

PREDICTORS OF THE DEVELOPMENT OF RECURRENT BRONCHIAL OBSTRUCTION IN CHILDREN

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Abstract. Purpose of the study: to determine the significance of risk factors for the development of recurrent bronchial obstruction in children. **Material and methods of research.** A total of 240 children were examined and divided into 3 groups: Group I - patients with acute obstructive bronchitis (AOB), acute bronchiolitis (ABL), Group II - children with recurrent obstructive bronchitis (ROB) and bronchial asthma (BA), Group III - patients with acute bronchitis without bronchial obstruction (BA). To assess the significance of risk factors for the development of recurrent and relapsing course of BOS, we analysed genealogical, biological and social anamnesis, premorbid and family background, in children of the studied groups, characterising the state of family health and features of child development in the ante- and postnatal periods, as well as in the first years of the child's life. **Results of the study and discussion.** When studying the causes and factors influencing the development and course of BOS in children, the most important is the study of background diseases that aggravate and prolong the course of bronchial obstruction. The study of pre-mobilisation background in patients of the compared groups showed that a number of factors were significantly more frequent in patients with acute and recurrent course of bronchoobstructive syndrome. **Conclusions.** It was found that the risk factors for the development of recurrent course of bronchial obstruction in children are: artificial feeding ($P < 0.002$; $OR = 4.80$), rickets ($P < 0.02$; $OR = 2.15$), overweight ($P < 0.002$; $OR = 5.40$), atopy ($P < 0.001$; $OR = 18.32$), first episode of BOS before the age of 1 year ($P < 0.002$; $OR = 3.01$), absence of fever ($P < 0.002$; $OR = 12.95$) and catarrhal syndrome ($P < 0.001$; $OR = 60.0$) during the episode of illness.

Key words: bronchoobstructive syndrome, predictors, children.

Introduction. Bronchial obstructive syndrome (BOS) is a collective term encompassing a specific set of clinical manifestations indicating impairment in bronchial patency, primarily characterized by the constriction or occlusion of the airways[1]. According to literature data, the prevalence of bronchial obstructive syndrome among infants ranges from 12 to 23% in the first year of life, while among preschool-aged children in European countries, it stands at 12.35%, and in Latin American countries, it reaches 19.27%.

In the presence of an aggravated medical history, this indicator can range from 35% to 55%. According to literature findings, wheezing and dyspnea have been identified in 50% of children at least once in their lives, while a recurrent course of BOS characterizes 25% of children[2]. The high incidence of BOS is largely influenced by predisposing anatomical and physiological features in young children. Among these features, prominent factors include the presence of glandular tissue hyperplasia, the predominance of viscous sputum secretion, relative airway narrowness, reduced smooth muscle volume, limited collateral ventilation, inadequate local immunity, and a flattened diaphragm dome[3]. Bronchoobstructive syndrome in early childhood, occurring against the backdrop of acute lower respiratory tract infections, is found in 5-40% of cases. In children with an aggravated history of allergies or frequent illnesses (more than 6 cases of acute respiratory infection in a year), this syndrome is detected in 30-40% of cases[4,5]. Allergic diseases or a hereditary predisposition to atopy have been demonstrated as risk factors for BOS development in children[6]. Premorbid factors contribute to the onset of BOS, including pregnancy toxemia, complicated labor, birth hypoxia, prematurity, maternal history of allergies, thymus hyperplasia, cerebral ischemia, and early artificial feeding[7].

The results of published studies on the diagnostic value of the recurrent course in children with recurrent bronchoobstructive syndrome are conflicting. A priority in diagnosing BOS involves seeking prognostic markers – predictors of predisposing factors in the formation of the disease. Consequently, scientific research in this direction will significantly enhance the specificity and effectiveness of diagnostic and preventive measures.

Purpose of the study: to determine the significance of risk factors for the

development of recurrent bronchial obstruction in children.

Material and methods of research.

A total of 240 children were examined and divided into 3 groups: Group I - patients with acute obstructive bronchitis (AOB), acute bronchiolitis (ABL), Group II - children with recurrent obstructive bronchitis (ROB) and bronchial asthma (BA), Group III - patients with acute bronchitis without bronchial obstruction (BA). To assess the significance of risk factors for the development of recurrent and relapsing course of BOS, we analysed genealogical, biological and social anamnesis, premorbid and family background, in children of the studied groups, characterising the state of family health and features of child development in the ante- and postnatal periods, as well as in the first years of the child's life.

Statistical processing of the obtained data was carried out using the package «SPSS Statistics 26.0.0» for Windows by SPSS Inc. & Microsoft Office Excel, 2019.

Results of the study and discussion.

When studying the causes and factors influencing the development and course of BOS in children, the most important is the study of background diseases that aggravate and prolong the course of bronchial obstruction. The study of pre-mobilisation background in patients of the compared groups showed that a number of factors were significantly more frequent in patients with acute and recurrent course of bronchoobstructive syndrome.

