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Review Article

Treatment of Acute and Chronic Cough in Children

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Abstract

Cough (lat. tussis) is an automatic, natural reflex (without human will) that helps expel secretions, various irritants, foreign particles and microorganisms from the airways. In children, the most common cause of cough is the accumulation of secretions in the respiratory tract as a result of an allergy or infection. According to the duration, cough can be divided into: acute cough that lasts up to 4 weeks and chronic cough that lasts longer than 4 weeks. Most cases of acute cough in children are associated with viral infections of upper respiratory tract and do not require specific diagnostic evaluation. Treatment of upper respiratory tract infections (URTIs) requires antipyretics, good hydration and aspiration of secretions. Intranasal steroids may be effective in children with allergic rhinitis that presents with cough during the pollen season. The causes of chronic cough in children vary depending on the age of the patient. The most common cause of non-specific chronic cough in children under 5 years of age is as a result of upper respiratory tract infection (37.6%), followed by asthma-like cough (31.8%) and post-infectious cough (18.8%). Chronic cough due to asthma requires treatment with bronchodilators and, depending on the classification, inhaled corticosteroids. In the case of allergic rhinitis, antihistamines and topical corticosteroids will be needed, at least for a month. The use of antihistamines has been shown to be very effective in patients with allergic cough. And that in groups of children with allergic asthma, allergic rhinitis and asthma, allergic rhinitis without asthma and atopic cough Treatment of allergic cough usually lasts about six months.

Keywords: Acute Cough; Chronic Cough; Treatment; Children

Introduction

Cough (lat. tussis) is an automatic, natural and involuntary reflex that helps expel secretions, various irritants, foreign particles and microorganisms from the airways. Irritation can be caused by foreign bodies, dust particles, chemical agents, changes in temperature, etc. In children, the most common cause of cough is the accumulation of secretions in the respiratory tract as a result of an allergy or infection. A healthy school child with no history of upper respiratory tract infection in the previous four weeks coughs up to 34 times a day [1]. Cough disturbs the quality of life in children, affects the level of activity and ability of the child to sleep well, play or attend school, so it is often a source of parental anxiety. About 80% of children presenting to a physician have a respiratory tract infection and accompanying cough. About 2/3 of these children are attending kindergarten and have a minor viral URI [2].

In order to clarify the causes of cough, attention should be paid to certain specific factors in children:

- The child's immune system develops gradually and fully matures around the age of fifteen.
- In the first months and years of life, the ability to defend against infections by viruses, bacteria and fungi is reduced.
- By starting nursery school early, the child is exposed to those pathogens and can be expected to get sick on average once a month.
- Only after the third year of attending kindergarten, the frequency of illness is equal to the frequency of illness of children who do not go to kindergarten.
- In early childhood (children under three years of age), there is long-term anterior and posterior rhinorrhea (postnasal drip into the pharynx, trachea and bronchi).

- Accumulation of secretions in the upper respiratory tract occasionally provokes coughing in children, when audible clearing of secretions from the respiratory tract can be heard – the so-called wet or productive cough.

Types of coughs

According to duration, cough can be divided into:

- Acute cough lasting up to 4 weeks
- Chronic cough which lasts longer than 4 weeks.

Acute cough

Most cases of acute cough in children are associated with viral upper respiratory tract infections and do not require specific diagnostic evaluation. Between 35% and 40% of school-aged children continue to cough 10 days after the onset of a cold, and 10% of preschool-age children continue to cough 25 days after a respiratory tract infection [3].

Diagnosis

The diagnosis can be made on the basis of history and physical examination, and children generally do not require further investigation. A chest X-ray is indicated only if there is clinical suspicion of pneumonia or some chronic respiratory disorder, hemoptysis, sudden onset of cough or episodes of choking that could suggest foreign body aspiration.

