Allergic Rhinitis in Children

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Received : December 14, 2020
Published : January 18, 2021

ABSTRACT

Allergic rhinitis is defined as a symptomatic disorder of the nasal mucosa that occurs after contact with environmental allergens resulting in an inflammatory reaction. Some people have allergic rhinitis only during certain periods of the year (seasonal allergic rhinitis). Others can have it at any time of the year (non-seasonal allergic rhinitis). Seasonal allergic rhinitis can be caused by pollen from weeds, grasses or trees. House dust, feathers, mold, animal hair and even some medications can cause non-seasonal allergic rhinitis. Sudden changes in temperature, physical exertion, tobacco smoke, and air pollution can make symptoms worse. The most common symptoms of allergic rhinitis are: sneezing, stuffy nose and nasal secretion, itching and redness of the nose and eyes, tingling and tearing of the eyes, and irritating cough and scratching in the throat. The symptoms of allergic rhinitis can disappear spontaneously or by taking certain medications.

KEYWORDS: Allergic Rhinitis; Comorbidity; Asthma; Treatment

INTRODUCTION

Allergic rhinitis (AR) is the most common chronic disease in children [1]. Often mistaken for recurrent episodes of the common cold. At difference to the common cold, AR usually does not present with low-grade fevers or malaise. Nasal and eye pruritus also distinguish AR from viral upper respiratory infections. AR is one of the major reasons for visits to pediatricians and is associated with a number of significant comorbidities, including asthma, sinusitis, and ear infections.

Allergic rhinitis has been categorized as seasonal or perennial [2]. Seasonal allergic rhinitis is most commonly caused by exposure to tree pollens (early spring), grass pollens (late spring and early summer), and ragweed or other weed pollens (late summer and fall). Allergens responsible for perennial allergic rhinitis include animal dander, house dust mites, and mold spores. Updated duration-based terminology established by the World Health Organization includes intermittent and persistent allergic rhinitis. These terms were chosen because not all patient with sensitivity to typical perennial allergens exhibit constant symptoms and because year-round pollens may be found in many parts of the world. It is important to recognize that food

allergens to do not typically cause isolated allergic rhinitis.

The symptoms of allergic rhinitis become visible immediately after inhalation of allergen; these symptoms include continuous sneezing after waking up in the morning; runny or blocked nose; tickling feeling in throat or a postnasal drip resulting in cough; watery or itchy eyes and itchy nose and throat [3]. It can also include hives, dark circles under eyes, sore throat; pressure under nose and cheeks; and headaches.

Secondary symptoms include a packed nose with sniffing; and difficulty breathing due to congestion. These long-term symptoms may result in sleep disorder; long-lasting cough; difficulty in hearing due to pressure or fluid in ear; and uncomfortable feeling or pain in the face.

Every child seems to have a runny, congested nose sometime throughout the year [4]. This commonly occurs from the fall to spring season. Parents become quite concerned over these symptoms and frequently seek medical attention and advice to address them. Pediatric rhinitis and sinusitis are largely responsible for many upper respiratory symptoms in children.

One of the common reasons for a child to visit the physician is chronic nasal airway symptoms [5]. The challenge for the physician is to find the underlying cause and therapy for the child. Infectious causes are the most common reason for acute rhinitis in children. Between the ages of 2 and 6, the average child has six infections per year with each lasting 7–10 days, unless a secondary infection occurs, extending the duration to 2–3 weeks. Immunologic defi ciencies can increase the frequency and length of rhinologic infections. Structural causes for rhinitis should be evaluated which include foreign bodies, choanal atresia, nasal polyps, nasal tumors, and septal deviation. Physiologic causes for rhinitis in children include ciliary dyskinesia, reflux, and cystic fibrosis.

The diagnosis may be straightforward with classic symptoms or uncertain and challenging as when differentiating allergy from an infection or irritation in a child [6]. One should be familiar with the common allergens, diagnosis, and treatment strategies in allergic rhinitis. Allergy testing should be pursued when indicated. On the other hand, although immunodeficiency is rare, there is significant morbidity and mortality associated with these diseases that can be avoided with prompt identification and treatment. One should recognize symptoms of immune deficiency and understand the laboratory testing and treatment options.

