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Broncho-Obstructive Syndrome in Young Children: Clinic, Diagnosis and Treatment

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Annotation: Most diseases of the bronchopulmonary system occur with broncho-obstructive syndrome (BOS), among which we should note congenital and hereditary pathology of the respiratory system, bronchial malformations, respiratory distress syndrome, primary immunodeficiency conditions, aspiration of foreign bodies, perinatal pathology, gastroesophageal reflux, enlarged intrathoracic lymph nodes, hyperplasia thymus, tumors, etc. Clinical manifestations of biofeedback consist of prolongation of exhalation and the appearance of expiratory noise. The diagnosis is made on the basis of clinical and anamnestic data, the results of a physical and functional examination. Treatment of biofeedback should be aimed at eliminating the cause of the disease that led to the development of obstruction.

Key Words: Broncho-obstructive syndrome, children, clinic, diagnosis, treatment.

Broncho-obstructive syndrome (BOS) is a pressing problem in pediatrics and occupies one of the first places in the structure of respiratory diseases in young children [1,3,5,10,20,38]. This is due to the wide prevalence of biofeedback in the general structure of bronchopulmonary diseases, severe course and complications. In children of the first years of life, up to 30-50% of acute respiratory infections are complicated by biofeedback, the main cause of which is acute obstructive bronchitis (AOB) [2,9,11,21,36].

Most diseases of the bronchopulmonary system occur with biofeedback, among which congenital and hereditary pathology of the respiratory system, bronchial malformations, respiratory distress syndrome, primary immunodeficiency conditions, aspiration of foreign bodies, perinatal pathology, gastroesophageal reflux, enlarged hilar lymph nodes, thymic hyperplasia, tumors should be noted. .d. [2,3,24,37,42]. The uniformity of clinical symptoms of bronchial obstruction in these diseases complicates early diagnosis and

treatment tactics, which can lead to a protracted and recurrent course of some of them.

BOS is a symptom complex that is clinically manifested by paroxysmal cough, expiratory shortness of breath, attacks of suffocation and is associated with a violation of bronchial patency of a functional or organic origin [6,8, 14,17,39].

Clinically, BOS is clearly manifested in children in the first years of life, which is due to the anatomical and physiological characteristics of the respiratory system: narrowness of the respiratory tract, insufficient elasticity of the lungs, softness of the cartilage of the bronchial tree, insufficient rigidity of the chest, a tendency to develop edema, hypersecretion of viscous mucus, poor development of smooth muscles bronchi [17,41]. When faced with biofeedback in children, a family doctor, as a rule, makes a diagnosis of obstructive bronchitis or bronchiolitis, which occurs with symptoms of respiratory failure, developing more often against the background of acute respiratory infections (ARI) [13,26,40]. BOS can often be a consequence of allergic inflammation of the tracheobronchial tree, obstructive obstruction or hemodynamic disorders [25,26].

Data on the prevalence of biofeedback in children of the first years of life are ambiguous. Some authors claim that one in three children under the age of 3 years had at least one episode of bronchial obstruction [27,28], others say that every third child suffers acute bronchiolitis or obstructive bronchitis due to viral infection [31]. Viral bronchiolitis suffered at an early age is often associated with repeated episodes of biofeedback in preschool age [18,19].

It is necessary to note the annual high rate of increase in the prevalence of bronchial asthma (BA) in children. At the same time, in recent years, asthma has been increasingly registered in children in the first years of life [4,29].

In infants who often suffer from respiratory infections, BOS occurs in 50% of cases or more [19,33]. The frequency of biofeedback, which developed against the background of infectious diseases of the lower respiratory tract, ranges from 5 to 40% [11,12]. Soroka Yu.A. et al. claim that in every second child, ARI is accompanied by bronchial obstruction of varying severity, and with subsequent episodes of respiratory infection, relapses of BOS occur, which often progress to severe exacerbations requiring hospitalization of children [17,18,34].

Recurrence of BOS in children who suffered acute bronchiolitis in the first year of life in 34–40% of cases is accompanied by the formation of

hyperreactivity of the tracheobronchial tree, followed by the development of BA in preschool and school age in 23–39% of children [25].

