Allergic rhinitis is estimated to affect as many as 40 million people in the United States on a regular basis, and even more individuals who have occasional symptoms. The disease is associated with a considerable burden on the healthcare system, accounting for a total of $7.9 billion in direct and indirect costs in 1997, and with significant adverse effects on patients’ quality of life, including disturbed sleep and impaired function at work and school. The pathophysiology of allergic rhinitis is complex, involving inflammatory mediators and immune cells that produce allergy symptoms via multiple mechanisms. The first principle of clinical management of patients with allergic rhinitis is avoidance of exposure to allergens, but this measure can be very difficult, and most patients require pharmacotherapy. Allergy vaccine therapy may be an appropriate and necessary option in selected patients with allergies refractory to other treatment modalities.

(Key words: allergen, allergy vaccine therapy, allergic rhinitis, allergy, avoidance, early-phase reaction, immunoglobulin E [IgE], immunotherapy, inflammation, late-phase reaction, mucosa, patient education, prevention, productivity, quality of life, rhinitis, sensitization, triggers)

Allergic rhinitis is the most common allergic disease in the United States, affecting 20 to 40 million people.1,2 It is an inflammatory disease of the upper airways, mediated by binding of antigens to specific immunoglobulin E (IgE) antibodies, resulting in inflammation of the airway mucosa. People with such allergies have a large number of IgE antibodies that bind to specific antigens. They are said to be sensitized to those antigens, and in such patients, antigens that bind to IgE and cause allergic reactions are called allergens.

Allergic rhinitis is one category of rhinitis, the other being nonallergic rhinitis (Figure 1). Allergic rhinitis may be seasonal or perennial, but some patients may have both types. Typical seasonal allergens include grass, tree, and weed...
pollens, and outdoor mold (fungus) spores. Common perennial allergens include dust mites, animal dander, cockroaches, and molds, as well as occupational allergens.

Patients with typical seasonal allergic rhinitis tend to have watery rhinorrhea; repetitive sneezing; itching (pruritus) of the eyes, nose, ears, and throat; watery eyes; and nasal congestion, whereas patients with perennial allergic rhinitis are more likely to have prominent and severe nasal congestion and postnasal drainage. Perennial allergic rhinitis may be more difficult to diagnose because its symptoms can mimic those of chronic sinusitis, recurrent upper respiratory tract infections, and vasoconstrictor rhinitis.

Signs and symptoms suggestive of nonallergic rhinitis consist of sensitivity to smoke, perfume, weather changes, and environmental irritants; nasal crusting or drying; and facial pain. Another common type of nonallergic rhinitis is rhinitis medicamentosa, a syndrome of rebound nasal congestion that may occur in response to overuse of α-adrenergic decongestants and short-term cocaine abuse.

Allergic rhinitis typically begins in childhood and persists through adolescence and early adulthood, but tends to wane in older adults. In terms of the physical examination, clinicians should examine the patient for mouth breathing, the “allergic salute” (ie, repeated wiggling, wiping, and pushing of the nose in response to continual nasal itching), and the nasal crease that often results, “allergic shiners,” and Dennie’s lines (ie, a prominent fold across the lower eyelids). In patients with long-standing, poorly controlled allergic rhinitis, the sustained activation of inflammatory processes over time by continued allergen exposure can lead to mucosal hyperplasia, which can in turn worsen nasal obstruction and impair sinus drainage.

Cost and social impact of allergic rhinitis
The 40 million people in the United States estimated to have allergic rhinitis includes 14 million working adults. Very high rates of allergic rhinitis have been reported in children; one study involving patients in a health maintenance organization in Tucson, Arizona, reported physician-diagnosed allergic rhinitis in 42% of children by age 6 years. In addition to individuals with medically established allergic rhinitis, a study using 1993 census data found that nearly 80 million people in the United States have 7 or more days of nasal/ocular symptoms each year.

The total cost of allergic rhinitis in the United States was estimated at $7.9 billion in 1997, including $4.5 billion in direct medical costs and an additional $3.4 billion in indirect costs, mostly related to reduced work productivity. Allergic rhinitis is responsible for 3.8 million days lost each year from work and school in the United States.

