



## **BRONCHOBSTRUCTIVE SYNDROME IN CHILDREN**

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### **Abstract**

Broncho-obstructive syndrome is a particularly urgent problem in pediatrics, as it occupies one of the first places in the structure of respiratory diseases in children [1,3,6]. Respiratory diseases that occur with broncho-obstructive syndrome are among the most common, which is associated with an increase in the number of frequently ill children, an increase in the survival rate of newborns with severe respiratory tract lesions, an increase in the number of children with an atopic anomaly of the constitution, and exposure to adverse environmental factors [2,4].

Broncho-obstructive syndrome is a symptom complex that is clinically manifested by paroxysmal cough, expiratory dyspnea, asthma attacks and is associated with impaired bronchial patency of functional or organic origin [9,10,11]. Broncho-obstructive syndrome is especially clinically pronounced in children of the first years of life, which is due to the anatomical and physiological characteristics of the respiratory organs: narrowness of the airways, 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 bronchial muscles [12]. It is important to note the high annual growth rate of the prevalence of bronchial asthma (BA) in children, which reaches 20%. At the same time, in recent years, BA has been increasingly registered in children of the first years of life [2, 7]. In young children, 5-50% of cases of acute respiratory infections are often complicated by BOS, the main cause of which is acute obstructive bronchitis (AOB) [3, 6].

Many diseases of the broncho-pulmonary system occur with broncho-obstructive syndrome: acute obstructive bronchitis (AOB), BA, bronchopulmonary dysplasia (BPD), congenital malformations (CM) of the bronchopulmonary system (tracheobronchomalacia, tracheobronchomegaly, malformations of the lung, etc.), cystic fibrosis, aspiration syndrome, foreign body, etc. [5,6,8]. 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 can also be the result of allergic inflammation of the tracheobronchial tree, hemodynamic disorders, congenital malformations of the upper respiratory tract. A wide range of diseases occurring with broncho-obstructive syndrome, the same type of clinical manifestations of bronchial obstruction, early age and manifestation against the background of an acute respiratory viral infection significantly complicate differential diagnosis [7,8,9].

Acute respiratory infections occupy a leading place in the structure of human infectious pathology. The air way of transmission of the pathogen, the high susceptibility of the population to almost all pathogenic viruses determines their main epidemiological feature - the speed and breadth of their spread. They are practically unlimited and increase significantly during periods of seasonal immunodeficiency that occurs in winter and winter-spring periods.

Clinical manifestations of biofeedback consist of exhalation lengthening, the appearance of expiratory noise (whistling, noisy breathing), asthma attacks, participation of auxiliary muscles in the act of breathing; unproductive cough often develops. In the English-language literature, this clinical symptom complex is called "wheezing" - "wheezing syndrome", since whistling sounds (distant or audible during auscultation) are the main clinical manifestation of BOS [1,4]. The genesis of wheezing is associated both with the turbulent movement of air against an obstacle in the airways (trachea, bronchi), and with rapid oscillations of the lumen of the lobar and segmental bronchi. In this case, there is an increase in intrathoracic pressure, fluctuations in the air flow rate during exhalation, compression of the bronchi and their vibration, and the end result is the occurrence of wheezing [12].

Bronchial obstruction against the background of respiratory diseases in children, as a rule, occurs more often in the form of acute obstructive bronchitis. BOS mainly develops acutely, but may be persistent.

In children with frequent infections of the respiratory tract with the development of biofeedback, changes in the immune system are noted [5,11], primarily from the cellular level, the interferon system and phagocytosis. According to Shvets E.A. and co-authors, 70-80% of children with frequent infections of the respiratory tract have changes in the immune system, primarily from the cellular level, the interferon system and phagocytosis [9,13]. Respiratory viral infection causes dyspnea in infants and, by affecting the cascade of immunological reactions, leads to a change in the cytokine response and various immunological disorders [14]. In the immune status of children





with recurrent obstructive bronchitis, disturbances are observed in the form of a decrease in T-cell immunity, a decrease in the functional activity of phagocytic cells, and a deficiency of the NK cell system [6].

