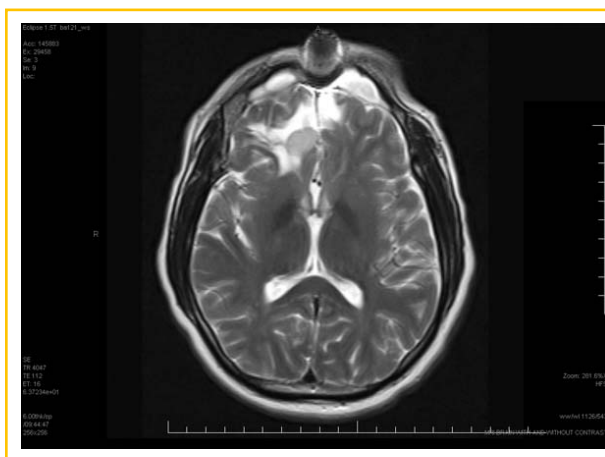
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tis including those described below.

Several types of acute sinusitis merit further mention. Acute frontal, ethmoid, and sphenoid sinusitis that aren't appropriately treated or don't respond to therapy can have serious consequences.

### **Frontal Sinusitis:**

The frontal sinus lining has veins that penetrate the posterior sinus wall and go directly to the dura on the opposite side. These veins can quite easily **transmit organisms** or become **pathways for propagation of an infected clot**.



This can lead quickly to meningitis and even brain abscess, in fact, the most common cause of frontal lobe abscess is frontal sinusitis.

**Figure 9.2.** This axial CT scan depicts a patient with fluid in his right frontal sinus. The infection has spread retrograde and he has developed a frontal abscess.



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Therefore, the diagnosis of acute frontal sinusitis with an **air-fluid level** requires **aggressive** antibiotic therapy. The key to frontal sinusitis is to cover *S. pneumoniae*, and *H. influenzae* as well as get good cerebrospinal fluid penetration.

Pain is severe, and patients usually require admission for treatment and close observation. **Topical vasoconstriction** to shrink the swollen mucosa around the nasofrontal duct and restore natural drainage into the nose is begun in the clinic and used often throughout the hospital stay. Systemic steroids may also be considered to decrease swelling. If frontal sinusitis doesn't greatly improve within 24 hours, the frontal sinus should be surgically drained to prevent serious **intracranial infections**.

### **Ethmoid Sinusitis:**

Severe ethmoid sinusitis can result in **orbital cellulitis** or abscess. These patients present with **eyelid swelling**, **proptosis**, and **double vision**. However, the double vision, instead of being due to the involvement of the nerves of the cavernous sinus, may be due to an abscess located in the orbit. A CT scan will generally show the presence (or absence) of an abscess, which is always accompanied by ethmoid sinusitis. If an abscess is present, it will require surgical drainage as soon as possible.



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However, if the condition is severe ethmoid sinusitis without abscess, it may be treated with intravenous antibiotics and nasal flushes with decongestant nose drops. If the patient's condition worsens, then surgery is indicated. However, severe ethmoid sinusitis will often resolve with nonoperative therapy.

### **Sphenoid Sinusitis:**

Sphenoid sinusitis can cause **ophthalmoplegia**, meningitis, and even **cavernous sinus thrombosis**. Cavernous sinus thrombosis is a complication with even more grave implications than meningitis or brain abscess, and it carries a mortality of approximately 50%. The veins of the face that drain the sinuses don't have valves, and they may drain posteriorly into the cavernous sinus. **Infectious venous thrombophlebitis** can spread into the cavernous sinus from a source on the face or in the sinus. The most common cause of this serious infection is rhinosinusitis.

The nerves that run through the cavernous sinus are the oculomotor (III), trochlear (IV), and 1st and 2nd divisions of the trigeminal (V) and the abducens (VI). A patient who has double vision and rhinosinusitis may be thought to have cavernous sinus thrombosis until it is ruled out. The treatment is high-dose intravenous antibiotics and surgical drainage of the **paranasal sinuses**. Anticoagulation is also a consideration in the treatment regimen. CT and/or



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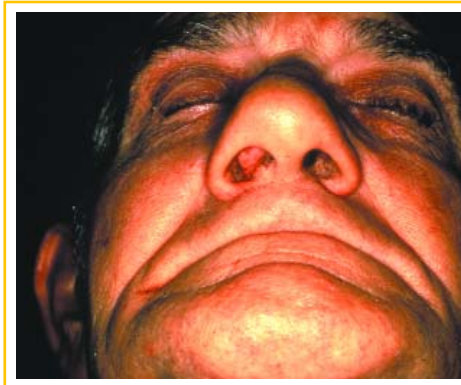
MRI scans are necessary to diagnose cavernous sinus thrombosis.

**Nasal Obstruction:**

Nasal obstruction is another common nasal complaint seen regularly in the ENT office setting. A frequent cause of nasal obstruction is **septal deviation**.

