Chapter 3: Rhinology
Bruce W. Jafek, Arlen Meyers

Nasal Stuffiness

Functional abnormalities of the nose are common and can present as nasal stuffiness, rhinorrhea, postnasal drip, fullness, pressure and pain of the frontal-maxillary or intercanthal region. Although the physiology of the nose is poorly understood, it is clear that minor variations in nasal function result in bothersome, sometimes incapacitating symptoms.

Ciliary activity, production and flow of mucus, the humidifying capability of nasal mucous membrane, and the regulation of nasal airflow are all finely tuned nasal physiologic processes which are susceptible to pathologic alteration.

Diagnostic Approach

Subjective Complaints

Nasal stuffiness is most commonly caused by a structural abnormality of the nose or a physiologic dysfunction of the nasal turbinates (see Chapter Opening Figures). Several historical facts help elucidate those features responsible for nasal stuffiness.

Age. Nasal stuffiness beginning at age 20 to 65 is usually not attributable to a structural abnormality, unless there has been surgery or trauma. Nasal stuffiness in children should alert the physician to the possibility of a foreign body. This usually presents as unilateral nasal obstruction with purulent rhinorrhea. In adolescent males unilateral nasal obstruction which may be accompanied by epistaxis is suggestive of juvenile nasopharyngeal angiofibroma.

Sex. Females taking estrogen or who are pregnant may experience intermittent nasal stuffiness.

Seasonal variation. Allergic rhinitis is characterized by the presence of symptoms during predictable periods of the year. Seasonal variations may vary with geography. For the most part, however, symptoms of seasonal rhinitis are linked to the appearance of molds, spores, grasses, trees, pollens, and other irritants during predictable times of the year.

Irritating factors. Some patients with nasal stuffiness relate exacerbation of symptoms to particular events. For example, the symptoms seem worse on windy days, in damp places, and outside of the house, rather than inside. These historical clues can help differentiate various mold allergens.

Coexisting symptoms. Several organs respond to allergens simultaneously. Vertigo, dizziness, itchy eyes, sneezing, chronic cough, headaches, and laryngitis are sometimes manifestations which accompany nasal stuffiness secondary to allergies.
**Drug history.** Rhinitis medicamentosa is caused by chronic application of sympathomimetic drugs to the nasal mucosa. In addition, such substances as reserpine, estrogens, and phenothiazines may cause nasal stuffiness.

**Nature of drainage.** Whereas bacterial rhinosinusitis causes a purulent nasal exudate, allergic rhinitis usually produces a serous discharge. Atrophic rhinitis usually has little or no discharge, but significant crusting is present.

**Table 3.1. Evaluation**

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<th>Historical</th>
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<td>Generalized tendency, ecchymoses, etc.</td>
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<td>Family history</td>
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<td>Operative/trauma history</td>
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<td>Drop in hematocrit secondary to epistaxis</td>
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<td>&quot;Easy bleeding or bruisability&quot;</td>
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<tr>
<th>Physical examination</th>
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<td>Light, suction, anesthesia, location</td>
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<th>Laboratory</th>
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<td>Screen: Prothrombin time, partial thromboplastin time, platelet count, hematocrit</td>
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<td>Detail: Specific factor assay, etc</td>
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<td>Angiography, hematology consultation.</td>
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**Other atopic diseases.** Patients with seasonal allergic rhinitis frequently have a past history of other atopic manifestations. A family history of food intolerance, asthma, or bronchospasm should be sought.

**Nonatopic disease.** Association of nasal stuffiness with asthma, aspirin intolerance, and nasal polyps ("triad asthma").

**Alternating nasal obstruction** which may be related to position (when in the lateral decubitus position, the "down" side normally is obstructed) is suggestive of obstruction caused by mucosal swelling and not septal obstruction.

**Objective Findings**

Patients with nasal stuffiness should have a complete ear, nose, and throat examination. Examination of the nose should include anterior rhinoscopy and examination of the nasopharynx using a nasopharyngeal mirror or fiberoptic examining apparatus. This should be carried out before the topical application of 1% ephedrine or 0.25% phenylephrine, which shrinks the mucous membranes and turbinates and allows a better view. Failure of the mucosa to shrink with the application of vasoconstrictors is important and should be noted. Be sure to note the presence, characteristics, and location of intranasal masses. The area of the middle meatus (below the middle turbinate) should be inspected carefully for the presence of polyps. When present, polypoid degeneration of the mucosa of the middle or inferior turbinate should be differentiated from true nasal polyps. The presence of what appears to be a unilateral polyp
or polyps should be viewed with suspicion, as this more likely represents tumor. Whereas the nasal septum is rarely perfectly straight, significant deviation should be noted. The nasal valve, the junction between the nasal septum and the upper lateral cartilages, is a particularly important area which regulates nasal airflow. This location or deviation of the dorsal edge of the nasal septum may interfere with valve function, as can redundant or enlarged upper lateral cartilages.

The identification of intranasal pathology can, in addition, be aided by noting the presence, characteristics, and location of nasal secretions. The exudate in allergic rhinitis is usually clear. Bacterial or viral illness causes secretions which are more mucoid or purulent. Cerebrospinal fluid is clear and watery and gives a positive test for glucose.

The maxillary and ethmoid sinuses open into the middle meatus and the superior meatus. The sphenoid sinus ostium is located in the sphenoid recess. Localization of drainage to the inferior, middle, or superior meatus helps to pinpoint the sinus involved. Palpation and transillumination of the paranasal sinuses sometimes reveals tenderness or opacification. Opacification of the sinus by transillumination might be indicative of a hypoplastic or absent sinus, however, and sinus x-rays are necessary to confirm the presence of sinusitis.

**Assessment**

Mechanical obstruction due to a deviated nasal septum is readily diagnosed by anterior rhinoscopy (posterior deviations of the vomer are very rare). Mechanical obstruction associated with functional obstruction due to mucous membrane swelling may be diagnosed by some relief of the obstruction by the application of vasoconstrictors. Normally, on the side opposite the deviation, there will be compensatory hypertrophy of the inferior turbinate.

