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Clinical Characteristics and Conditions of Development of Recurrent Bronchitis in Pediatrics

Kabilova D.K.,¹ Azizova N.D.,² Karimova M.Kh.,² Shamsiev F.M.,² Uzakova Sh.B.²

¹Medical Faculty of the Central Asian Medical University. Fergana. Uzbekistan.

²Republican Specialized Scientific and Practical Medical Center of Pediatrics of the Ministry of Health of the Republic of Uzbekistan.

ABSTRACT: The aim of the study was to identify the features of the clinical course and immune status in children with recurrent bronchitis. The studies were conducted in 117 children aged 4 to 6 years who were receiving inpatient treatment in the pulmonology department of the Republican Specialized Scientific and Practical Medical Center of Pediatrics with a diagnosis of recurrent bronchitis, during the exacerbation period of the disease. Among those hospitalized: boys – 65 (55.5%) and girls – 52 (44.4%). In all children, the main clinical features and immunological parameters were studied.

INTRODUCTION

Frequent respiratory morbidity in children continues to remain one of the urgent tasks of modern pediatrics. Particular attention is paid to diseases of the respiratory system characterized by a recurrent course. A significant place among them is occupied by recurrent bronchitis (RB), which is characterized by reversibility of bronchial changes. Despite the relatively mild clinical course, RB presents diagnostic difficulties, especially when differentiating it from such diseases as bronchial asthma and pneumonia [1,2]. Recurrent bronchitis (RB) most often develops in childhood, especially during the preschool period, when the highest number of cases is recorded. During school years, the incidence of the disease decreases somewhat. In some children, RB may eventually progress to chronic nonspecific lung diseases (CNLD), which in adulthood often leads to disability. All this emphasizes the importance and relevance of this problem [3,4,5]. The prevalence of recurrent bronchitis (RB) is 16.4 cases per 1,000 children [2,4,7]. Out of 1,000 children, 40–50 people aged 1–3 years suffer from it, 75–100 people aged 4–6 years, and 30–40 people aged 7–9 years. In ecologically unfavorable zones, the pathology is much higher. Thus, at the age of 3–6 years, it is 5–6 times higher than in favorable areas, reaching 250 cases per 1,000 children. RB is distinguished by the reversibility of bronchial changes and, despite its non-severe clinical course, by the difficulty of differential diagnosis with other respiratory pathology (bronchial asthma, pneumonia) [6, 7]. At the same time, despite the presence of a large number of publications devoted to this problem, key questions remain unresolved concerning the causes of RB development, as well as the features of its etiopathogenesis and clinical manifestation. Numerous publications on the problem of RB do not answer a number of important questions about the cause of this disease and the features of its etiopathogenetic and clinical aspects [1,8].

The aim of the study was: to identify the clinical features and risk factors for the development of recurrent bronchitis in children.

Materials and Methods

In the course of our work, 90 children aged 3 months to 3 years were examined. The following groups of children served as the material for observation and research:

- **Group I** – 45 patients with recurrent bronchitis with bronchial obstruction.
- **Group II** – 45 patients with recurrent bronchitis.

An analysis was conducted of anamnestic data, including the presence of a burdened family history, sex, age of onset of the disease, nature of feeding during the first year of life, frequency and features of the course of acute respiratory infections (ARI), living conditions, and the presence of bad habits in parents. Data from the ante- and perinatal history, the course of the neonatal period, features of diseases in early age, and the presence of other allergic diseases besides BA – atopic dermatitis (AD) and allergic rhinitis (AR) – were analyzed. Statistical processing of the obtained results was carried out using the Statistica 6.0 software package.

Important factors determining the child's health status and development are the features of obstetric history, the child's condition at birth, and his development before the onset of the present disease. The results of anamnestic data are presented in Table 1.

Examinations of children were conducted in the age group from 1 to 14 years. The distribution of children by age showed that community-acquired pneumonia with obstructive syndrome is more common at 1–3 years – 48 (63%), in children aged 4–6 years – 17 (23%), 7–11 years – 9 (12%), whereas in children aged 12–18 years it was 2 (2%). In children aged 1–3 years with AOB and RB with BOS – 32 (44%) – 35 (24%), in children aged 4–6 years – 17 (24%) – 46 (30.5%), 7–11 years – 18 (25%) – 46 (30.5%), whereas in children aged 12–18 years it was 5 (7%) – 23 (15%).