ANATOMY

The nasal skeleton consists of the nasal bones, the paired lateral cartilages, and the septal cartilage [4]. The septum divides the nasal cavity into two halves. The lateral wall of the nose has three projecting divisions of bones known as turbinates, specifically the inferior, middle, and superior turbinate. The space below each turbinate is called a meatus. The middle meatus plays an essential role in the ventilation and mucociliary clearance of the sinuses, as all the sinuses, with the exception of the sphenoid and posterior ethmoid air cells, open into this meatus. The osteomeatal complex is a culmination of all the openings of the sinus ostia. Its patency or lack thereof, is responsible for many sinus symptoms and the development of sinusitis.

There are four pairs of sinuses that are air-filled bony cavities within the skull. They are lined with the same respiratory epithelium that lines the nose as well as the trachea, bronchi, and the eustachian tubes. This is specifically called pseudostratified ciliated columnar epithelium and, as we will further discuss, is the reason sinusitis and rhinitis are associated with lower airway and middle ear disorders and illnesses.

Each pair of sinuses forms at varying time frames during the course of a child's development. This information is essential to keep in mind when caring for a child with a suspected sinusitis as a sinus can only be responsible for symptoms if it is already developed and pneumatized. The maxillary and ethmoid sinuses are the only two that are formed at birth but are not aerated until 3–4 months of age. The ethmoid sinuses do not exist as a single cavity as the others but consists of several air cells. It typically reaches its adult size by the age of 12 years. The maxillary sinus continues to grow into puberty and by adulthood is the largest sinus with a volume of 15mL. The sphenoid sinuses begin to form between 3 and 5 years of age and are fully developed at 7–8 years of age. The frontal sinuses are rudimentary before the age of 7 years and continue to develop into adolescence. It is not uncommon to see either a unilateral absence or complete absence of the frontal sinus without negative implications.

DISORDER

Allergic rhinitis is a chronic disorder of the upper airway which is induced by IgE-mediated inflammation secondary to allergen exposure [7]. It significantly affects quality of life, interfering with physical and social activities, concentration, school performance, and sleep. Allergic rhinitis can contribute to the development of rhinosinusitis, otitis media, and asthma. Symptoms may include

nasal congestion, sneezing, rhinorrhea, and itchy nose, palate, throat, and eyes. On physical examination, the nasal turbinates are swollen and may be red or pale pink-purple. Several classes of medications have proven effective in treating allergic rhinitis, including intranasal corticosteroids, oral and intranasal antihistamines, leukotriene antagonists, and decongestants. Ipratropium nasal spray may also be used as an adjunctive therapy. Nasal saline rinses are helpful to wash away allergens. Recent studies have indicated that use of intranasal steroid sprays may not only decrease the impairment caused by allergic rhinitis symptoms, but also help prevent progression to more severe disease and decrease the risk of related comorbidities such as asthma and sleep-disordered breathing.

Allergic rhinitis is a common, chronic medical problem that affects patients of all ages [8]. Eighty percent of individuals develop symptoms of AR before 20 years of age, with 40% of patients becoming symptomatic by age 6 years. Approximately 30–40% of children suffer from AR. Although allergic rhinitis is not life-threatening, it causes significant morbidity and is an economic burden. The diagnosis of allergic rhinitis is made from history of typical symptoms and physical exam findings.

Infectious rhinitis is caused by viruses or bacteria; infection with viruses is many times more common than that with bacteria [7]. The common cold is a syndrome caused by more than several hundred antigenically different viruses that may intermittently colonize and infect the upper respiratory tract. The viruses can be divided into four groups: (1) the myxovirus and paramyxovirus groups [containing influenza, parainfluenza, respiratory syncytial viruses (RSVs), and human metapneumovirus], (2) the adenovirus group (containing 35 different human serotypes), (3) the picornavirus group (containing enteroviruses and more than 100 different rhinoviruses), and (4) the coronavirus group. The specific cause of a cold can be identified in 80% of cases by using sensitive nuclei acid amplification techniques. Rhinoviruses account for 40%–60% of infections; RSVs are generally second most common. Coronoviruses, influenza A, enteroviruses, human metapneumovirus, parainfluenza, and adenoviruses fill in the remaining percentage in variable proportions depending on time and geographic area.