These patients often present with histories of nasal obstruction, possibly complicated by sinusitis and headaches. They may also snore and have obstructive sleep apnea syndrome. Surgery readily corrects the nasal obstruction and can reduce

chronic sinusitis and headaches. Studies have shown that correction of the nasal obstruction rarely cures the sleep apnea. When the obstruction involves the nasal pyramid, it, too, must be corrected by **rhinoplasty**. Rhinoplasty involves controlled chisel cuts of the bones (**osteotomies**)



**Figure 9.3.**

View of nose of a patient with a deviated nasal septum. Note that the cartilaginous septum extends into the right nostril, resulting in impaired airflow. Most septal deviations are not as dramatic as this and can be visualized only with rhinoscopy.



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on either side of the nose and placement of the bones into the correct position. (Rhinoplasty can be combined with trimming of the nasal cartilage to subtly change the contour of the tip of the nose.) This is held in place with a splint for a week after surgery.

**Nasal Polyps:**

Nasal polyps are localized, extremely edematous nasal or sinus mucosa. Microscopically they are essentially full of water. They can enlarge while in the nose and obstruct either the nose or the ostia through which the sinuses drain. The exact cause of polyps is not known, but fifty percent of patients who have polyps also have allergies, so patients with polyps are evaluated for allergies.

Polyps usually respond very well to a course of systemic steroids followed by continuous intranasal steroid



**Figure 9.4.**

Photograph of a nasal polyp. Nasal polypoidosis is a common ailment that results in nasal obstruction and drainage. Most patients require medical treatment with topical steroids and antibiotics as well as surgical removal of polyps and diseased tissue.



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sprays. If they do not respond or reoccur frequently then surgery may be indicated.

**Unilateral nasal polyps** may be a manifestation of a **neoplasm**, and must be referred to an otolaryngologist for evaluation. Nasal polyps are also a frequent cause of nasal blockage. Patients with allergic rhinitis and chronic sinusitis develop these grapelike swellings that protrude into the **lumen**, causing obstruction and **anosmia**. These polyps are often associated with **asthma**. Medical therapy with inhaled nasal steroids as well as short bursts of systemic steroids often produces good long-term control of the disease. Surgical removal provides relief, but, unfortunately, recurrence is common. **Triad** asthma (Samter's triad), which involves asthma, aspirin allergy, and nasal polyposis, is a particularly difficult form of this disease.

Another relatively frequent cause of nasal blockage is **rhinitis medicamentosa**. This syndrome develops when people repeatedly use decongestant nasal sprays over a long period. The rebound effect causes them to need the spray just to breathe. After prolonged use, the mucosa becomes quite inflamed. The treatment is discontinuation of the decongestant sprays. Symptoms can be reduced by the use of an intranasal steroid spray, occasionally accompanied by short bursts of systemic steroids. Cocaine abuse can also cause this problem. Cocaine may also induce **ischemic necrosis in the nasal septum** because of the



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amount of vasoconstriction. The ischemia then may result in a **nasal septal perforation**, which interferes with nasal airflow and is very difficult to repair surgically.

In addition, some patients have a very straight septum with no nasal polyposis or inflammation, but they suffer from chronic rhinosinusitis due to blockage of sinus drainage. The **uncinate process** comes very close to the **ethmoid bulla**, forming the **infundibulum** through which the **maxillary sinus** drains. Only 1 mm of swelling in the mucosa in this area will obstruct the sinus **ostium**.

Patients with chronic obstruction in this area and recurrent sinusitis often undergo surgery to remove the uncinat process and open the bulla to let the ethmoid and maxillary sinuses drain more freely. After the surgery, a small amount of swelling won't obstruct the drainage flow from these sinuses. This procedure is now done endoscopically, and patients tolerate it very well.

### Nasal Masses:

By far the most common nasal mass encountered by physicians are nasal polyps. As expected they present with symptoms that are due to the obstruction caused by the mass being present. Obstruction of the natural ostium of the sinus will cause a backup and may lead to sinusitis.



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**Questions, Section #9**

1. A patient complains of fatigue, low grade fever, purulent rhinorrhea, and headache that resolves within 7 days. The most likely diagnosis is a \_\_\_\_\_
2. A patient had a typical cold that did not resolve in 10 days and now has fatigue, purulent rhinorrhea, low-grade fever, and headache for 3 weeks. The most likely diagnosis is \_\_\_\_\_
3. Another patient has similar symptoms for more than 3 months. This patient has \_\_\_\_\_
4. A common cause of nasal obstruction that is easily corrected by surgery is a \_\_\_\_\_
5. Triad asthma (Samter's triad) consists of asthma, nasal polyposis, and \_\_\_\_\_
6. Unilateral nasal polyps can either be caused by or be a manifestation of a \_\_\_\_\_ and therefore warrant referral to an otolaryngologist.
7. Any patient with symptoms of sinusitis and \_\_\_\_\_ should be referred to an otolaryngologist immediately.
8. Patients should see an otolaryngologist if they have \_\_\_\_\_ episodes of sinusitis per year or if they have any \_\_\_\_\_ of sinusitis.



## Answers

1. Cold
2. Acute rhinosinusitis
3. Chronic rhinosinusitis
4. Deviated septum
5. Aspirin allergy
6. Neoplasm
7. Double vision
8. 3-4, complication

## More educational opportunities from the AAO-HNSF

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