Differential diagnosis of biofeedback in young children is difficult due to the impossibility of using methods for assessing the function of external respiration, the difficulty in obtaining sputum for cytological and bacteriological studies in order to verify the diagnosis [8,12]. A persistent relapsing course of BOS that is 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 [1, 9]. The first symptoms: shortness of breath and wheezing syndrome often appear in children at an early age [13]. According to various data, from 30 to 50% of young children experience an episode of BOS at least once, of which the first episode of lower airway obstruction is recorded in 30% of children in the first year of life, and only in 20% of the symptoms of BOS persist at a later age [11]. Almost every second child with ARI has some degree of bronchial obstruction in the clinical picture [2]. BOS in the form of wheezing against the background of acute respiratory infections is observed in up to 50% of children under the age of 6 years [1]. In infancy, the most common causes of bronchiolitis are RS virus [1,12], rhinovirus [3,15], and mixed viral infection [1,3]. Parainfluenza, influenza, metapneumovirus, enterovirus, coronaviruses, bocavirus, polyomaviruses, adenovirus can also be the cause. RS virus is responsible for approximately 70% of hospitalizations of children under 1 year of age with bronchiolitis. In a study conducted by D. Jackson and co-authors in 2008 in children under 3 years of age with BOS, viruses were detected in 90% of cases (most often rhinovirus - 48%, RSV - 21%, parainfluenza viruses - 12%, metapneumovirus - 7%, coronaviruses - 5%, adenoviruses - 4%, influenza viruses - 4% and enteroviruses - 2%) [2,3].

BOS of both infectious and allergic inflammatory origin is always more severe in children with bronchial hyperreactivity and manifestations of atopy [2]. It is also known that BA develops in 30–50% of children who had recurrent BOS of viral origin in infancy [7].

Viral infection acts synergistically with allergic sensitization and decreased lung function in infancy, leading to the development of asthma later on. Atopy is a risk factor for the development of asthma after virus-induced biofeedback. Children who have undergone biofeedback in the early years of life and have such signs of atopy as allergic sensitization, atopic dermatitis, allergen-specific immunoglobulin E have the highest risk of developing BA [2,13].





In a study by R.F. Lemanske et al found that children at a high genetic risk of developing allergic respiratory diseases at the age of 3 years more often develop BOS if the following risk factors are present in infancy: passive smoking, allergic sensitization to food at the age of 1 year, any respiratory disease without BOS moderate and severe, at least one episode of BOS associated with infection with respiratory syncytial (RS) - virus, rhinovirus or other pathogens in infancy [6,12].

In children who often suffer from respiratory infections, BOS is recorded more often [7, 10], according to some data, bronchial obstruction in infants with ARI reaches 50% or more [14].

Timely and correct identification of infants at increased risk of developing persistent asthma can help predict long-term outcomes and improve prevention and treatment [12]. Over the past two decades, many scientific advances have improved the understanding of AD and the physician's ability to effectively manage it [2,7].

Early diagnosis, which determines the timely initiation and tactics of treatment, and also largely determines the prognosis of the disease and the choice of preventive measures [1,6]. The basis for determining the prognosis of biofeedback, as well as early diagnosis of asthma, was the study of biofeedback phenotypes depending on the age, genesis, and characteristics of the course of the disease [12,13].

Thus, broncho-obstructive syndrome in young children develops frequently and its structure is heterogeneous. In the development of respiratory diseases accompanied by broncho-obstructive syndrome in children, adverse factors of family history, the course of pregnancy and childbirth in the mother, premorbid background (artificial feeding, perinatal damage to the nervous system) are important.

Aggravating premorbid background factors (intrauterine growth retardation by type of malnutrition, anemia, rickets), passive smoking, allergic sensitization to food at the age of 1 year, any respiratory disease associated with respiratory syncytial (RS) virus infection, rhinovirus or other pathogens in infancy are risk factors for the development of bronchial asthma and recurrent obstructive bronchitis.

## Literature

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