RHINITIS AND ASTHMA

There is growing evidence for a conceptual vision of the upper and lower airway as part of a continuum [9]. The information to support this includes epidemiologic, histopathologic, physiologic, and clinical studies. The practical clinical outcome of this airway integration is that allergic rhinitis and asthma may be considered to be elements of a disease spectrum and that, in the individual, insults to one element actually influence the other.

In children, atopy is a dominant factor in rhinitis and asthma. Measures to control environmental allergens can be valuable for decreasing airways reactivity. To accomplish appropriate avoidance, allergy skin testing or in vitro measures of specific IgE should be performed. Allergen avoidance measures can then be focused correctly.

Reported prevalence rates of allergic rhinitis in children with asthma ranges from 60% to 80% [10]. Asthma and allergic rhinitis frequently coexist because of their shared allergic inflammatory pathogenesis and the crosstalk between the nasal and the lower airway epithelium. Symptoms of allergic rhinitis (including nasal itching, sneezing, increasing secretion and a blocked nose) may be missed if patients or parents are not directly questioned about them. In adults, the use of nasal corticosteroids is associated with a significantly reduced risk of asthma-related emergency room treatments and hospitalisations. Although it is likely that adequate treatment of allergic rhinitis can also reduce asthma morbidity in children, this has not been demonstrated in clinical studies to date. We recommend questioning all children with asthma about symptoms of rhinitis and, if needed, prescribing medication, in particular when asthma is not well controlled.

COMORBIDITY

Comorbid medical conditions are common in pediatric asthma and can be associatedwith greater asthma severity [11]. Allergic rhinitis and atopic dermatitis are atopic diseases which share with asthma an allergic oversensitivity leading to allergic inflammation and are often present in children with asthma. Chronic rhinosinusitis is often present in youth with asthma and is an independent risk factor for asthma exacerbations. Gastroesophageal reflux disease is also common and can affect asthma through the activation of vagal reflexes and/or microaspiration especially in youth with severe or difficult to treat asthma. Obstructive sleep apnea may occur along with asthma, especially as the two conditions share predisposing factors. Vocal cord dysfunction (VCD) is a functional disorder in which the vocal cords close abnormally during inhalation, which may be diagnosed as treatment-resistant asthma. While asthma and VCD sometimes co-exist, the treatments are different and asthma medications will not improve VCD. Finally, asthma and obesity are highly comorbid, and further, these youth experience

greater asthma severity and poorer asthma-related outcomes (e.g., more frequent symptoms, ED visits) than their non-obese peers with asthma. Obesity may be a risk factor for asthma due to the generation of unique inflammatory mediators (e.g., leptin, C-reactive protein) that lead to airway dysfunction. This is compounded by the fact that children with asthma may refrain from exercise, leading to weight gain.

Acute bacterial sinusitis occurs when there is an interruption of the physiologic clearance mechanism of the paranasal sinus system, resulting in obstruction of the ostia, ciliary dysfunction, stasis of secretions, and reduction in the partial pressure of oxygen within the affected sinus cavity [12]. This provides an ideal environment for bacterial growth and the resulting purulent infection that occurs within the normally sterile sinus cavity.

Any condition that causes a blockage of the paranasal sinus ostia can result in acute bacterial sinusitis. The most common predisposing condition in children is a viral upper respiratory infection (URI). Viral rhinitis may involve the paranasal sinus mucosa in most URIs, resulting in the characteristic symptomatology associated with this self-limiting condition. Although viral URIs are common in young children, only 5% to 10% of cases will have bacterial superinfection requiring antimicrobial treatment. Children in daycare tend to develop more frequent and severe URIs, which may be secondary to bacterial superinfection. Other less common factors that can predispose children to obstructioninduced bacterial sinusitis include allergic sinonasal disease, foreign bodies, polyps, tumors, and anatomic variations, such as nasal septal deviation.

