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Cough in Young Children with Atopic Pneumonia

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Abstract
The article presents the main causes of cough in children and provides information on the differential diagnosis of cough from various bronchopulmonary pathologies. The main characteristics of the main diseases that occur with the symptom of cough are given, and modern approaches to the choice of antitussive therapy in children are considered.

Keywords: children, cough, differential diagnosis of cough, antitussive therapy, butamirate citrate.

The respiratory tract has several physiological protection mechanisms, these include endogenous surfactant and mucociliary clearance. Cough is an auxiliary mechanism for clearing the airways.

Cough is based on a complex protective reflex aimed at removing from the respiratory tract foreign substances that come with inhaled air and mucus that accumulates in the respiratory tract. Thanks to the activation of the cough center and with the participation of the reticular formation, a response in the form of a cough is formed. Cough occurs as a result of complexly coordinated contraction of the muscles of the larynx, bronchi, chest, diaphragm and abdomen [1].

Cough, playing a supporting role in various diseases, can be an important symptom that helps in diagnosis.

If you have a cough symptom, the doctor will have to answer the following questions:

- Why did the cough occur and what is its cause?
- Is it associated with bronchopulmonary pathology or due to extrapulmonary causes?
- What are the leading pathogenetic mechanisms and accompanying symptoms?
- Is it necessary to treat a patient’s cough? What treatment is appropriate?
- The main diagnostic guidelines in the presence of cough [1, 2]:
- duration of cough (up to 3 months or more than 3 months),
- contact with irritating substances,

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- previous respiratory tract infection,
- Signs of allergies (drug, food, etc.),
- nasal discharge,
- heartburn and belching,
- heart disease,
- extrapulmonary malignant tumors,
- fever
- Separation of sputum and its character.

A detailed description of the cough symptom in combination with anamnestic data, the results of clinical and additional examinations greatly facilitates the diagnostic search.

Cough can be a manifestation of inflammatory processes in both the upper (oronasopharynx , larynx) and lower (trachea, bronchi) parts of the respiratory tract, as well as lung tissue and pleura [2-4] (Table 1).

Often the occurrence of cough in children is associated with acute rhinitis or nasopharyngitis . Nasal congestion in these diseases leads to difficulty in nasal breathing. Breathing through the mouth is accompanied by drying of the pharyngeal mucosa. The latter, along with mucus draining down the back of the throat, leads to coughing. The cough usually gets worse at night and in the morning. Chronic diseases of the nasopharynx (adenoiditis, recurrent nasopharyngitis) may also be accompanied by a cough.

With laryngitis, true and false croup, cough can be one of the first symptoms of these diseases. The cough is usually dry and rough (“barking”). Often a cough is combined with aphonia and hoarseness, which arise as a result of a sharp swelling of the vocal cords and laryngeal mucosa.

The cough in the initial period of acute bronchitis and tracheobronchitis is usually dry and obsessive. With tracheo -bronchitis, the cough may be accompanied by a feeling of pressure or pain in the chest.

Allergic cough, as a rule, becomes productive, and there is a tendency to reduce its intensity and frequency.

With obstructive bronchitis, the cough at the beginning of the disease can also be dry, and then gradually becomes wet. The duration and intensity of cough depend on the etiology and nature of the inflammatory process. If the causative agent of bronchitis is the RS virus, influenza virus, parainfluenza, or enterovirus, then the cough stops by 10-14 days from the onset of the disease. With bronchitis caused by adenovirus and intracellular pathogens (chlamydia, mycoplasma), the cough is more prolonged, persistent, with sputum difficult to separate . Moreover, it can be observed during

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the 3-4th week. And more. A long-lasting cough requires the exclusion of not only diseases of infectious and inflammatory origin, but also conditions such as foreign body and chronic aspiration syndrome.

A foreign body in the respiratory tract is characterized by the sudden development of a coughing attack, often with cyanosis and asphyxia. Subsequently, the attacks periodically recur. The cough is frequent, dry, and painful, does not bring relief and often exhausts the child.

Chronic aspiration of food occurs with tracheoesophageal fistula, stage 3 gastroesophageal reflux, as well as with organic damage to the central nervous system (bulbar or pseudobulbar disorders). A characteristic sign of these pathological conditions is the occurrence of attacks of suffocation, cyanosis, accompanied by a severe coughing attack during or immediately after eating.