Treatment

Treatment of upper respiratory tract infections (URTIs) includes antipyretics, adequate hydration and nasal toilet (aspiration of secretions). Antitussives, antihistamines and decongestants are no more effective than placebo in acute cough and have the potential to cause side effects; so they should be avoided in children under two years of age. Intranasal steroids may be effective in children with allergic rhinitis that presents with cough during the pollen season. Bronchodilators are not effective and should be avoided in non-asthmatic children who have an acute cough. We apply antibiotics only when we have confirmation of a bacterial infection. For example, in the case of pertussis, macrolide antibiotics should be prescribed immediately (in the first to second week of the disease). Symptomatic therapy with honey-derived products presents a natural and safe treatment option which may be used in children older than 2 years [4].

Chronic cough

Chronic cough in children can be classified into three etiological groups:

- **Normal or expected cough:** The cause is known, so the cough is also considered expected and no special studies are needed.
- **Specific cough:** Is a cough that occurs with signs and symptoms that suggest a specific diagnosis that is established after thorough examinations. This group includes asthma, bronchiectasis, cystic fibrosis (CF), foreign body aspiration, atypical respiratory infections, cardiac abnormalities and interstitial lung disease among others.
- Non-specific cough; includes syndromes that present with a predominantly dry isolated cough, without signs and symptoms of the disease in a well-child with normal spirometry and chest X-ray. In most cases, the cause is a secondary to a long-term URI. The cough is not serious and resoves spontaneously. Sometimes a persistent cough is the result of increased sensitivity of cough receptors after a viral infection, but factors such as environmental pollution and exposure to tobacco smoke may contribute to a persistent cough. Many of these cases were wrongly treated with inhaled corticosteroids and classified as "asthma-like cough" [2].

Causes

The causes of chronic cough in children vary depending on the age of the patient. A study by Chen X., *et al*. showed that cough after upper respiratory tract infection (37.6%) is the most common cause of non-specific chronic cough in children under 5 years of age, followed by asthma-like cough (31.8%) and post-infectious cough (18.8%) [5]. In a study by Asilsoi., *et al*. [6] in school children, the most common causes of cough were asthma (25%), persistent bacterial bronchitis (23%), upper respiratory tract syndrome (20%) and GERD (5%). After adolescence, the causes of chronic cough are similar to those of adults.

Pathophysiology

There are certain controversies regarding the cause-and-effect relationship between nasal, sinus and chronic cough [7]. Post-nasal drip is a common occurrence, but few patients complain of coughing. The nasal mucosa is primarily innervated by branches of the trigeminal nerve; so that direct stimulation of the nasal nerve endings, for example, in guinea pigs, with histamine or an irritant may cause a sneeze reflex, but not a cough reaction. Accordingly, there are different views on the use of H1 antihistamines in the treatment of chronic cough.

The prevalence of allergic rhinitis in children is about 33% [8]. The frequency of allergic rhinitis has increased in children in recent years and is gradually developing even in children younger than 3 years. The number of patients with chronic cough associated with allergic rhinitis is also increasing in both children and adults. Allergic rhinitis is characterized by leakage of significant amounts of secretions from the nose. As babies and children have an immature immune system, they often suffer from infectious rhi-

nosinusitis [8], which results in viscous, white or green nasal discharge. Thus, in children, not only inflammation of the airway mucosa but also direct stimulation of cough receptors due to postnasal drip (PND) underlies the cough caused by allergic rhinitis. That is why the frequency of coughing at night is significantly increased in subjects with PND. This suggests that PND directly stimulates cough receptors in the larynx and trachea and leads to coughing [9]. In the series by Hossain M., *et al.* who examined the etiology of chronic cough in children, it was observed that 56.0% of patients had allergic rhinitis [10].

About 26% of patients with allergic rhinitis have a persistent cough as the dominant symptom. Allergic cough can be recognized as dry, long-lasting, often accompanied by headache, dizziness or weakness and not accompanied by elevated body temperature. The term "allergic cough" was first proposed by Japanese scientists Fujimura., *et al*. [11] in 1992, and later was found to be one of the main etiological causes of chronic cough in children in Japan. These are patients with an atopic constitution, where the use of antihistamines achieves an excellent therapeutic effect [5].