DIAGNOSIS

In clinical practice, it is rarely necessary to know the precise cause of the common cold [13]. However, virus may be isolated from the nasopharynx (by direct swabbing) or from the nasal cavity (with nasal washes) by conventional tissue culture techniques. These cultures are expensive and variably sensitive, and the results are not usually available for four to seven days. Rapid diagnostic techniques such as enzyme immunoassay, fluorescent antibody methods, and polymerase chain reaction have been developed for detecting RSV, rhinovirus, parainfluenza virus, influenza virus, coronavirus, adenovirus, enterovirus, and human metapneumovirus. Although precise etiologic information is not essential for the practitioner, community surveillance cultures may provide useful epidemiologic information, for example, signaling the onset of influenza season.

Obvious symptoms of allergic rhinitis including [14]:

• Sneezing many times in a row

• Clear discharge from a continuously runny nose

• Itchy nose, ears, mouth

• Red, itchy eyes

• "Allergic shiners," those black circles under a child's eyes caused by nasal congestion

• The allergic salute: the child frequently swipes his hand upward across the tip of his nose

As a side effect of the clogged nasal passages caused by allergic rhinitis, a child may have frequent ear infections or sinusitis that, in turn, can cause asthma flares. When the swelling from allergic rhinitis blocks a child's ears, she can't hear as well as usual.

For diagnosing is very important:

- History and physical examination are key to diagnosis [1]
- Percutaneous (prick or puncture) skin testing remains the most specific and cost-effective diagnostic modality
- Serum detection of allergen-specific IgE by enzyme-linked immunosorbent assay (ELISA) also may be used
- These tests can help to identify the offending allergen, and specific avoidance can be recommended
- Nasal smear for eosinophils with eosinophil count of greater than 4% in children may help distinguish AR from viral infections and nonallergic rhinitis

Manangement

Allergic rhinitis is managed by avoidance of allergens, use of pharmacologic agents (antihistamines, leukotriene inhibitors, or corticosteroids), or immunotherapy [15]. Parents usually ask how sick children should be before they need to see an allergist about skin testing and definite treatment (an expensive, time-consuming, and potentially painful procedure). Individual circumstances dictate the direction of treatment. As a rule, a child whose symptoms are increasing in intensity, who has associated lower respiratory tract involvement, or whose condition interferes with activities in which the child wants to participate needs definitive testing and treatment. Others can

be managed by environmental control and medications to reduce symptoms.

Intranasal corticosteroids or antihistamines are effective in reducing symptoms in most children. Caution children and parents that antihistamines tend to cause sleepiness. Assess whether this will interfere with schoolwork or if an adolescent, if it could interfere with driving an automobile. Be certain that parents understand that if nasal antihistamine sprays are given for more than 3 days, a rebound effect may occur (the nasal mucosa becomes more edematous rather than less edematous).

Avoidance of allergens may be ineffective with allergic rhinitis because a child has a sensitivity to many different pollens or grasses. If children always show symptoms at one particular time of the year, parents may be able to carry out environmental control for that period of the year. Some children with allergic rhinitis are more comfortable in air-conditioned buildings; others have strong symptoms in the presence of air conditioning, probably accounting for the high incidence of headaches that occur at school.

Allergic rhinitis is often considered a minor illness by parents, something that children will outgrow. However, for children who have the condition, it may not be a minor illness and it may keep them from interacting with other children during certain months because they dread going outside and initiating symptoms. Help parents understand the importance of avoiding allergens and the need for conscientious administration of intranasal corticosteroids or antihistamines to minimize symptoms.

CONCLUSION

Allergic diseases have the character of a modern epidemic. More than 20% of the world's population suffers from allergic rhinitis, asthma or atopic dermatitis. Although an easily recognizable disease, allergic rhinitis in many cases remains undiagnosed and untreated. Symptoms of agitation and hyperactivity during the day predominate in children. Allergic rhinitis is a risk factor for many other conditions and diseases (asthma, sinusitis, polyposis, otitis media), which further increases its medical significance, but also the costs of treatment. Children with allergic rhinitis have multiple episodes of acute upper respiratory tract infections, they last longer and have a more severe course.