In acute pneumonia, as in bronchitis, the nature of the cough varies depending on the stage of the disease. At the beginning of the disease, the cough is dry. The duration of the dry cough period is usually 3-5 days. Gradually the cough becomes wet with the release of a small amount of sputum. Cough with uncomplicated pneumonia can be observed for 14-18 days. When the pleura is involved in the inflammatory process, the cough becomes painful and superficial.

Cough is a constant symptom of chronic nonspecific pulmonary diseases (CNPD). The intensity of cough in these diseases closely correlates with the extent of damage to the lung tissue. Thus, with damage within the segments of one lobe, the cough during the period of remission is rare and inconsistent. The cough is usually observed in the morning, with slight sputum production. In some cases, when 1-2 pulmonary segments are affected, cough occurs only with an exacerbation of the inflammatory process. Widespread lesions cause a more persistent cough, sometimes with significant amounts of sputum.

In the pulmonary form of cystic fibrosis, cough is one of the main symptoms of the disease. In this case, the nature of the cough changes depending on the stage of the disease and the degree of damage to the bronchopulmonary system.

In the initial stage of cystic fibrosis with minimal functional impairment, the cough is intermittent, occurs mainly in the morning, and is accompanied by the discharge of a small amount of sputum. However, excessive viscosity of sputum complicates its evacuation and is accompanied by a decrease in local immunity. This leads to bacterial colonization of the bronchial tree, the development of inflammation with natural edema and infiltration of the bronchial wall. In this case, the cough becomes constant, painful, paroxysmal and unproductive.

With bronchial asthma, in the pre-attack period, a sore throat and dry paroxysmal cough may occur. During an attack, the patient is bothered by a cough with difficult-to-discharge, viscous and viscous

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sputum. In the post-attack period of bronchial asthma, a wet cough with the release of light mucous sputum is noted.

Cough is based on a complex protective reflex aimed at removing foreign substances from the respiratory tract that come with inhaled air and mucus that accumulates in the respiratory tract.

Cough is one of the constant signs of malformations of the trachea and bronchi. The group of such defects includes Munier -Kuhn syndrome (tracheobroncho-dilatation), tracheobronchomalacia , Williams- Campbell syndrome , bronchomalacia . The cough in these diseases is constant, wet and produces a large amount of sputum.

Kartagener's syndrome, a congenital disease characterized by combined defects of internal organs, sinusorinopathies, frequent inversion of organs, is also characterized by signs of chronic inflammation of the bronchopulmonary system. The development of the inflammatory process is associated with dysfunction of the ciliated epithelium of the bronchi, which leads to impaired mucociliary clearance. Bronchopulmonary changes in Kartagener syndrome are accompanied by a constant cough with difficult-to-discharge mucous or mucopurulent sputum.

Parasitic lung diseases in children are diagnosed relatively rarely. Lung lesions are observed during the invasion of parasites, for which humans are both the final and intermediate hosts. The lungs can be affected transiently (with ascariasis, echinococcosis) or serve as the site of final localization of the parasite (with paragonimiasis). Damage to the respiratory system is manifested by a cough, which results in the release of yellowish mucous sputum, often mixed with blood.

Immunodeficiency conditions in children are often accompanied by the development of chronic inflammatory processes in the bronchopulmonary system with a constant wet cough and the discharge of a large amount of purulent

Additional survey data.

X-ray examination of the chest (if cough and low-grade fever persist in a child observed with pneumonia). According to Rg there are no infiltrative shadows.

According to CT data, the pulmonary pattern on both sides is significantly deformed; on the right, in the area of the apex of the lung, a rounded area of compaction with a “track” is identified. Primary tuberculosis complex on the right. Thanks to this method, a diagnosis of tuberculosis was made and specific therapy was prescribed.

Sputum. Of course, not all conditions that are relevant to discuss when a child has a cough were listed above.