Nasal obstruction due to mucosal swelling where the mucus is clear (uninfected) is usually related to allergic rhinitis, perennial (nonseasonal or nonallergic) rhinitis, hormonal imbalance, drug-induced mucosal swelling, or rhinitis medicamentosa. In addition to the history of nose drop use, the failure of the mucosa to shrink with the application of vasoconstrictors is suggestive of rhinitis medicamentosa. Allergic rhinitis may be diagnosed by the finding of eosinophils in the nasal smear, the presence of circulating eosinophilia and positive skin tests to inhalant allergens. Vasomotor rhinitis which represents an excessive response of the nasal mucosa to stimuli which normally produce some swelling (or sympathetic-parasympathetic mucosal imbalance) is usually accompanied by profuse clear rhinorrhea and sneezing with a nonseasonal pattern. The nasal smear is normal.

Mucosal swelling with purulent secretions (purulent rhinitis) is usually associated with purulent sinusitis. The nasal smear will reveal many polymorphonuclear leukocytes and bacteria. Sinus x-ray films will show either mucosal thickening or fluid levels in the sinuses. A culture of the nasal or preferably the sinus pus should be obtained. Aerobic and anaerobic cultures of sinus pus should be obtained. The usual organisms will be *Haemophilus influenzae, Pneumococcus, Streptococcus*, or *Staphylococcus*.

Unilateral polyp-like masses should be examined carefully as they are rarely simple polyps. When firm polypoid masses are seen in males, especially around adolescence, they
should not be manipulated and never biopsied in the office. The nasopharynx should be inspected carefully and sinus x-rays films obtained as well as films of the nasopharynx. Where indicated, tomograms are obtained. The proper study of lesions suspected of being angiofibromas is by carotid arteriography. Friable lesions in other patients should be evaluated by biopsy and sinus x-rays and tomograms. These will usually be ethmoid or maxillary sinus carcinomas. They may be accompanied by purulent or serosanguineous nasal discharge.

Nasal polyps arising from the middle meatus, usually bilaterally, are most commonly either allergic polyps or polyps associated with non-reagin-mediated (triad) asthma. The history is helpful as is a family history, although reagin-mediated and non-reagin-mediated disease may occur in the same family and the same patient. Where asthma is present, the history of exacerbation with aspirin usage is diagnostic. Sinus x-rays usually reveal polypoid degeneration of the sinus mucosa. Skin tests to inhalant allergens should be performed. Pulmonary function studies are also obtained and any pus in the nose is cultured.

**Plan**

Septal deviation, where the symptoms are sufficiently bothersome to the patient, can be treated only surgically. Any mucosal disease should first be managed medically or the results will be disappointing.

Mucosal swelling due to allergy should first be managed by avoidance of the allergen (furnace filters, mattress and pillow pads, etc). Secondly, medical management using antihistamines such as chlorpropeneramine, 4 mg QID, and decongestants such as pseudoephedrine, 30-60 mg orally QID, should be used. Rarely, hyposensitization by antigen injection may be necessary.

Drug-induced obstruction is treated by removing the offending drug where possible. This responds poorly to vasoconstrictors.

Rhinitis medicamentosa is difficult to treat. The patient is usually "hooked" on spray or drops. These must be stopped completely. Symptomatic relief with vasoconstrictors by mouth is used. In stubborn cases, nasal dexamethasone spray is used three times a day for a few weeks (it is systemically absorbed). The patient must be warned that up to 3-6 months may be required for improvement.

Vasomotor rhinitis may respond to vasoconstrictors by mouth. If very severe, vidian nerve section may be beneficial.

Juvenile nasopharyngeal angiofibromas are treated surgically and may require intracranial resection as well as nasopharyngeal approaches. Radiation may be necessary where there is significant intracranial extension of the tumor.

Squamous cell carcinoma of the ethmoid and maxillary sinuses is treated by irradiation and surgery where feasible.

Nasal polyps in reagin-mediated disease are treated by antihistamine vasoconstrictor (by mouth) followed by nasal dexamethasone spray. The polyps frequently recur. In non-
reagin-mediated disease (triad asthma) the patients must be advised on aspirin avoidance. The asthma is the chief problem. The nasal polyps may be treated by nasal steroid spray or direct injection of the polyps with a long-acting steroid. If refractory, they should be removed. The steroid spray is then decreased to the minimum dose consistent with airway maintenance. Remember that adrenal suppression occurs with absorbable nasal steroids or polyp injection.

Where purulent rhinosinusitis is present, along with oral vasoconstrictors and antihistamines, antibiotics are used. The choices, depending upon culture results, are (in order of desirability): ampicillin, 250 mg QID; erythromycin, 250 mg QID; or tetracycline, 250 mg QID - all for 10 days.

Note that no mention is made of vasoconstrictor nose drops or sprays. They have no role in treatment of chronic rhinitis and should be restricted to use of less than 5 days for acute rhinitis or sinusitis.

Enlarged turbinates which don't respond to the above may require surgical treatment or electrocautery, but care must be used, as excessive removal of turbinates results in atrophic rhinitis with crusting, infection, and more obstruction, sometimes along with ozena, a foul-smelling purulent infection. Satisfactory treatment of this complication is almost impossible.

The complications of using long-term steroids must be borne in mind, as must the problems of vasoconstrictor use in hypertensive patients.

**Rhinorrhea**

Rhinorrhea (nasal discharge or "running nose"), probably the most common otolaryngologic complaint, is an inconvenient, but rarely serious, symptom and is often self-limited. Important historical considerations include unilateral or bilateral, intermittent or constant, associated pain or pruritus, drug use, or other systemic conditions (fever, etc). The character of the discharge is important (bloody, purulent, clear) in the differential diagnosis along with its relation to recent or remote trauma.

