

The differential diagnosis of rhinorrhea

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Rhinorrhea disrupts the quality of life of a large segment of the population. The first step to treating it properly is to make an accurate diagnosis of its underlying cause. This is not always a simple proposition, however, because rhinorrhea has many causes that can easily be confused in clinical practice. Diagnosis has come to rely increasingly on testing, but test costs add significantly to the health-care burden. This article reviews the use of medical logic in the differential diagnosis of rhinorrhea and describes the relative usefulness of various testing methods. (J ALLERGY CLIN IMMUNOL 1995;95:1080-3.)

Key words: Rhinorrhea, diagnosis, conjunctivitis, sinusitis, vasomotor, inflammatory

It is estimated that 40 million Americans suffer from the annoying problem of rhinorrhea, a recurrent or chronic watery nasal discharge.¹ Rhinorrhea and its potential complications can be debilitating; it is often seen on an order serious enough to cause lost time at work or school. The pathogenesis and etiology of rhinorrhea are complex and not always well understood. Rhinorrhea therefore presents a substantial cost burden to the health-care system in the form of diagnostic techniques and treatment. This expense is compounded by the fact that treatment is often inappropriate or ineffective.

When the cost of health care becomes a prominent social concern, economy and accuracy of diagnosis assume increased importance. Sound medical logic can reduce the costs of diagnosis of rhinorrhea, both with regard to technology and treatment. A review of the mechanisms known to be prominent in the production of rhinorrhea and the practical steps that can be taken to distinguish them in clinical practice may be warranted.

PROBLEMS OF DIFFERENTIAL DIAGNOSIS

Rhinorrhea has many causes that are not always easily discerned (Table I). The challenge of differential diagnosis is compounded by overlapping symptoms between the various diseases and disorders. By process of elimination, however, it is possible in most cases for the seasoned practitioner

Abbreviation used

VMR: Vasomotor rhinitis

to reach a sound diagnosis and begin helpful treatment without wasting valuable time.

The first difficulty facing the physician is indicated by the very word "rhinitis," which is typically used to describe the various underlying causes of rhinorrhea. The "-itis" suffix implies inflammation, and indeed rhinorrhea is very often either the result of an inflammatory process or coincident to it. When the inflammatory process itself is the cause, the rhinitis may be infectious—almost always viral—that is, the "common cold." However, it also may be noninfectious. And while the most common noninfectious inflammatory state associated with rhinorrhea is allergic rhinitis, nearly half the patients with noninfectious rhinorrhea have negative allergy skin tests to the common allergens found locally.²

In other patients with rhinorrhea there will be no evidence of inflammation at all, as judged by a lack of inflammatory cells in nasal mucosa biopsies³ or of vasoactive chemical mediators in the nasal discharge.⁴ Here differential diagnosis may focus on dysfunction of some kind in the innervation of the nasal mucosa and its blood vessels. It is well recognized that the autonomic nervous system has an important role in the homeostasis of nasal function.^{5,6} Rhinorrhea resulting from autonomic abnormalities has been labeled "vasomotor rhinitis," which is a misnomer, because no inflammation is in evidence. Although rhinorrhea may be the primary clinical symptom in this condition,

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many patients will complain of a blocked nose or a feeling of "nasal congestion." This perceived congestion may even be more troublesome to them than their rhinorrhea. Thus it becomes easy to confuse "vasomotor rhinitis" with other disease states leading to rhinorrhea.

A rare but serious cause of watery rhinorrhea is a cerebrospinal fluid leak, which is usually—but not always—related to trauma to the head. If a leak is suspected, analysis of the fluid will quickly determine the diagnosis.

THE UPPER AIRWAYS: STRUCTURE AND FUNCTION

In both structure and function, the nose and paranasal sinuses may be considered a unit, analogous to a single-level house with interconnected rooms and open doors—the "doors" being the meati. The epithelium of the nose and sinuses is continuous. In most clinical conditions, the entire structure responds uniformly to an offending agent, whether it be allergenic pollen or cat dander, a nonallergic but irritating pollutant (e.g., cigarette smoke), or the invasion of the mucosa by the viruses that cause the common cold. The contiguity of the structures can bring systemic considerations into play in the treatment of rhinitis and rhinorrhea.

As has been recently described, computed tomography scans of the sinuses in patients with the common cold show some increase in fluid and a slight increase in mucosal thickening.⁷ It may be useful, then, to think of the pathologic states causing rhinorrhea as "rhinosinusitis" rather than rhinitis alone. The semantics are not trivial in regard to treatment. The inclusion of the sinuses in the rhinitis label reminds the physician that in many cases the complications of "rhinitis" may be of greater clinical significance than the rhinorrhea itself. Conditions frequently observed in conjunction with rhinorrhea include purulent sinusitis, nasal polyps, otitis media, loss of hearing, and mouth breathing, among others. Mouth breathing can lead to a dry, sore throat; it can also lead to dry gums, which can then produce gingivitis.