The wide prevalence of biofeedback in children, as well as the heterogeneity of its course, development and outcome, have been a relevant object of study for many years for scientists and practitioners, since difficulties arise in the differential diagnosis of this condition [30].

Clinical manifestations of biofeedback consist of prolongation of exhalation, the appearance of expiratory noise (wheezing, noisy breathing), attacks of suffocation, and the participation of auxiliary muscles in the act of breathing. In the English-language literature, this clinical symptom complex is called “wheezing” - “wheezing syndrome”, since whistling sounds (distant or heard during auscultation) are the main clinical manifestation of biofeedback [9,16,22,35].

The first symptoms: shortness of breath and wheezing syndrome quite often appear in children at an early age [20,21,23]. According to various data, from 30 to 50% of young children experience an episode of biofeedback at least once, of whom the first episode of lower respiratory tract obstruction is recorded in 30% of children in the first year of life [8], and only in 20% the symptoms of biofeedback persist for more than late age [30.]. Morales E. et al provide data on the prevalence of recurrent wheezing in preschool children up to 40% [29]. According to Zaitseva O.V. in young children, asthma causes biofeedback in 30–50% of cases [8,9].

Almost every second child with ARI has one or another degree of severity of bronchial obstruction in the clinical picture [15]. BOS in the form of wheezing against the background of ARI is observed in up to 50% of children under the age of 6 years [12]. In young children, the most common causes of bronchiolitis are RS virus, rhinovirus and mixed viral infection: parainfluenza virus, influenza virus, metapneumovirus, enterovirus, coronavirus, adenovirus [30,31]. The RS virus is responsible for approximately 70% of hospitalizations in children under 1 year of age with bronchiolitis.

Biofeedback of both infectious and allergic inflammatory origin is always more severe in children with bronchial hyperreactivity and manifestations of atopy [15]. Preexisting allergic inflammation may lead to a decreased IFN response, allowing for more successful infection and possibly more severe symptoms [32]. BA develops in 30–50% of children who had recurrent BOS of viral origin in infancy [31].

Viral infection may upregulate neurotrophins, potentially promoting remodeling of airway neural structure and possibly nonspecific airway reactivity [7,8]. However, the influence of the RS virus on the development of asthma after bronchiolitis can only be certain on a specific genetic background and/or in combination with other environmental factors [26]. Atopy is a risk factor for the development of asthma after virus-induced biofeedback. Children who have had biopsy at an early age and have signs of atopy such as allergic sensitization, atopic dermatitis, eosinophilia or allergen-specific immunoglobulin E have the greatest risk of developing asthma [30,32].

Diagnosis of biofeedback in young children is somewhat difficult due to the impossibility of using methods for assessing external respiratory function and the difficulty of obtaining sputum for cytological and bacteriological studies to verify the diagnosis [21]. A persistent recurrent course of BOS, resistant to traditional conservative therapy, may require an endoscopic examination of the bronchial tree, which makes it possible to visualize changes in the bronchi, as well as laboratory study of biological fluids and tissues obtained during bronchoscopy [38]. However, such invasive techniques are extremely rarely used in young children [24, 27].

The diagnosis of bronchial obstruction is made on the basis of clinical and anamnestic data, the results of a physical and functional examination. In children over 5-6 years old, physical function is studied using spirography (flow-volume curve) and pneumotachometry (peak flowmetry). It is necessary to study the clinical and anamnestic data in detail, paying attention to the presence of allergic diseases in the family and the presence of relapses of bronchial obstruction.

In case of recurrent BOS, the complex of examination methods should include:

1. Study of peripheral blood.
2. Serological tests (specific IgM and IgG are required, IgA testing is desirable) for the presence of chlamydial, mycoplasma, cytomegalovirus and herpetic infections; in the absence of IgM and the presence of diagnostic IgG titers, the study must be repeated after 2-3 weeks (paired sera).
3. Serological tests for the presence of helminthiasis (toxocariasis, ascariasis).
4. Allergy examination (level of total IgE, specific IgE, skin prick tests); other immunological examinations are carried out after consultation with an immunologist.