**Clear Rhinorrhea**

Of great importance is the physiologic consideration that the nose and sinuses normally produce 1-1.5 pints of mucus a day to humidify and filter the inspired air. This is normally carried to the nasopharynx by the metachronal beat of the respiratory cilia and then swallowed, or occasionally expectorated. Urban dwellers may produce more mucus. Medications given to "dry up" the nose, do so by decreasing the water content of the mucus, frequently making it thicker and more tenacious, and the patient more symptomatic. Additional considerations are given in the subsequent section on postnasal discharge.

Anterior rhinorrhea in symptomatic amounts implies either an excessive production of mucus, an abnormality in ciliary action, or nasal blockage. The latter are uncommon causes of clear rhinorrhea, as ciliary stasis (caused by smoking, infection, etc) usually leads to local infection with resultant purulent rhinorrhea (see Purulent Rhinorrhea).
**Subjective Complaints**

Clear nasal discharge, unilateral or bilateral, intermittent or continuous, seasonal or perennial.

**Objective Findings**

Complete *nasal examination* with subsequent vasoconstriction (4% cocaine-moistened cotton packs or 1% ephedrine or 0.25% phenylephrine for 5 minutes). The condition of the *nasal mucosa* is noted. High (ethmoidal) polypi are searched for. A *sinus series* is obtained in longstanding cases. The patency of the posterior choanae (nasal openings) can be checked with a catheter in cases of total obstruction.

**Assessment**

*Upper respiratory infection (URI)*, the "common cold" or coryza, is the most common etiology of clear rhinorrhea. The rhinorrhea is preceded by sneezing and nasal irritation and often by constitutional symptoms (fever, chills, etc). The nasal mucosa is edematous and hyperemic. The profuse clear rhinorrhea becomes purulent as secondary infection, an outpouring of leukocytes and resolution occur. Various viruses are usually implicated in the early stages followed by secondary bacterial invasion (Staphylococcus, Streptococcus, Pneumococcus).

**Allergic rhinitis** is another frequent etiology. The *history* is usually positive for a family history of allergies; infantile eczema or "colic" or seasonal recurrence, especially at times of known elevated allergen levels, typically spring and fall, such as the "ragweed of hay fever season," etc. The symptoms may also be "perennial" (year-round), or have seasonal exacerbations of a continuous condition. The *nasal mucosa* is bluish and edematous. *Eosinophils* may be found in increased numbers (> 2% in the nasal secretions. *Skin tests* are usually positive, often showing multiple sensitivities.

**Vasomotos rhinitis (VMR)** presents with profuse watery rhinorrhea ("catarrh"). Heredity, infection, and psychologic or endocrine imbalances have been identified as predisposing factors. Atmospheric changes (humidity, temperature) or irritants (smoke, alcohol) may act as precipitating factors. The nasal mucosa may appear normal, but is more commonly hyperemic or hypertrophic. A frequent description is of a patient with nasal obstruction and rhinorrhea, "carrying a box of Kleenex."

**Hay fever** is a nonspecific, lay term for recurrent (seasonal) rhinorrhea with other nasal symptoms (obstruction, sneezing, etc) which can be included, on a general basis, with allergic rhinitis or possible VMR, and usually includes conjunctival irritation and itching of the palate.

**Nasal polypi** may be accompanied by clear rhinorrhea, but are a manifestation of another condition (VMR, allergies, etc).
Cerebrospinal fluid (CSF) rhinorrhea is uncommon. A history of trauma (iatrogenic, surgical, or external) is nearly always present, although neoplastic and congenital etiologies have been described. It may occur intermittently, being classically described as "dripping with the head forward." The fluid contains glucose but no mucus or albumin. It "dries soft" on handkerchief.

Rhinitis medicamentosa results from prolonged use of vasoconstrictors (nasal sprays or drops) with resultant "rebound." The usual history is of a URI treated symptomatically followed by continued use of the drug beyond 3 weeks. The nose is sprayed "more frequently," as often as every half hour. The mucosa is bluish and edematous. The mucosal swelling usually fails to respond to spraying the nose with ephedrine (in long-standing cases).

Rare causes of rhinorrhea during the acute infective stages of rhinitis include rhinoscleroma, diphtheria, erysipelas, anthrax, etc. Granulomas (sarcoid, syphilis, etc) may also produce clear rhinorrhea, but purulent rhinorrhea due to secondary bacterial infection is more common. Tumors should also be considered, but again purulence, epistaxis or a mass usually makes the diagnosis more obvious.

In the child, unilateral or bilateral rhinorrhea may be a manifestation of choanal atresia, especially if presence from birth can be documented. Bilateral atresia is usually accompanied by airway problems, as the infant is an obligate nasal breather for the first 2 or more weeks of life. The diagnosis is suspected if a catheter cannot be passed through the posterior choanae and can be confirmed on x-ray by putting a small amount of contrast material into the nose and noting an air-fluid level in the posterior nose on the lateral film of the child's head in the supine position.

A foreign body should also be suspected, with unilateral rhinorrhea in the child, but this usually rapidly becomes purulent rhinorrhea.

Plan

Symptomatic relief can be obtained with decongestants (early coryza, etc), with two cautions. The commonly used sympathomimetic drugs (pseudoephedrine) should be used with caution in hypertensives or older men with evidence of prostatic hypertrophy. Acute urinary retention or a hypertensive crisis may be precipitated. More important, these drugs often make patients more symptomatic as the mucus becomes thicker and more tenacious.

Combinations of decongestants with antihistamines are usually helpful in providing acute symptomatic relief in many cases of allergic rhinorrhea, seasonal or perennial, but the treatment should be directed toward eradication of the allergen. Avoidance is the most successful treatment, where the allergens are few and relatively infrequently encountered. When the allergens are more ubiquitous and the symptoms unresponsive to medical management, however, allergic consultation with hyposensitization, etc, may be required. Steroids may also be used to relieve the acute symptoms (hydrocortisone, 25-100 mg qid) and may even be required chronically in an extremely unusual case.
Vasomotor rhinitis may be extremely difficult to control. If an allergic component can be identified, it is handled as above. Submucosal resection of the inferior turbinates or vidian neurectomy have been recommended, while some recommend an intracranial (middle fossa) approach to the greater superficial petrosal nerve or transantral vidian neurectomy. Tranquilizers have often been used.