In contrast to the perception that many healthcare providers may have of allergic rhinitis as a relatively “trivial” disease, allergic rhinitis can result in significant reductions in quality of life in several important domains, with adverse consequences generally equivalent to those seen in patients with asthma (Figure 2). Allergic rhinitis can have a particularly severe impact on sleep in adolescents (Figure 3), which can in turn translate into problems with concentration and learning at school. Con gestion associated with allergic rhinitis can contribute to snoring and disturbed sleep, which might be confused with sleep apnea in older adults.

Pathophysiology of allergic rhinitis
For reasons that are not known, people with allergies have γ-globulin E (IgE) antibodies that are “designed” to bind specifically to antigens such as pollens, molds, animal dander, and dust mites. The binding of a specific antigen to the IgE antibody triggers the activation of
the immune cell. Affected individuals are said to be sensitized to those antigens that for them, act as allergens. The IgE antibodies (reaginic antibodies) also bind to receptors on cells of the immune system cells (eg, mast cells, basophils, monocytes, and eosinophils). The immediate reaction occurs in mast cells, which are triggered to release inflammatory mediators, including histamine, stored in granules in the cell (degranulation). These inflammatory mediators stimulate nerve endings and other tissues in the nasal mucosa to produce itching, sneezing, rhinorrhea, and congestion. In addition to stimulating nerve cells in the mucosa, histamine also makes blood vessels “leakier,” leading to plasma extravasation and congestion—essentially, edema in the mucosa due to leakage of fluid into the extracellular space.

The initial release of inflammatory mediators (early-phase reaction) includes cytokines such as leukotrienes, which promote the local expression of adhesion molecules and “recruit” additional inflammatory cells such as eosinophils and lymphocytes to the site. The influx of these cells and their activation leads to chronic inflammation, ie, the late-phase reaction. One troubling feature of such chronic inflammation is its contribution to nasal hyperreactivity, so that the nasal mucosa becomes even more sensitive to stimuli—not just from the allergen, but also to irritants in general—resulting in a worsening of symptoms. One result of this complex situation is that inflammation is being caused by multiple mechanisms; therefore, we need to offer multiple modes of treatment that work via different mechanisms to provide the greatest relief of symptoms.

Treatment of allergic rhinitis

Because allergic rhinitis is associated with several other medical conditions, including asthma, otitis media, and sinusitis, achieving good control of inflammation in the nasal mucosa and of the symptoms of allergic rhinitis is crucial. Specific treatment modalities are discussed in detail in the next article, “Improved strategies and new treatment options for allergic rhinitis,” by Sandra K. Willsie, DO, beginning on page S7. The general approach to clinical management of patients with allergic rhinitis includes four elements or principles:

- avoiding factors that cause symptoms,
- using appropriate treatment modalities,
- evaluating for immunotherapy, and
- educating the patient and ensuring follow-up.

Prevention by avoidance of exposure to triggers of the allergic reaction whenever possible is the first and most obvious step. Avoidance, however, can be difficult, either because the allergen is ubiquitous, as occurs in entire geographic regions during pollen seasons, for example, or because the individual has difficulty avoiding an allergen or eliminating it from his or her environment (eg, cockroach or mold infestation in a building). Appropriate environmental control measures include keeping windows and doors closed during the allergy season, reducing outdoor activity on days with high-pollen counts, maintaining a dust- and allergen-free environment, keeping pets outdoors, avoiding smoke and strong odors, and using air conditioning and/or air filters.

Pharmacotherapy includes both nonprescription (over-the-counter, or OTC) and prescription options. Over-the-counter treatment modalities include intranasal cromolyn sodium, intranasal decongestants, oral antihistamines, and oral decongestants. Prescription medications include oral and intranasal antihistamines, oral decongestants, oral and intranasal corticosteroids, and intranasal anticholinergic agents.

For appropriately selected patients who have a poor response to the other available treatment modalities, the World Health Organization currently recommends allergy vaccine therapy. It can be highly effective in the management of allergic rhinitis. It is the only intervention that can modulate the immune system and reduce symptoms for a prolonged time, even after its use has been discontinued.

Comment

Allergic rhinitis is a complex disease of the immune and inflammatory systems. Inflammation in the nasal mucosa occurs via multiple mechanisms and is most effectively treated with medications that work via different mechanisms. Also, allergic rhinitis is the nasal aspect of a systemic disease, which often involves the lungs and the entire body as well. Finally, although there is no mortality from allergic rhinitis, there is considerable morbidity associated with the disease, including sleep disturbances and adverse effects on quality of life, as well as contributions to associated diseases such as asthma, sinusitis, and otitis media.
References


