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Risk factors of bronchial asthma in children

Keywords: children, bronchial asthma, risk factors.

Up to date allergy is one of the most common pathological conditions in children. According to epidemiological studies 25 % of children and adolescents that is one in four suffer from allergic diseases (AD) and from bronchial asthma (BA) every tenth child. Once originating, allergy bears a risk of severe allergic reactions that can threaten the patient's life and reduce the quality of life for children and their parents. Substantial financial expenses from the society and families which have children with BA are required for implementation of a proper control of these diseases.. All this circumstances raises the problem of allergic pathology to the one of the first places in modern pediatrics [1, 2]. At that bronchial asthma is one of the most significant health and social problems in many countries around the world including Ukraine. From the side of prevalence, severity, complexity of diagnosis, treatment and rehabilitation and social and economic problems BA takes the leading place among the «diseases of the century» [2, 3]. The concept of detection mechanism and course of the disease is constantly changing and improving, but the questions of early diagnosis and effective treatment stay to be not completely clarified.

The problem of late and delayed diagnosis of BA in children remains still now. The level of diagnostic errors by general practice doctors exceeds 40 % and the correct diagnosis is delayed for 5–6 years. According to Sokolova L. V. [4], at the level of primary care unit 15,9 % of children were diagnosed in the first 6 months of disease, 18,8 % – in 2 years, 65,3 % – in 5–10 years or more. Until now district pediatricians rarely diagnose the bronchial asthma. The diagnosis is usually set by allergist or pulmonologist often when the disease has become moderate and severe course, that significantly affects the prognosis and outcome of asthma [7, 11]. The disease in childhood has different variety of clinical and functional manifestations associated with the child's age, severity and possible combination with other respiratory infection. Difficulties in making the diagnosis of BA in childhood are determined not only by variability of clinical progression and

clinical and anamnestic similarity with obstructive bronchitis [9], but also by the age restrictions on children's opportunities for additional diagnostic procedures, the ability to perform respiratory maneuvers during spirometry and subjective underestimation of pediatricians the equivalents of symptoms of BA, that leads to find alternative ways of diagnostic tactics.

Hereafter untimely verification of BA diagnosis in children determines the negative prognosis of its progression with the formation of severe forms of disease and early disability of children. The difficulty of BA diagnosis especially in early childhood is stipulated by the lack of reliable monopredictors of development, by the multifactor nature of the disease and clinical heterogeneity of progression [5, 8].

In order to study the formation of BA in children the anamnestic data of 85 children were analyzed. Groups of patients were represented as: 30 children with broncho-obstructive syndrome (BOS), 35 children with old-established BA and 20 – with first-diagnosed BA.

Anamnestic data were collected by questioning of parents using an enquirer developed by the authors. The obligatory main risk factors according to the asthma predictive index were studied, namely, the presence of large (family allergic anamnesis and atopic dermatitis) and small risk factors (allergic rhinitis and «wheezing» out of the acute respiratory viral infection – ARVI). Also additionally were examined sex of the child, age of decease onset, duration of breastfeeding, the frequency of acute respiratory infections, presence in anamnesis of acute obstructive bronchitis, their frequency, presence of smoking parents, living conditions. In addition the analysis was conducted in the following areas: the history of pregnancy and childbirth, patterns of children health in the neonatal period and during the first years of life, the character of infant feeding, patterns of premorbid profile, the presence of other allergic diseases (except BA) in children. The results of the analysis are given in the table.

Table

Risk factors of BA progression in patients (M ± m), %						
Risk factors	Groups of patients					
	Patients with BOS (n = 30)		Patients with old-established BA (n = 35)		Patients with first-established BA (n = 20)	
	Abs.	M ± m	Abs.	M ± m	Abs.	M ± m
Passive smoking	12	40,0 ± 6,2	17	48,6 ± 6,6	8	40,0 ± 8,6
Presence of atopy from the mother's side	6	20,0 ± 7,3	19	54,3 ± 8,4*	12	60,0 ± 8,9*
Presence of atopy from the father's side	4	13,3 ± 6,7	8	22,9 ± 7,1	4	20,0 ± 8,9
Presence of atopy in both parents	2	6,7 ± 4,6	5	14,3 ± 5,9	4	20,0 ± 8,9
Pathology of pregnancy	17	56,7 ± 8,6	17	48,6 ± 7,1	10	50,0 ± 8,9
Pathology of birth	10	33,3 ± 8,6	14	40,0 ± 8,3	7	35,0 ± 9,9
The term of breastfeeding, Up to 4 month, month	7	23,3 ± 7,7	13	37,1 ± 8,2	5	25,0 ± 9,7
Presence of ARVI in the first year of life	6	20,0 ± 7,3	16	45,7 ± 8,4	12	60,0 ± 9,6*
Presence of ARVI more than 4 times per year	2	6,7 ± 4,6	14	40,0 ± 8,3*	10	50,0 ± 8,9*
Obstructive syndrome in the first year of life	1	3,3 ± 3,8	8	22,9 ± 7,1*	7	35,0 ± 9,8*

Note: * – significant difference between 1 and 2, 3 comparison groups (p < 0,05).

Results and Discussion

Comparative analysis of children anamnesis in all groups has shown that the formation of recurrent BOS is influenced by various unfavorable factors.

The family anamnesis of the vast majority of children with BA has been complicated with the criterion of the allergy presence, that coincides with the data in literature [3, 5, 11]. So, complicated allergic anamnesis from the mother's side occurred accurate more frequently in cases with BA than with BOS (54,3 % and 60,0 % vs 20,0 % of patients). The presence of atopy from the father's side and in both parents in patients with BA was observed in anamnesis more frequently, but there was no significant difference between the indexes.