Rhinitis medicamentosa is handled by having the patient discontinue the use of the drug immediately. A "burst of steroids" is frequently required to control the extreme rebound congestion during this period (prednisone, 40 mg on the 1st day, decreasing by 5 mg per day until "finished," requires no. 36 5-mg tablets). Also useful is pseudoephedrine by mouth (30 mg qid) and topical dexamethasone spray (Decadron Turbinaire) tid.

Of the less common causes, unilateral or bilateral choanal atresia is handled surgically. One side of bilateral atresia should be opened shortly after birth. Surgical correction of unilateral atresias can be postponed until age 5-10. Traumatic CSF rhinorrhea should be handled initially by elevating the head of the bed 45° and instituting daily spinal taps. In order to avoid masking meningitis, antibiotics are not given. If conservative measures are unsuccessful, or if a congenital basis is diagnosed, surgical repair with fascia may be required. Neoplastic origin is handled according to the treatment of the neoplasm. Foreign bodies should be removed with reversal of the changes and elimination of the symptom. Rhinorrhea due to granulomas or infections are handled by treating the systemic condition.

Purulent Rhinorrhea

Yellowish or greenish discoloration of the rhinorrhea implies infection in the upper respiratory tract (nose, sinuses, or nasopharynx). Brownish discoloration may be found in smokers with or without infection. The treatment is generally directed toward eradication of the infection and elimination of any predisposing factors.

Subjective Complaints

Purulent nasal discharge, often accompanied by posterior nasal discharge and constitutional symptoms (fever, malaise, etc). May be unilateral or bilateral. "Chronic" rhinorrhea lasting over 6 months.

Objective Findings

Complete nasal examination with vasoconstriction. Sinuses (frontal and maxillary) are palpated bilaterally at the same time to compare tenderness. Transillumination of sinuses is rarely helpful. Sinus x-rays may show air-fluid levels in acute sinusitis, or mucosal thickening in chronic sinus disease. Bony erosion may be apparent in cases of neoplasia, or a radiopaque foreign body seen. Systemic manifestations should be sought (sarcoidosis, hypoinnune states, etc).
**Assessment**

In general, unilateral symptoms imply mechanical obstruction, and bilateral symptoms imply systemic etiologies.

The history of unilateral purulent rhinorrhea in the child strongly suggests a foreign body. Examination under anesthesia may even be required to evaluate this possibility.

The possibility of neoplasm should always be considered, especially in unilateral purulent rhinorrhea in the adult. Biopsies should be obtained of suspicious areas.

**Acute sinusitis** is usually accompanied by constitutional symptoms (fever, malaise, etc) with pain localized to the involved sinus. Fever and leukocytosis are unusual in early uncomplicated sinusitis. Malaise is common. X-rays are usually confirmatory. Purulent rhinorrhea may be minimal or absent if the sinus ostium is completely occluded. The usual organisms are gram-positive, Staphylococcus, Streptococcus, and Pneumococcus being most common. Culture with sensitivities is indicated when this diagnosis is suspected.

**Atrophic rhinitis** is usually found in the older patient, often a smoker. It is also an iatrogenic problem following excessive removal of nasal tissue, especially the inferior turbinates. Complaints of obstruction are frequent in spite of the fact that the airway is widely patent. Atrophy of the nasal mucosa with crusting is apparent on nasal examination.

**Chronic rhinosinusitis** is diagnosed when the condition has persisted for over 6 months. Varying states of mucosal change, including both atrophy and hypertrophy, are seen. X-rays usually show mucosal thickening of all of the involved sinuses. The organisms are usually mixed, including some anaerobes. Anosmia or objective parosmia may be noted.

**Hypoimmune states** may occasionally be found and an immune assay is indicated in chronic states.

**Polypoid degeneration** of the nasal mucosa is apparent on nasal examination and can be confirmed on x-ray.

Specific (uncommon) forms of chronic rhinosinusitis occasionally accompanied by purulent rhinorrhea includes syphilis, yaws, lupus vulgaris, tuberculosis, sarcoidosis, “chronic” diphtheria, scleroma, leprosy, rhinosporidiosis, and rhinoscleroma.

**Fungal conditions** are occasionally found, especially in the diabetic or patient with altered immune status, and include aspergillosis, actinomycosis, moniliasis, and even, amazingly, infections with Penicillium.

**Granulomas** include Wegener's and lethal midline granuloma.

Whenever one of the unusual infections is suspected, culture is indicated. Biopsy may also be required, especially where one of the specific or nonspecific granulomas is suspected.
Plan

Whenever a specific organism can be identified in acute infections, antibiotic therapy is indicated. This is usually not indicated, however, during the purulent resolution phase of coryza.

Management of the "rare" forms of rhinosinusitis (TBC, etc) is that of the specific infection. Wegener's and lethal midline granuloma may respond to high doses of steroids, tapering these to determine the least effective dose, Immuran and Cytoxan. Radiotherapy may also be required. The prognosis is poor.

Atrophic rhinitis can be managed by irrigating the nose with physiologic saline followed by application of conjugated estrogen cream (Dienestrol vaginal cream) to the involved mucosa. Smoking must be discontinued.

Polyps should be removed when severe obstruction occurs. Subsequent treatment should be with irrigations and antibiotic management of acute infections. Local steroids (Decadron Turbinaire) may also be helpful in preventing recurrence, as well as intralesional injection with Kenalog.

Chronic rhinosinusitis is the most common cause of persistent purulent rhinorrhea. Antibiotics are rarely helpful except during the acute exacerbation. Decongestants may be somewhat helpful in relieving the congestion. Provision of drainage is the most effective form of therapy. This may be accomplished by having the patient "sniff up" physiologic saline (1 teaspoon of table salt in a pint of water) and blow it out forcefully. Surgical procedures include sinus irrigation (rarely helpful on a chronic basis), creation of a new ostium, or sinus obliteration. The choice of procedure depends on the individual case.