Thus, artificial feeding was significantly more frequent in group I patients compared to patients without bronchoobstructive syndrome ($\chi^2 = 13.740$; $P = 0.0001$; $OR = 2.22$), and artificial feeding was even more frequent in patients with recurrent obstructive bronchitis and bronchial asthma compared to group III patients ($\chi^2 = 28.399$; $P = 0.0001$; $OR = 4.80$). Such a difference in the type of feeding of patients seems to be related to the direct protective effect of breast milk in the development of bronchoobstructive syndrome, as a result of an increase in the level of antibodies to various viral-bacterial associations, as well as normalisation of both humoral and cellular immunity.

An important role in the development of bronchial obstruction in children belongs to various vitamin-D deficiency states, including rickets of various severity degrees, which was confirmed by our study of premorbid background in children. Thus, rickets was significantly more frequent in group II patients as compared with patients with OOB, OBL ($\chi^2 = 5.45$; $P = 0.033$; $OR = 2.13$). A significantly higher proportion of rickets in premorbid was found in group II patients as compared to group III ($\chi^2 = 11.75$; $P = 0.001$; $OR = 4.58$). The study showed that overweight can be considered as a risk factor for recurrent course of bronchoobstructive syndrome, as this feature was significantly more frequent in patients with ROB, BA in comparison with patients with OOB, OBL ($\chi^2 = 6.74$; $P = 0.016$; $OR = 0.76$). Overweight was also 2 times more common in patients with ROB, AD compared with patients with OPD, which showed a statistically significant difference ($\chi^2 = 5.10$; $P = 0.0028$; $OR = 1.99$).

The study of premorbid background showed that in patients with acute and recurrent course of bronchoobstructive syndrome the presence of concomitant allergic diseases prevails, so in patients of group II this factor was significantly more frequent in comparison with patients of group III ($\chi^2 = 14.00$; $P < 0.001$; $OR = 3.90$), and in group I patients concomitant allergic pathologies were also observed almost twice as often in comparison with patients without bronchial obstruction manifestations ($\chi^2 = 5.03$; $P = 0.027$; $OR = 1.98$).

The presence of «maternal atopy only» was significantly more frequent in patients with recurrent obstructive bronchitis and bronchial asthma compared with patients with acute bronchitis without bronchial obstruction ($\chi^2 = 4.01$; $P = 0.050$; $OR = 3.07$), while this factor had no significant differences in group I patients compared with group III patients ($\chi^2 = 1.93$; $P = 0.146$; $OR = 1.97$) and with group II patients ($\chi^2 = 0.72$; $P = 0.429$; $OR = 0.75$). At the comparative analysis of the feature «atopy only on the father's line» a similar characteristic was noted, so this indicator was significantly more frequent in patients with recurrent obstructive bronchitis and bronchial asthma in comparison with patients without bronchoobstructive syndrome, at the same time this factor had no significant differences in patients of groups I and II. The study showed that the presence of atopy in the family history on the line of both parents was significantly more frequent in patients with OOB, OBL in comparison with patients from group III ($\chi^2 = 20.10$; $P < 0.001$; $OR = 9.83$), and more than 9 times more frequently in patients with recurrent obstructive bronchitis and bronchial asthma compared with group III patients ($\chi^2 = 29.22$; $P < 0.001$; $OR = 18.32$). When this factor was compared between patients of groups I and II, no significant differences were

found ($\chi^2 = 3.01$; $P = 0.084$; $OR = 0.49$).

Thus, in patients with an episode of bronchial obstruction, only one third of patients had no family history of atopy in relatives, which was significantly lower compared with patients with bronchitis without bronchobstruction ($\chi^2 = 28.04$; $P < 0.001$; $OR = 0.19$), an even greater difference was observed in the comparative analysis of this indicator in patients of groups II and III, namely, patients with recurrent obstructive bronchitis and bronchial asthma had 9 times fewer cases of absence of atopy in relatives compared with patients with acute bronchitis ($\chi^2 = 55.09$; $P < 0.001$; $OR = 0.02$). When this criterion was compared between patients in groups I and II, there was also a significant difference ($\chi^2 = 12.22$; $P < 0.001$; $OR = 4.95$).

Absence of catarrhal manifestations was noted in 2/3 of ROB and AD patients, which was significantly more frequent in comparison with the indicators of groups I and III ($\chi^2 = 32.00$; $P < 0.001$; $OR = 0.13$), ($\chi^2 = 53.00$; $P < 0.001$; $OR = 59.00$), it was also found that in group I patients this sign was significantly more frequent in comparison with group III patients ($\chi^2 = 12.11$; $P = 0.001$; $OR = 9.01$). Thus, the absence of catarrhal phenomena during BOS is a symptom predisposing to the development of repeated and recurrent forms of bronchial obstruction.

Conclusions. It was found that the risk factors for the development of recurrent course of bronchial obstruction in children are: artificial feeding ($P < 0.002$; $OR = 4.80$), rickets ($P < 0.02$; $OR = 2.15$), overweight ($P < 0.002$; $OR = 5.40$), atopy ($P < 0.001$; $OR = 18.32$), first episode of BOS before the age of 1 year ($P < 0.002$; $OR = 3.01$), absence of fever ($P < 0.002$; $OR = 12.95$) and catarrhal syndrome ($P < 0.001$; $OR = 60.0$) during the episode of illness.

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