Chronic conjunctivitis is another unpleasant condition often observed with rhinitis. Many patients with nasal congestion and/or rhinorrhea complain of having itchy, red eyes with excessive lacrimation. They are often labeled as "allergic" even when no specific allergic cause can be found. However, it is important to remember that the nasolacrimal duct is in close proximity to the turbinates. If there is significant swelling of the turbinates, as

TABLE I. Differential diagnosis of rhinorrhea

Inflammatory
Infectious
Viruses
Bacteria
Noninfectious
Seasonal allergic rhinitis
Perennial allergic rhinitis
Nonallergic perennial rhinitis
Nonallergic rhinitis with eosinophilia
Noninflammatory
Vasomotor rhinitis
Cerebrospinal fluid leak

in rhinitis, the duct may become compressed, with the resultant reflux of tears into the eyes. Not only are the eye drops that are often recommended for this condition ineffective, but complications may develop from using them, such as contact dermatitis in the eyelids or an allergic reaction in the conjunctival membrane. This is particularly true when antibiotics are components of the eye drops. Successful treatment of the nasal obstruction will often relieve eye symptoms that do not respond to local treatment.

Both allergic and nonallergic rhinosinusitis are frequently complicated by recurrent viral infections in the upper airway and throat. These infections may lead to bronchitis and asthma, particularly when chronic sinusitis or nasal polyps are present. The triad of asthma, nasal polyps, and aspirin sensitivity is well known, as described by Samter and Beers.⁸

Often, patients with chronic rhinosinusitis will complain of having lost their sense of smell. They may also complain of a nasal-sounding voice or hoarseness, which may be produced through inflammation either of the resonating sinuses or the vocal cords. Cough and postnasal drip are often associated with rhinosinusitis, and sometimes loud snoring. Patients with the latter complaint often have sleep disturbances, even to the point of sleep apnea. This is especially true in older and overweight men, who are prone to developing secondary bacterial infection when the meati are blocked by swollen tissue or local secretions.

STEPS TO UNCOVERING UNDERLYING CAUSES

The condition known as "rhinorrhea," although not life-threatening in itself, can be associated with significant morbidity. With regard to treatment op-

tions, it is of paramount importance for the physician to investigate the underlying causes of rhinorrhea, remaining always mindful of the interconnectedness of the nose, sinuses, and other systems.

The most important first step in diagnosis and treatment, as always, is the case history. Diagnosis of allergic rhinitis requires a familiarity with certain subtle differences between allergic causes. Allergies are often seasonal, resulting from the cycles of nature. When they are perennial, local climate factors and geography contribute to the chronicity of the symptoms, as do housing conditions, such as the presence of pets in the house, the degree of humidification, local temperature changes, and other environmental factors among the myriad components that affect our daily lives. The diagnosis of allergy may be confirmed by positive skin prick tests to local allergens. There would seem to be little justification for requesting serum radioallergosorbent tests for specific IgE antibody. Allergy skin tests are cheaper and give immediate results of equal or, in some cases, greater accuracy.⁹

The nonallergic patient with rhinorrhea may present with an identical history to the allergic patient, including seasonal variations and variable intensity of such symptoms as sneezing, nasal congestion, eye irritation, cough, and so on. This should not be surprising, because the nasal mucosa can only respond to the external environment in a limited number of ways, that is, by sneezing, running, blocking, or bleeding. Allergy skin tests are by definition negative in this condition.

The season itself often provides a background for diagnosis. Most viral infections, for instance, occur in the winter months, whereas most seasonal allergies occur in warmer months. By symptomology alone it can be difficult to differentiate between a viral infection and an allergy. Patients with viral infections often present with a sore throat, malaise, and fatigue, but many patients with severe allergic attacks feel tired and achy as well. Fever, however, while not uncommon with viral infections, is rarely found in patients with allergic rhinitis.

In difficult cases, the physician may be tempted to make an etiologic diagnosis by anterior rhinoscopy. Such diagnoses may be difficult; the nose must be carefully examined, of course, but interpretation of what is seen there can be complicated by a variety of factors. A reddened mucosa only suggests inflammation, for instance, and does not help to differentiate between infectious and non-infectious causes. Pallor and edema suggest allergy, but identical surface appearances can be seen with nonallergic perennial rhinitis.