Hemorrhagic Rhinorrhea

This symptom, while ominous to the patient, rarely implies serious pathology. The nose should be carefully inspected and managed according to the principles presented in this chapter, under Epistaxis.

Epistaxis

Epistaxis (bleeding from the nose) is a common symptom. The successful management is dependent upon a sequential, practical approach that is logically andatraumatically applied. Site-of-bleeding classification (local, regional, or systemic) is helpful in stopping the acute bleed; etiologic classification is important in preventing its recurrence.

The initial assessment should always include documentation of the side of bleeding (right or left) and location (anterior versus posterior and high versus low). A general plan for evaluation is contained in Table 3.1 and for therapy in Table 3.2. Specific considerations are as follows:
Anterior Epistaxis with Associated Trauma

Subjective Complaints

History of trauma to nose usually with resultant deformity (swelling or displacement).

Objective Findings

Obvious displacement of nose or swelling; however, the nose may also have a nondisplaced fracture without deformity. Nasal examination utilizing suction, light (usually headlight) and anesthesia with vasoconstriction (4% cocaine-soaked gauze). Bleeding is often through traumatized mucosal edge. Check for septal hematoma.

Assessment

Evaluate degree of deformity (external and internal). X-rays are usually obtained to try to confirm fracture, but may be difficult to interpret because blood vessel channels along the nasal bones simulate fractures and give minimal useful information. The diagnosis of fracture is therefore often a clinical diagnosis and x-rays may or may not be confirmatory. If displacement is identified, septal or external, relocation under local anesthesia will be necessary. Pretrauma pictures (as large as possible, anterior view) are helpful in confirming a previous "straight" nose.

Plan

Manage fracture as described for nasal trauma (see Chapter 11, Facial Trauma). Bleeding can usually be controlled with light absorbable anterior pack or cautery (see following). If posterior pack is required, arterial ligation is preferable to prolonged packing, which may lead to resultant deformity requiring secondary surgery. The fracture can be reduced and stabilized at the time of vascular ligation.

Low Anterior Epistaxis (90%) without Associated External Trauma

The most common site is Little's area (Kiesselbach's plexus). Bleeding may be initiated by minimal trauma. Usually a single bleeding point is seen in a vessel running up from the floor along the anterior (caudal) septal margin. The younger the patient, the greater the likelihood of this anterior bleeding source.

Subjective Complaints

Nosebleed; may be unilateral or bilateral, continuous or intermittent, minimal or profuse.
Objective Findings

Careful nasal examination with suction, light, and anesthesia to identify bleeding site and search for possible neoplasm. Suspicious areas should be biopsied. General appraisal for signs for systemic etiology (capillary hemangiomas, spider angiomas, ecchymoses, etc).

Assessment

History: positive family history, easy bleeding or bruisability, or other history suggests bleeding diathesis (may require repetitive questioning before the patient or parents "remember"). Physical examination helps in ruling out other systemic problems or neoplasm. Laboratory screen should be obtained to include hematocrit, prothrombin time (protime), partial thromboplastin time (PTT), platelet count, and bleeding time. Detailed specific factor assay with hematology consultation is indicated when the screening tests are abnormal.

Plan

Pressure (pinching the nose for 5-10 minutes) and vasoconstriction/anesthesia (4% cocaine or 4% lidocaine + 1% ephedrine, if cocaine is unavailable, on cotton packed into the nose) are sufficient to control most anterior bleeds. The nose can then be examined carefully with light and suction and the bleeding point identified. It can then be touched with a silver nitrate stick or electrodesiccated to prevent re-bleeding ("spot-welded"). Following application of the topical vasoconstrictor, the specific site of bleeding is cauterized. Electrocautery is better than chemical cautery (AgNO₃). Do not cauterize the entire septum, paint-brush fashion. The nose is then packed with absorbable packing (Surgicel) for 3 days. If the bleeding persists, hospitalize the patient and manage with a posterior pack as indicated under posterior epistaxis.

If a coagulopathy is identified, specific factor correction should be accomplished as rapidly as possible. Manipulative intervention in coagulopathies should be avoided whenever possible. If temporary packing is required, absorbable packing is preferred over nonabsorbable packing, as removal is not required. Gelfoam covered with powdered topical thrombin or Surgicel is useful in treating epistaxis when coagulopathies are the etiology. Epistaxis as the isolated manifestation of a coagulopathy is very uncommon.

High Anterior Epistaxis

Subjective Complaints

Vigorous epistaxis, which is primarily anterior, usually in the older hypertensive patient.

Objective Findings

Anterior bleeding from above the middle turbinate, often pulsatile and brisk. Usually unilateral.
**Assessment**

Evaluate patient for shock and other systemic disease. Immediate hematocrit and appropriate coagulation studies. Hourly repeat of the hematocrit until it equilibrates, as it has undoubtedly not yet stabilized. Complete nasal examination.

**Plan**

Type and cross 2 units of blood if initial hematocrit is depressed (< 30%). Utilizing light, suction, vasoconstriction, pack nose with absorbable packing. If bleeding persists, place posterior pack and hospitalize (see below). If still persistent, otolaryngology consultation for consideration of arterial ligation. In face of acute bleed in elderly patient, signs of shock require monitoring of central venous pressure and appropriate transfusion. Also, Vaseline gauze packing may give superior hemostasis over any absorbable packing material in brisk bleeds.

**Recurrent Anterior Epistaxis (Usually Pediatric)**

**Subjective Complaints**

Daily or frequent nosebleeds, usually in the child. Patient may awaken in am with significant blood on pillow.

**Objective Findings**

*Nasal examination* for foreign body (usually associated with purulence). *General appraisal* for systemic disease/signs of bleeding diathesis (telangiectasias, etc). Identification of bleeding site, usually from bleeding point on large vein running from floor along anterior (caudal) septal margin. Bleeder often on right with right-handed child.