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Bacteriological examination methods and PCR diagnostics are highly informative when collecting material during bronchoscopy and deep coughing up of sputum from the lower respiratory tract; smear examination characterizes mainly the flora of the upper respiratory tract.

A chest x-ray is performed in the following cases:

– suspicion of a complicated course of biofeedback (atelectasis, etc.);

– exclusion of pneumonia;

– suspicion of a foreign body;

– recurrent course of biofeedback (if radiography has not been performed previously).

According to indications, bronchoscopy, computed tomography of the lungs, etc. are performed.

Severe cases of bronchial obstruction and recurrent BOS require mandatory hospitalization to clarify the genesis and treatment of BOS.

Treatment of biofeedback should be aimed at eliminating the cause of the disease that led to the development of obstruction. According to modern treatment algorithms, for BOS, bronchodilators are used, which are administered by inhalation, which contributes to a high concentration of the drug in the respiratory tract, reducing its systemic effect and reducing the total dose of the drug. It is necessary to ensure optimal delivery of the drug to the respiratory tract. Metered aerosol inhalers (MDIs) and nebulizers are currently used as delivery vehicles. Short-acting b2-agonists (salbutamol, terbutaline, fenoterol) are the first choice drugs. The action of this group of drugs begins 5–10 minutes after inhalation and lasts 4–6 hours. For children, the drug is delivered using a babyhaler, spacer or volumatic. A single dose of salbutamol (Ventolin) for inhalation through a spacer is 100-200 mcg. For children under 2 years old - 200 mcg, over 2 years old - 100 mcg. Drugs in this group are highly selective and have minimal side effects. Anticholinergic drugs (ipratropium bromide) can be used as bronchodilator therapy, taking into account the pathogenetic mechanisms of BOS. The combination drug Berodual, which combines 2 mechanisms of action: stimulation of adrenergic receptors and blockade of M-cholinergic receptors, is currently used most often in the complex therapy of biofeedback in young children. Berodual contains ipratropium bromide and fenoterol, their action in this combination is synergistic. When ipratropium bromide and fenoterol are used together, the bronchodilator effect is achieved by acting on various pharmacological targets. These substances

complement each other, as a result, the antispasmodic effect on the bronchial muscles is enhanced and a greater breadth of therapeutic action is provided for bronchopulmonary diseases accompanied by constriction of the airways. A single dose in children under 6 years of age is on average 2 drops/kg body weight 3–4 times a day. In the nebulizer chamber, the drug is diluted with 2-3 ml of physiological solution.

In case of severe BOS in children, topical or systemic corticosteroids are prescribed. In the treatment of acute BOS, the use of inhaled corticosteroids (ICS) in solutions through a nebulizer is recommended. The maximum therapeutic effect after inhalation is achieved after 1–2 weeks. after starting treatment.

It is recommended to carry out active oral rehydration to improve the drainage function of the bronchi; the use of expectorants and mucolytic drugs, massage, postural drainage, and breathing exercises is indicated.

In children with BOS, it is necessary to prescribe mucolytic drugs that can be administered by inhalation or orally, for example, Lazolvan (ambroxol). For mild to moderate BOS in children in the first three years of life, acetylcysteine can be used as a mucolytic under medical supervision. For children with an obsessive, unproductive cough and lack of sputum, it is advisable to prescribe expectorant medications, for example, alkaline drinks. The use of antihistamines, especially the first generation (fenistil, fenkarol, peritol, suprastin, etc.), is not recommended, as they interfere with mucociliary clearance. If necessary, atopic children are prescribed antihistamines, mainly of the latest generation (Claritin, Erius), once a day.

In acute obstructive bronchitis or bronchiolitis, antiviral drugs (interferon, viferon, etc.) are included in therapy. Antibiotics are prescribed only in the presence of bacterial foci of infection.

Thus, the importance of the problem of broncho-obstructive syndrome, especially in young children, is beyond doubt. It is necessary to take into account that BOS in children often occurs against the background of acute and recurrent diseases of infectious etiology or may be a consequence of allergic inflammation of the tracheobronchial tree, obstructive obstruction. That is why the use of complex diagnostic methods is often required. At the same time, diagnostics and differential diagnosis should not interfere with the timely initiation of therapeutic measures.

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