With laryngitis, true and false croup, cough can be one of the first symptoms of these diseases. The cough is usually dry and rough (“barking”). Often the cough is combined with aphonia and

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hoarseness of the voice, which arise as a result of a sharp swelling of the vocal cords and laryngeal mucosa

If there is a symptom of cough, it is necessary to conduct a comprehensive examination of the child and pay attention to the following data:

- Presence of a burdened medical history of diseases of the bronchopulmonary system and atopy (presence of bronchial asthma, hay fever, respiratory allergosis) in the child and in relatives.
- When analyzing the medical history, the data of the epidemiological history, the " vaccination " of the child (including the presence of BCG and DPT), and the frequency and duration of diseases of the respiratory system as a whole are clarified.
- During an objective examination, attention is paid to the nature of breathing, respiratory frequency, the presence of shortness of breath and wheezing.
- Consultation with an otolaryngologist is necessary to exclude pathologies of the ENT organs (otitis, sinusitis, pharyngitis).
- 1 Chest poison to exclude pathology in the lungs.
- Study of saliva by PCR and blood by enzyme immunoassay to detect antigens and antibodies to Ch . pneumoniae , Micoplasma pneumoniae , Pneumoniae, helminthic infestation, which can act as an etiological factor in damage to the respiratory tract and clinically manifest itself as a symptom of cough.
- Tomography to exclude pathology of the bronchopulmonary system not detected by standard x-ray examination (developmental defect, specific process in the lungs, etc.) (Fig. 1).
- Esophagogastroscopy to exclude gastroesophageal insufficiency, which may cause microaspiration of gastric contents.
- Spirometry to assess respiratory function.
- Allergy tests to assess the allergological status of the child and determine the role of allergies in the genesis of cough.

Analysis of cough characteristics and examination data help in each specific case to determine the diagnosis and differentiate the approach to prescribing therapy.

Acute pathology of the respiratory system in 70-90% of cases is accompanied by a cough symptom. An acute cough in acute pathology is usually dry, frequent, sharp and unproductive. This cough disrupts the patient's quality of life.

In some cases, cough loses its physiological purpose and not only does not contribute to the resolution of the pathological process in the respiratory system, but also leads to the development of

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complications. A painful, obsessive, unproductive “dry” cough, combined with chest pain and shortness of breath, requires the use of antitussives [6].

In young children, as well as children with a pronounced gag reflex and a high risk of aspiration, expectorant drugs that increase the volume of secretions and especially enhance the gag and cough reflexes are contraindicated. And for the targeted suppression of a non-productive cough caused by irritation of the mucous membrane of the respiratory tract (for example, with whooping cough), on the contrary, it is possible to use antitussive non-narcotic drugs of central action.

Centrally acting drugs that have the least number of adverse reactions and effectively eliminate dry cough include non-narcotic drugs based on citrate butamirate , which are not inferior in effectiveness to codeine-containing drugs, but do not have a depressing effect on the respiratory center and are not addictive. These drugs are well tolerated by children, stopping attacks of dry cough from the first use. The antitussive effect begins 30 minutes after taking the drug, the maximum effect occurs after an hour and a half.

Indications for the use of butamirate citrate preparations are a dry, irritating, painful cough, which is observed in acute laryngitis, tracheitis, bronchitis, influenza, ARVI, as well as cough and pain in dry pleurisy.

Some butamirate citrate preparations are approved for children from 2 months of age, the duration of therapy is 3-4 days.

The drugs are prescribed before meals. It should be especially emphasized that, subject to the recommended dosing regimens, butamirate citrate is characterized by good tolerability and a high safety profile, having not only an antitussive, but also a moderate anti-inflammatory effect, and also promotes moderate bronchodilation .

In some cases, cough loses its physiological purpose and not only does not contribute to the resolution of the pathological process in the respiratory system, but also leads to the development of complications. A painful, obsessive, unproductive “dry” cough, combined with chest pain, shortness of breath, requires the use of antitussives

These drugs are quickly and completely absorbed when taken orally. The half-life of butamirate citrate in syrup form is 6 hours. When the drug is re-administered, its concentration in the blood remains linear and no accumulation is observed. Metabolites of butamirate citrate also have antitussive activity. In general, high therapeutic efficacy and tolerability of such drugs have been noted in the treatment of nonproductive cough in children with various respiratory tract infections (whooping cough, chlamydia, mycoplasmosis, etc.), as well as when used to suppress the cough reflex in the pre- and postoperative period during surgical interventions and bronchoscopy [6].

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The correct approach, rational choice of therapy and timely inclusion of antitussive drugs in the complex therapy of respiratory diseases accompanied by cough significantly increases the effectiveness of basic treatment and improves the patient's quality of life with a dry obsessive cough [7].

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