**Assessment**

History helps to rule out bleeding diathesis. If bleeding point seen, additional evaluation rarely required except for hematocrit and screening blood coagulation studies (see above). Nose picking (trauma) may be etiology.

**Plan**

Bleeding point can be cauterized with chemical cautery (AgNO₃ stick) or electrodesiccated. Bipolar cautery is helpful if active brisk bleeding encountered. *Use insulated nasal speculum if unipolar cautery used*. In younger child (< 5 years old) general anesthesia may be required with elevation of the septal mucoperichondrium and cautery or division of feeding vessels following otolaryngologic consultation. Weber-Rendu-Osler syndrome (hereditary hemorrhagic telangiectasia) may require septal dermoplasty. If nose picking involved, cut child's fingernails short.
Posterior Epistaxis with Trauma

Subjective Complaints

Bleeding in severely traumatized patient (major maxillofacial injury).

Objective Findings

Usually brisk pumping arterial bleeding. Complete nasal/neurologic examination to identify side of bleeding. Facial bone x-rays usually required to define extent of maxillofacial injuries. Immediate blood studies should be obtained and vital signs monitored.

Assessment

Posterior epistaxis due to external facial trauma is extremely unusual. The patient usually has a major maxillofacial injury; the initial assessment, following control of the bleeding, should be of the neurologic status and facial bones. Concomitant neurologic injury (CSF rhinorrhea, concussion, etc) is usual. Facial bone fractures should be handled as discussed under Facial Trauma (Chapter 11). Arteriogram may be helpful.

Plan

A posterior pack is usually required (see below). Type and cross 2 units of blood and start IV. Plasma expanders or blood should be given as indicated by the initial hematocrit and state of vital signs. Broad spectrum antibiotics are started (posterior pack, possible CSF leak), eg, penicillin 1.2 M units every 6 hours. Central venous pressure (CVP) line may be required.

Posterior Epistaxis without Trauma (10%)

Subjective Complaints

Nosebleed, usually severe in older hypertensive smoker. Increased incidence during dry weather.

Objective Findings

Complete nasal examination with definition of side and site of bleeding. Evaluate for neoplasm (if unable to see due to active bleeding, recheck 3 weeks post-treatment). Vital signs to identify hypertension or hypovolemic hypotension. Systemic appraisal. Arteriography should be considered only if tumor is suspected or there is persistent bleeding in spite of packing. EKG should be obtained.

Assessment

Historical aspects include age, hypertension, coagulopathy, smoking history, medications, trauma, etc. The physical examination should determine the site of bleeding. Laboratory studies (hematocrit, hemoglobin, coagulation studies, blood chemistries,
hepatorenal chemistries, etc) should be obtained as a baseline immediately along with an EKG in patients over 40 or with sufficient cardiac history. The *vital signs* should be monitored frequently.

The presence of neoplasm should always be considered, although it is unlikely. The major exception is that juvenile nasopharyngeal angiofibroma should be suspected in the pubescent male with severe posterior epistaxis.

The patient's general status should be monitored closely as the pO$_2$ will decrease approximately 10 mm Hg *just by packing the nose* due to poorly understood nasopulmonary reflexes. This, on top of the hypovolemia hypotension, and preexisting chronic pulmonary disease (common in smokers) may precipitate a stroke or myocardial infarction. In *pregnant* *women*, *fetal monitoring* should be undertaken for signs of fetal distress.

**Plan**

Patient should be *admitted* and *typed* and *cross-matched* for 2 units of blood. An IV is placed and *plasma expanders* started if the patient is hypovolemic until the blood becomes available. CVP line in poor-risk patients. O$_2$ is given by mask. Bleeding is controlled with an absorbable *anterior pack*, if possible, or a *posterior pack*.

*The posterior pack* is placed as follows: The nose is first packed with 4% cocaine-moistened cotton or lidocaine-ephedrine mix (part of initial steps in identifying and controlling bleeding). A 30-mL 12-24 Fr Foley catheter is passed through the bleeding side and visualized in the pharynx. The tip has previously been cut off to decrease pharyngeal irritation. *Under vision*, the balloon is inflated with 10-12 mL of saline, and light tension is placed anteriorly. An additional 1-4 mL of saline are added until the soft palate bulges slightly. At this point, the *nasopharynx* is occluded and bleeding comes anteriorly. The nose is then packed *bilaterally* with Vaseline gauze which is wrapped externally around the catheter approximately 2 cm to project from the nose. *Light tension* is maintained on the catheter and it is clamped with a C-clamp, which rests against the Vaseline, which rests, in turn, against the nose. Direct pressure of the clamp against the nose *must be avoided* to prevent pressure necrosis.

The pack remains in place for 3 days, during which *antibiotics* (penicillin VK, 250 mg *qid*, or erythromycin, 250 mg *gid*) and *sedation* (phenobarbital, 60 mg STAT, followed by 8-30 mg every 6 hours, depending on the level of consciousness, general physical condition, etc) should be given.

The patient should be observed closely for complications of hypoxemia, hypoperfusion syndromes, nitrogen retention due to blood in the gastrointestinal tract (GI) tract, hypertension, disseminated intravascular coagulopathy (DIC), etc. The combination of nasal packing, sedation, immobilization and hemorrhage places severe stress on the cardiopulmonary and central nervous systems. Blood gas studies should be done on all patients with posterior packs.
The pack is removed on the 4th day and the patient is observed 24 hours before discharge. The post-hospitalization check at 3 weeks should include careful reexamination for neoplasm.

**Medical consultation** with initiation of antihypertensive therapy is indicated during the hospitalization if hypertension is found. Smokers should be advised to stop.

**Arterial ligation** may be required in cases of persistent or recurrent bleeding in spite of a good posterior pack. If this is required, otolaryngologic consultation is indicated. In an aged patient with poor general health or poor cardiopulmonary reserve, vascular ligation may be considered earlier.