Rhinoscopy renders certain predictable results. The inferior turbinates are normally pink and large, because they function as heating and humidifying units. The physician expects nasal polyps and tumors to have a typical appearance; both of these arise higher up in the nasal cavity. Middle turbinates are more elongated and tend to be pale; superior turbinates are rarely seen. Because the physical appearance of the turbinates is not specific, it is important to base diagnosis and treatment not on rhinoscopy alone but on the patient's history and skin test results.

Investigation may in some cases include a complete blood cell count, but of particular interest is the eosinophil count. One would expect to see some eosinophilia in the peripheral blood or nasal discharge of patients with seasonal allergic rhinitis and perennial allergic rhinitis, but not in patients with nonallergic perennial rhinitis. Patients with Mullarkey's syndrome, on the other hand—"non-allergic rhinitis with eosinophilia syndrome"—present with symptoms similar to those previously outlined, yet their skin allergy tests are negative and their nasal discharge shows eosinophilia.¹⁰ Thus the presence of eosinophilia does not necessarily establish that the mechanism underlying the symptoms is IgE mediated. Very often the trigger mechanism is a local viral infection—a cold—which causes the primary inflammation and then becomes amplified by the influx of inflammatory cells and release of vasoactive chemicals.

When other potential etiologies have been ruled out, there remains a group of patients whose disease state is commonly described as vasomotor rhinitis (VMR). Patients with VMR often claim that they feel worse in the winter and better in warmer months. To better define this group, we should include only those patients in whom an allergy skin test is negative or who have a positive skin test that appears to be irrelevant—for instance, a positive ragweed skin test but symptoms only in seasons where ragweed pollen is absent. Generally, there is no eosinophilia in these patients.

Patients with VMR may have been treated with immunotherapy and obtained no relief. They are often dependent on vasoconstricting α -adrenergic blocking agents, either nose drops or tablets. It is significant to note that patients with symptoms and signs of VMR do not respond to topical corticosteroids or to adequate doses of systemic corticosteroids, such as prednisone. That is the hallmark of a noninflammatory rhinorrhetic condition.

The "vasomotor" adjective is a historical term implying involvement of the autonomic nervous sys-

tem. The condition suggests hyperactivity of parasympathetic tone with vasodilatation of submucosal venous sinusoids or excessive seromucous secretions from mucus glands. The cause is unknown, and treatment to date has been unsatisfactory. Vasomotor rhinitis appears to be mechanically analogous to the syndrome labeled "functional bowel disease" or "irritable colon," which also has been blamed on autonomic nervous system dysfunction and an increase in parasympathetic tone. Clinical experience indicates that whereas the "constipated" component of the vasomotor rhinitis, that is, the blocked nose, appears to respond only to decongestants, the "diarrhea" component, rhinorrhea, responds well to topical anticholinergic agents such as ipratropium bromide.

TREATMENT OPTIONS

It would appear that the attending physician has an excellent opportunity, on the basis of the patient's history alone, to make up a reasonable differential diagnosis of rhinorrhea. As has been stated, this has important implications with regard both to timely, effective treatment and to health-care costs. In most cases it may be possible to keep investigations to a minimum—a few appropriate screening allergy skin tests, and a complete blood cell count or nasal specimen for eosinophilia. It is not necessary to take x-ray films of the paranasal sinuses unless focal sinus disease is suspected, which is usually evident from the history and the physical sign of localized pain and tenderness over a specific paranasal sinus, indicating an air-fluid level. On the other hand, some patients with the complaint of a runny or stuffy nose can be shown to have an air-fluid level on sinus x-ray films but have no focal signs or symptoms. If the patient responds poorly to traditional first-line treatment, such as H₁-blocking antihistamines and topical corticosteroids, it may then be necessary to move on to more specialized diagnostic imaging techniques, such as the expensive computed tomography and magnetic resonance imaging scans.

Where bacterial superinfection is suspected, appropriate cultures of the nasal discharge are indicated. Bacterial sinusitis is generally a late complication of the original condition, and thus antibiotics are not indicated early in the course of the disorder. Viral infections do not respond to

antibiotics. It seems unfortunate, then, that the second line of treatment for the common cold in the United States, after H₁-blocking antihistamines, is antibiotics. It is true that patients often demand antibiotics for their colds, but physicians in their roles as teachers have an opportunity to educate the patient and at the same time help to reduce the cost burden of health care.

A diagnosis based on a clear idea of the clinical picture in rhinorrhea allows the physician to rationalize treatment. Treatment choices include a step-by-step selection, depending on the diagnosis, of H₁-blocking antihistamine medications, oral decongestants, topical antiinflammatory agents, both nonsteroidal and steroidal, and topical anticholinergic agents. It should be possible to keep patients with rhinorrhea reasonably comfortable with such an approach, and surgical intervention with all its potential hazards and costs might be avoided.

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