Manifestations of Inhalant Allergies Beyond the Nose

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KEYWORDS

• Allergic rhinitis • Rhinosinusitis • Asthma • Laryngitis • Conjunctivitis
• Unified airway • United airway disease

KEY POINTS

- Allergic rhinitis, rhinosinusitis, and asthma frequently occur in the same patients.
- The upper and lower airways are linked both epidemiologically and pathophysiologically.
- Allergic rhinitis is a risk factor for the development of asthma, and treatment of rhinitis has been shown to improve asthma outcomes.
- Rhinosinusitis and asthma are linked, and comorbid sinusitis and asthma is associated with more severe clinical presentation.
- Allergic laryngitis is less well-understood; however, there is evidence of an epidemiologic link.

INTRODUCTION

Allergic inflammation affects both the upper and lower airways. The relationship between allergic rhinitis and its comorbidities, including chronic rhinosinusitis (CRS) and asthma, has been well-established. Given that a large part of the otolaryngologist's practice involves the diagnosis and management of upper airway disease, including allergic rhinitis, sinusitis, and laryngitis, knowledge of the manifestations of inhalant allergies beyond the nose is critical. The otolaryngologist may be the first physician to suspect and diagnose asthma in this at-risk patient population. As otolaryngologists, we therefore must be knowledgeable regarding the signs and symptoms of lower airway disease to ensure timely diagnosis of asthma and to optimize treatment of both upper and lower airway inflammatory diseases. A thorough understanding of the close relationship between allergic rhinitis, CRS, and asthma will facilitate early identification of asthma and improve patient outcomes.[1]

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THE UNIFIED AIRWAY

The "unified airway" or "united airway disease" describes the concept of viewing the upper and lower airways as a single, functional unit. This model originated from the observation that allergic inflammation in response to an allergen is not confined to a specific organ, but rather it affects the entire respiratory tract. The nose, paranasal sinuses, pharynx, larynx, trachea, and bronchi through the pulmonary alveoli are included in this unit. Upon allergen exposure, local inflammatory processes occur along with a systemic response produced by the migration of proinflammatory mediators through the circulatory system. Under this model, upper and lower airway disease, including rhinitis, sinusitis, and asthma, can be thought of as different manifestations of the same disease.[2]

The upper and lower respiratory tracts share histologic structures in common, including pseudostratified columnar epithelium, basement membrane, lamina propria, and goblet cells. It follows that inflammatory processes are similar along the length of the respiratory tract. However, there are several structural differences that contribute to the unique physical manifestations of allergic inflammation in distinct respiratory sites; upper airway mucosa is richly vascular, whereas lower airway bronchial mucosa is characterized by the presence of smooth muscle. Inflammation of the nasal mucosa results in vasodilation and edema, whereas inflammation of the bronchial mucosa produces smooth muscle contraction.[3] The pathophysiologic link between the upper and lower airway has been demonstrated in several studies.[4–6] Stimulation with antigen at 1 respiratory site has been shown to produce an inflammatory response at distant and distinct respiratory sites. This "inflammatory cross-talk" supports the shared immunity mechanism to explain the unified airway.

Because the inflammation associated with allergy acts both locally and systemically, upper and lower airway pathology frequently coexist. Allergic rhinitis is the most common atopic disease. Not only is allergic rhinitis associated with asthma, but the presence of allergic rhinitis itself is considered a risk factor for the development of asthma. Long-term studies have demonstrated that allergic rhinitis is a risk factor for the future development of bronchial hyperresponsiveness and/or asthma. The risk of development of asthma is 3 times higher in patients with allergic or nonallergic rhinitis.[7] Patients with clinically severe sinonasal symptoms are at even greater risk for the development of asthma.[8] The prevalence of asthma in patients with rhinitis has been estimated to be as high as 40%, and approximately 80% of patients with asthma also have rhinitis. Furthermore, 30% of patients with allergic rhinitis who do not have asthma demonstrate bronchial hyperresponsiveness to methacholine or histamine challenge.[3] This supports the idea of "one airway, one disease."

The clinical impact of the unified airway has also been explored. Examination of prescription data revealed that patients with both asthma and allergic rhinitis had a higher percentage of prescription medication use than those with asthma alone.[1] Several studies have shown that treatment of rhinitis in patients with asthma produces clinical benefit in terms of reduction of lower airway symptoms, emergency room visits, and hospitalizations.[9–11]

RHINITIS AND ASTHMA

Epidemiologic Relationship and Clinical Implications

Allergic rhinitis is defined as symptomatic, immunoglobulin E (IgE)-mediated inflammation of the nasal mucosa after allergen exposure. Symptoms of allergic rhinitis include rhinorrhea, nasal congestion, obstruction, pruritus, and sneezing.[12] Asthma is a chronic respiratory disorder characterized by wheezing, coughing, chest