Unlike a cold, which can occur at any time of the year, an allergic cough can have a seasonal character. Seasonal allergic rhinitis (hay fever) and accompanying cough is most often caused by plant allergens which vary by season and include grass, tree or weed pollens. Allergic cough can also occur in response to other types of allergens such as dust mites and dust. This cough is most common between November and February when heating, lack of ventilation and more time spent indoors all contribute toward greater allergen exposure. Due to increased air pollution in cities, plant pollens have undergone genetic changes and have stronger allergenic properties than their counterparts in the countryside. Therefore, allergic rhinitis is about five times more common in children who live in an urban environment, compared to those who grow up in the countryside.

Presentation

The presentation depends on the type of cough, daily pattern, aggravating factors and triggers, quality of cough (dry or productive) and associated symptoms. Symptoms such as nasal obstruction, mucopurulent rhinorrhea, runny nose and halitosis would suggest a cough syndrome due to a runoff of upper respiratory tract infections, and persistent headache may be a symptom of sinusitis.

Diagnosis

Attention should be paid to a detailed history and clinical examination. A chest X-ray is the first study, and depending on the results, the following tests should be considered: immunoglobulins test, in case of suspected immunodeficiency in children with cough and recurrent bacterial infections. Skin tests: tuberculin sensitivity testing, sweat testing (chloride concentration determination after pilocarpine stimulation) and allergy testing. Microbiological testing: sputum or nasopharyngeal aspirate culture for respiratory viruses, bacteria (culture and sensitivity) and/or cell studies. Pulmonary function testing: spirometry can be performed from the age of 3-4 years with appropriate training. A positive bronchodilator test suggests asthma. Flexible bronchoscopy: this should be done in all children with chronic cough and suspected airway abnormalities or foreign body aspiration., pH monitoring: this should be done if GER is suspected.

Treatment

In the treatment of chronic cough, the main goal would be to remove the causative agent, including tobacco smoke and other irritants in the environment.Chronic cough due to asthma requires step-up therapy with bronchodilators and inhaled corticosteroids. In the case of allergic rhinitis, antihistamines and topical corticosteroids will be needed, at least for a month. The use of antihistamines has proven to be very effective in patients with allergic cough. And that in groups of children with allergic asthma, allergic rhinitis and asthma, allergic rhinitis without asthma and atopic cough Treatment of allergic cough usually lasts about six months. Bacterial sinusitis should be treated with antibiotics, and GER with proton pump inhibitors. Bacterial bronchitis should be treated long-term (between two and 6 weeks) with the use of antibiotics: amoxicillin-clavulanate or clarithromycin [12]. Psychogenic cough requires investigation into the cause of stress or anxiety and possible subsequent psychological support [13].

Treatment of non-specific cough. If the cough is moderate and there is no underlying disease and the child is healthy, a period of observation is recommended. Trial treatment with half-dose inhaled corticosteroids is recommended for predominantly dry cough (budesonide 400 g/day or equivalent) for 2-12 weeks, depending on guidelines. The patient should be reassessed after two to three weeks and if there was no improvement, it should be discontinued [14]. In case of non-specific productive cough, administration of antibiotics (amoxicillin-clavulanate) is started.

Conclusion

Cough in childhood is a common symptom which, in most cases, is due to a minor respiratory infection, but all children must be thoroughly examined to determine the cause.

Acute cough is most often the result of an upper respiratory tract infection and is treated symptomatically usually resolving after 2 weeks. In the case of proven bacterial infection, antibiotics should be prescribed.

Chronic cough is most often the result of lower respiratory tract disease and the underlying disease should be treated. Allergic cough should be treated with antihistamines and topical corticosteroids. If the diagnosis is unclear, the characteristics of the cough, depending on whether it is dry or productive, can help determine treatment: inhaled corticosteroids for dry cough or antibiotics for productive cough.

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