REFERENCES

1. Lloret MIG, Kuo CY. (2020). Allergy and Immunology in Naga, O. I. (ed): Pediatric Board Study Guide - A Last Minute Review, Second Edition, Springer Nature Switzerland AG, Cham, Switzerland, pp. 391–393.
2. Stevenson MD, Ruddy RM. (2010). Asthma and Allergic Emergencies in Fleisher GR, Ludwig S. Bachur RG, Shaw KN, Gorelick MH, Ruddy RM. (eds): Textbook of Pediatric Emergency Medicine, Sixth Edition, Wolters Kluwer, Lippincott Williams & Wilkins, Philadelphia, USA, pp. 667.
3. McClafferty H. (2017). Integrative Pediatrics - Art, Science, and Clinical Application, Routledge, Taylor & Francis Group, Abingdon, UK, pp. 247–248.
4. Mackey WSL, Dziedzic MM, Gagnon LM. (2012). Upper airway disorders in Tolomec, C. (ed): Nursing Care in Pediatric Respiratory Disease, Wiley-Blackwell, John Wiley & Sons, Chichester, UK, pp. 162–163.
5. Sanford T. (2009). The Pediatric Allergic Nose in Mitchell RB, Pereira KD. (eds): Pediatric Otolaryngology for the Clinician, Humana Press, Springer Science + Business Media, New York, USA, pp. 114.
6. Baxi SN, Phipatanakul W, Jones DT. (2012). Role of Allergy and Immunologic Dysfunction in Upper Respiratory Disease in Wetmore RF, Muntz HR, McGill TJ. (eds): Pediatric Otolaryngology - Principles and Practice Pathways, Second Edition, Thieme Medical Publishers, Inc., New York, USA, pp. 47.
7. Yoon PJ, Scholes MA, Friedman NR. (2018). Ear, Nose, & Throat in Hay, jr, WW. Levin MJ, Deterding RR, Abzug MJ. (eds): CURRENT Diagnosis & Treatment - Pediatrics, 24th Edition, McGraw-Hill Education, New York, USA, pp. 496.
8. Misra SM. (2014). Current Evidence for Common Pediatric Conditions in Misra SM, Verissimo AM. (eds): A Guide to Integrative Pediatrics for the Healthcare Professional, Springer International Publishing Switzerland, Cham, Switzerland, pp. 71.
9. Shapiro GG. (2006). Comorbid Illness Associated with Childhood Asthma in Szefler SJ, Pedersen S. (eds): Childhood Asthma, Taylor & Francis Group, New York, USA, pp. 566–568.
10. Klok T, de Groot EP, Brouwer AFJ, Brand PLP. Follow-up of children with asthma in Carlsen KH, Gerritsen J. (2012). Paediatric Asthma, European Respiratory Society, Sheffield, UK, pp. 217.

11. Netz M, Fedele D, Horky S, Prabhakaran S. (2018). Asthma in Forman SG, Shahidullah JD. (eds): Handbook of Pediatric Behavioral Healthcare - An Interdisciplinary Collaborative Approach", Springer Nature Switzerland AG, Cham, Switzerland, pp. 75.

12. Sobol SE. (2007). Management of Acute Sinusitis and Its Complications in Wetmore RF. (ed). Pediatric Otolaryngology - Requisites in Pediatrics, Mosby, Elsevier, Philadelphia, USA, pp. 119.

13. Wald ER. (2014). Rhinitis and Acute and Chronic Sinusitis in Bluestone CD, Simons JP, Healy GB. (eds): Bluestone and Stool's Pediatric Otolaryngology, Fifth Edition (Volume I)", People's Medical Publishing House, Shelton, USA, pp. 1037–1028.

14. Lewis Allen J, Bryant-Stephens T, Pawlowski NA, Buff S, Jablow MM. (eds) (2004). The Children's Hospital of Philadelphia Guide to Asthma - How to Help Your Child Live a Healthier Life, John Wiley & Sons, Inc., Hoboken,USA, pp. 42.

15. Pillitteri A. (2010). Maternal & Child Health Nursing - Care of the Childbearing and Childrearing Family, Sixth Edition, Wolters Kluwer, Lippincott Williams & Wilkins, Philadelphia, USA, pp. 1249.

Citation: Franjić S. (2021) . Allergic Rhinitis in Children. Neonatal. 2(1):03.

DOI: https://doi.org/10.35702/neo.10003