The internal maxillary or external carotid artery is ligated if the bleeding is from the external carotid system, and the anterior ethmoid if from the ethmoid (internal carotid) system. Ligation procedures: don't ligate the bleeder, they ligate feeder, decreasing the arterial pressure head; therefore, ligate as distally as possible. External carotid artery ligation is technically easier, and can be done under local anesthesia, but is slightly less successful and may cause CNS complications in the uncommon case of anomalies of the internal carotid system. In cases in which the bleeding point remains obscure, control both the internal carotid (ethmoid ligation) and the external carotid supplies (external carotid or internal maxillary artery ligation) in order to achieve maximal decrease in the arterial pressure to the bleeder.

Injection of the pterygomaxillary space to control posterior epistaxis is a temporary measure, offering control for 8-12 hours. It should not be used where internal maxillary artery ligation is being considered.

A successful ligation should allow unpacking of the nose in the operating room with discharge of the patient on the 1st postoperative day.

Increasing numbers of authors are recommending ligation as the initial approach to posterior epistaxis in order to avoid the morbidity and mortality associated with a posterior pack and to shorten the period of hospitalization.

In conclusion, the patient with posterior epistaxis is sick; 2% will die during that hospitalization, usually not of exsanguination, but rather owing to complications (gram-negative sepsis, stroke, myocardial infarction, etc). These patients should be watched closely. It is essential that the physician not be lulled into a sense of complacency. It is not "just a nosebleed".

Several final points are important in the general management of the epistaxis patient:

1. Systemic etiologies should be managed systemically; local causes should be controlled locally.

2. Trauma, followed by infection, are the major causes of pediatric epistaxis. Epistaxis under the age of 2 is uncommon.
3. Cardiovascular causes (hypertension, etc) are the most common causes of adult epistaxis.

4. The patient should have a careful ENT examination 3-4 weeks after pack removal, especially in cases in which the source of bleeding is obscure. This should include anterior and posterior rhinoscopy and sinus x-ray examination.

**Olfactory Disorders**

Disturbances in the ability to perceive odors, or smell, can be generally classified as *dysosmias* (*dys-*, impairment of; *osmia*, sense of smell) or more specifically as decreased (*hyposmia*), lack of (*anosmia*), increased (*hyperosmia*), or perverted perceptions (*parosmia*). A more useful working classification is into conductive versus perceptive etiologies. Underlying disease states and site-of-lesion considerations are also important.
Table 3.2. Management of Epistaxis

Epistaxis
  Anterior (90%)
    Low (Little's area - Internal maxillary branch)
      Cauterize bleeder and pack or control with anterior pack (absorbable)
    Remove pack in 3 days
    Bleeding persists
    Posterior pack
    Hospitalize
    Mask O₂
      Bleeding persists
      Arterial ligation
      Remove pack
      Bleeding persists
      Art. gr.
  High (Anterior ethmoid branches)
    Proceed as above unless bleeding persists
    Arterial ligation
    Remove pack
    Bleeding persists
    Art. gr.
  Posterior (10%)
    Low (Internal maxillary branch)
      Cauterize bleeder and pack
      Remove pack in 3 days
      Bleeding persists
      Posterior pack
      Hospitalize
      Mask O₂
      Remove pack in 3 days
      Bleeding persists
      Arterial ligation
      Remove pack
      Bleeding persists
      Art. gr.
  High (Posterior ethmoid branches)
    Proceed as above unless bleeding persists
    Arterial ligation
    Remove pack
    Bleeding persists
    Art. gr.
Hyposmia, Anosmia

Subjective Complaints

Decreased or absent ability to smell, often accompanied by impaired taste sensation (dysgeusia).

Objective Findings

Patency of airway (anterior, posterior, superior) must be assessed (conductive etiologies) along with the condition of the mucosa (erythema, edema, atrophic, etc) which could either account for micro-obstruction (conductive) of the olfactory region or imply direct destruction (infection, granulomas, etc). Any discharge (especially yellowish or greenish, implying an infection) is noted. The adjacent sinuses are palpated and percussed and any signs of systemic conditions (pregnancy, Addison's disease, etc) evaluated. A complete neurologic examination is tone.

Assessment

Conductive etiologies (Table 3.3) should be apparent on the physical examination. Sinus x-rays are helpful in reevaluating the extent of mucosal disease, infections, or obstructions (osseous). The cribriform plate region should be checked carefully for bony erosion (tumors or granulomas) or calcifications (olfactory groove meningioma) on these views. Additional radiologic (angiography, tomography, CAT scan), neurologic (lumbar puncture, EEG), or allergic (skin tests, etc) evaluations may be necessary according to the findings on the initial screening examination and test battery. Appropriate consultations are obtained as indicated. Additional blood studies may be required if specific systemic disorders are suspected (eg, Addison's, diabetes, etc).

Olfactometry (testing of olfactory function) can be extremely complex. On a research basis, temperature, humidity, purity of the odorant, flow rate, stimulus duration, and concentration all must be controlled. As a matter of fact, most researchers in this area begin by devising their own tests, making meaningful comparison of results or treatment regimens virtually impossible. Examples are included in the bibliography.

In a more practical way, the following test battery (with considerations of each) is useful in the office setting:

1. Coffee (complex odorant; excellent recognition index); patient should close eyes to avoid visual clues; fresh "instant" coffee may be used.

2. Oil of cloves (a complex odorant with good recognition index): olfactory (cranial nerve I) stimulant.

3. Phenylethyl alcohol: cranial nerve I stimulant; pleasant odor - like roses; widely used in research.
4. Amyl acetate: cranial nerve I stimulant; more subtle (like bananas).

5. Distilled water: use as a control.


All odorants are kept in similar glass-stoppered bottles and the patient is allowed to "sniff" each. It is recognized that there is no "standard sniff", but this technique is useful within the context of a screening battery with the interpretations as given below.

Anosmic patients should perceive, but not necessarily identify, the two trigeminal controls, but not the cranial nerve I stimulants, nor the distilled water. Hyposmic patients should perceive most and recognize some odorants. Hysterical patients will be inconsistent in their replies, often reacting to such stimulants as acetone, but denying perception. Ammonia, which strongly stimulates cranial nerves V, is helpful in additional evaluation of the hysterical patient.