Among all patients with BA (55 patients) in poor conditions lived, «wet» housing – 20 %, contact with pet epidermal antigens – 61,8 % and with mold fungi – 34,5 % of patients.

Passive smoking was presented in families of members of all groups, that was almost with the equal frequency in patients with both BOS and with BA (p > 0,05).

Ante- and perinatal factors play a significant role in the development of recurrent BOS in children. Among somatic pathology in mothers acute pyelonephritis during pregnancy and gynecological diseases were often recorded. Negative impact on prognosis is influenced by complicated pregnancy, recorded in half of mothers (56,7 %, 48,6 % and 50,0 % of women in appropriate comparison groups), the threat of

termination of pregnancy (p < 0,05) was observed significantly more often, severe gestational toxicosis (p < 0,05). Complicated birth with primary weakness of labor, caesarean section, rapid progression was fixed in 2/3 of mothers.

Body weight at birth in most patients were in the normal range and averaged (3500,0 ± 70,2) gr. in patients of 1 group, (3487,6 ± 85,2) gr. – in 2 group and (3513,8 ± 92,1) gr. – in patients of the 3 group.

Up to 37,1 % of the patients with BA were breastfed up to 4 months, other (2/3 of patients with BA) – were early artificial fed that confirms the general trend of today.

The development of chronic inflammation in bronchi is associated with acute respiratory deceases (ARD) in early age [10], which according to the survey data were observed in the first year of life in patients of 1 group (20,0 ± 7,3) % and more frequently – in groups 2 (54,3 ± 8,4) % and 3 (60,0 ± 8,9) %. Significant influence on BA progression is made by the frequency of ARD incidences in the first year of life: a significant difference between indices in patients with BA and BOS was fixed at a frequency of ARI more than 4 times per year (p < 0,05) and at presence in anamnesis of obstructive bronchitis in the first year of life (p < 0,05).

Summarizing the results, the authors were able to make sure once again that the progression of the neonatal period affects the subsequent health of the child. Because of the occurred respiratory disorders in the early years of life there is an imbalance of biologically active substances, reduction

of function of protective mechanisms and often bronchial hyperactivity is formed, that clinically manifested by recurrent BOS. Of course, the severity of inflammatory reactions and bronchospasm in different patients is different. These differences are explained by individual characteristics and genetic factors that have influence to the ability of cells to synthesize mediators, the resistance level or degree of damages of the architecture of the bronchi and bronchioles [8].

The results of the analysis of all factors still not found a substantial contribution of each of these indicators that confirms the lack of reliable monopredictor of BA progression in children. However, the most significant were:

- complicated heredity – 78,2 % (54,5 % of them – through the maternal line);
- abnormal pregnancy (49,1 %) and delivery (38,2 %) in mother;
- early artificial feeding (67,3 %);
- frequent acute respiratory diseases – in 47,3 %, with a frequency of 4 or more times in a year – in 43,6 %, obstructive bronchitis – in 27,3 % in the first year of life.

Thus, the majority of children with BA had complicated family and prenatal medical history, early artificial feeding, which is considered the earliest and permanent sensitizing factor and is also one of the major risk factors of ARD in infants. Frequent ARD, which are considered as the earliest clinical manifestation of transient immunodeficiency, were dominant in the majority of patients in the early stages of BA forming.

Conclusions

Based on the analysis of clinical manifestations and previous diagnoses, which were observed in the patients with asthma, it was determined that for the early diagnosis of bronchial asthma in children with of broncho-obstructive syndrome of any origin in a medical history it is necessary to have a careful gathering of anamnestic information with specification of the family anamnesis about the presence of allergopathology, features of living conditions, information about bad habits from their parents, as well as information about the peculiarities of ante- and perinatal progression. In addition, the great importance should be given to the presence of allergic rhinitis and other clinical manifestations of allergic diseases, frequency and nature of the respiratory pathology, patterns of clinical progression and timing of emergence of the first episode of broncho-obstruction syndrome in a child under the age of five years.

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ФАКТОРЫ РИСКА ВОЗНИКНОВЕНИЯ БРОНХИАЛЬНОЙ АСТМЫ У ДЕТЕЙ

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Резюме. С целью изучения формирования бронхиальной астмы у детей был проведен анализ анамнестических данных 85 детей. Проведенным анализом всей совокупности факторов установлено равно не существенный вклад каждого из этих показателей, что подтверждает отсутствие надежного монопредиктора развития бронхиальной астмы у детей. Наиболее значимыми выявились: наследственность – 78,2 % (из них у 54,5 % – по материнской линии), патологическое течение беременности (49,1 %) и родов (38,2 %) у матери, раннее искусственное вскармливание (67,3 %), частые острые респираторные заболевания – у 47,3 %, с частотой 4 и более раз в год – у 43,6 %, обструктивный бронхит – у 27,3 % на первом году жизни.

Ключевые слова: бронхиальная астма, дети, факторы риска.

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RISK FACTORS OF BRONCHIAL ASTHMA IN CHILDREN

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Summary. In order to study the formation of BA in children the anamnestic data of 85 children were analyzed. The results of the analysis of all factors still not found a substantial contribution of each of these indicators that confirms the lack of reliable monopredictor of BA progression in children, the most significant were: complicated heredity – 78,2 % (54,5 % of them – through the maternal line); an abnormal pregnancy (49,1 %) and delivery (38,2 %) in mother, early artificial feeding (67,3 %), frequent acute respiratory diseases in 47,3 %, with a frequency of 4 or more times in a year, in 43,6 %, obstructive bronchitis – in 27,3 % in the first year of life.

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