**Quantitative testing** is more time-consuming and is generally used only in research setting; protocols can be found in the reference.

**Plan**

When a conductive defect is correctly identified, surgical correction or medical treatment should allow return of smell.

Correction of an underlying disease state may also eliminate the symptom.

Where no definite etiology can be found ("idiopathic anosmia or hyposmia"), various empirical regimens have been found to be helpful in some cases. Each can be tried in sequence for 1 month:

1. Zinc sulfate, 220 mg *tid*.

2. Vitamin A, 100.000 units *qid*.

3. Repetitive cocainization (10% cocaine - 2 drops to olfactory region to eliminate "efferent feedback inhibition").

If the condition persists for longer than 1 year it is usually permanent.
Hyperosmia

Subjective Complaints

Complaints that odors are "too sharp" or the sense of smell "too sensitive". Differentiate from parosmia (distorted, perverted or foul odors).

Objective Findings

Inspection of patency of airway, condition of mucosa, discharge, neurologic examination, signs of systemic condition.

Assessment

Almost exclusively perceptive etiology. Physical examination rarely contributory except for determining associated systemic condition (Table 3.3). May be psychogenic or hysterical.

Plan

Correction of associated disease state should correct hyperosmia if identified. Otherwise no specific therapy.

Parosmia

Subjective Complaints

Perverted or distasteful smell. May be intermittent or continuous.

Objective Findings

Complete nasal and neurologic examination. If smell is also perceived by examiner, local nasal etiology is strongly suggested (infectious, etc) (Table 3.3).

Assessment

Sinus series and complete neurologic workup to include skull x-rays and EEG is indicated to evaluate temporal lobe. May represent postinfectious perceptive etiology. Psychogenic dysosmias often take this form. Symptom more likely to have central etiology, although this may remain obscure.

Plan

Vitamin A, 100,000 units qid for 2 weeks followed by 50,000 units for an additional 2 weeks is helpful in some postinfectious parosmias. Correction of the underlying condition (polyposis, infection, sinusitis, etc) is usually curative in objective parosmias. Psychogenic parosmia may be extremely difficult to diagnose, but once found, psychiatric referral is indicated.
In conclusion, olfactory disorders are hard to evaluate and harder to treat successfully except where a reversible conductive or systemic etiology can be definitely identified. In these cases, however, the symptoms are often recurrent because of recurrence of the underlying condition.
Table 3.3. Classification of Dysosmias

A. By site of lesion
   1. Conductive
      a. Structural abnormality
      b. Physicochemical changes
   2. Perceptive
      a. End organ lesions
      b. Olfactory nerve lesions
      c. Central lesions

B. By etiology
   1. Non-disease states reported to affect olfactory acuity
      a. Hyperosmia
         (1) Hunger (?)
         (2) Nausea
         (3) Obesity
         (4) Occupational (perfumers, wine tasters)
         (5) Environmental
         (6) Nonobstructive nasal congestion
         (7) Hormonal pregnancy state, etc
      b. Hyposmia
         (1) Presbyosmia
         (2) Hormonal (testosterone)
         (3) Satiety state (?)
         (4) Trace metal deficiency (zinc, copper, nickel)
   2. Disease states reported to affect olfactory acuity
      a. Hyperosmia
         (1) Adrenal cortical insufficiency (Addison's disease)
         (2) Virilizing nonhypertensive congenital adrenal hyperplasia
            (elevated testosterone)
         (3) Mucoviscidosis (prior to nasal polyposis)
         (4) Epilepsy
      b. Parosmia (distasteful, distorted smell)
         (1) Objective
            (a) Sinusitis, atrophic rhinitis
            (b) Other infectious etiology
         (2) Subjective
            (a) Hysteria
            (b) Drug-induced (eg, tetracycline)
            (c) Epilepsy (especially temporal lobe)
            (d) Postinfectious perceptive
      c. Hyposmia and anosmia
         (1) Intranasal
            (a) Conductive
               Rhinitis: vasomotor, allergic, medicamentosa, bacterial
               Polyposis
               Septal deviation; nasal valvular collapse
Endocrine vascular engorgement
Neoplasm: adenoid cystic carcinoma, adenocarcinoma, nasopharyngeal carcinoma
Chronic rhinitis (syphilis, sarcoidosis, TBC, rhinoscleroma)

(b) Perceptive
Postinfectious (viral)
Pollutants: tobacco, SO₂, menthol, heavy metals
Drug-induced: cocaine, formaldehyde, carbon monoxide, petrol derivatives, organic solvents, streptomycin
Atrophic rhinitis, Sjögren's syndrome
Radiation
Trauma
Neoplasm: esthesioneuroblastoma, Schwannoma, neurofibroma
Diabetes
Diphtheria

(2) Extranasal-intracranial
(a) Selected congenital anosmia
(b) Familial dysautonomia (usually hyposmic)
(c) Trauma: concussion (50%)
(d) Diffuse senile atrophy
(e) Infection: meningitis, frontal/ethmoid sinusitis with secondary osteomyelitis, viral (influenza)
(f) Cerebrovascular accident
(g) Tumors: vascular, meningioma, intracerebral (frontal lobe), osteoma, paraoptic chiasmal (craniopharyngioma, pituitary, aneurysm)
(h) Drug-induced: amphetamines
(i) Epilepsy
(j) Hydrocephalus
(k) "Little strokes"; transient ischemic attacks (TIAs)

(3) Extranasal-extracranial
(a) Familial dysautonomia
(b) Turner's syndrome
(c) Congenital hypogonadotrophic eunuchoidism
(d) Diabetes mellitus
(e) Pseudohypoparathyroidism
(f) Hypogonadal females
(g) Vitamin A deficiency: postgastrectomy, Whipple's disease, abetalipoproteinemia
(h) Iatrogenic postlaryngectomy
(i) Psychogenic: hysteria, schizophrenia.