Analyzing, we found that in AOB patients were mainly admitted on the 3rd–5th day of the disease – 74 (67.3%); in RB with BOS with a recurrent course, children were mainly admitted on the 5th–7th day of illness – 24 (48.0%) children; in CAP with BOS, they were mainly admitted on the 3rd–5th day of the disease – 96 (45.5%) after unsuccessful treatment at home.

Analyzing the complete anamnestic data of the examined children, we identified the most frequently encountered risk factors (Table 1).

As follows from the table, the majority of patients with RB with BO were born from II–III pregnancies – 20 (45.3%) and, accordingly, II–III births – 17 (38.5%). Patients with RB – 22 (49.2%) were born from the first pregnancy, from II–III pregnancies in 17 (38.5%) cases, from IV and more – 5 (12.3%) children. In the majority of the observed mothers of the examined patients, various complications of the course of pregnancy occurred, and this was greatest in the group of mothers of patients with BA – 39 (87.7%). ARI during pregnancy was greatest in the group of mothers of children with RB – 36 (80.0%). During pregnancy, mild or moderate anemia was diagnosed in mothers of patients with RB with BO in 64 (85.3%) cases, RB with BO – 45 (75.0%), and in RB in 54 (83.1%). In the group of patients with RB, in 37 (83.1%) cases, the mothers had a history of pathological course of labor. Prematurity and birth in asphyxia were detected in the highest frequency of cases in the group of patients with RB – 2 (6.2%) and 6 (14.7%), and in RB in 2 (6.2%) and 9 (21.5%), respectively.

Table 1. Factor analysis of the examined children

Risk factors	RB (n=45) abs	RB (n=45) %	RB with BO (n=45) abs	RB with BO (n=45) %	P
Born from: I pregnancy	22	49.2	18	41.3	>0.05
II–III pregnancy	17	38.5	20	45.3	>0.05
IV and more pregnancies	5	12.3	5	13.3	>0.05
Born from: I birth	24	53.9	19	44.0	>0.05

Risk factors	RB (n=45) abs	RB (n=45) %	RB with BO (n=45) abs	RB with BO (n=45) %	P
II–III births	17	38.5	15	45.3	<0.01
IV and more births	3	7.7	3	10.7	>0.05
Complications of the course of the present pregnancy: toxicoses of the I–II half	39	87.7	21	46.7	>0.05
Anemia of I–II degree	37	83.1	38	85.0	>0.05
Maternal diseases during pregnancy: ARI	36	80.0	17	38.7	>0.05
Pathological course of labor	18	40.0	12	28.3	<0.01
Born: premature	2	6.2	6	14.7	<0.01
in asphyxia	9	21.5	13	30.0	<0.01
Feeding until one year: natural	20	46.6	18	66.6	<0.01
artificial	10	22.3	4	10.0	>0.05
mixed	15	35.3	10	23.3	>0.05

In the clinical picture of recurrent bronchitis (Table 1), in all children 45 (100%) manifestations of intoxication were observed: subfebrile temperature – in 14 (32.5%) children, fever (above 38.1 °C) – in 6 (14.5%), weakness, adynamia – in 34 (76.9%), decreased appetite – in 33 (73.5%), emotional lability – in 25 (57.3%) children. In 32 (72.6%) children, difficult nasal breathing was noted, mucous discharge from the nose – in 22 (47.9%). In 100% of children, the dominant symptom was cough, of which in 20 (45.3%) it was poorly productive, and in the remaining children it was productive in nature. Signs of expiratory difficulty in breathing, noisy or wheezing in nature – in 11 (25.6%) children, involvement of auxiliary muscles in the act of breathing – in 4 (9.4%), flaring of the wings of the nose – in 23.9%. In addition, pallor of the skin was detected in 28 (62.4%) children, dry skin – in 8 (19.6%), perioral cyanosis – in 17 (39.3%) children.

The severity of the examined patients is significantly influenced by an unfavorable premorbid background and concomitant pathology (Table 2). Analyzing this table, it can be stated that in all three observation groups, the most frequently encountered

background conditions were anemia of I–II degree, residual effects of rickets, and allergic diathesis. In the group of patients with AOB, the above conditions were of greater importance.

Table 2. Characteristics of the background state and concomitant pathology in the examined patients

Background diseases	AOB (n=45) abs	AOB (n=45) %	RB with BO (n=45) abs	RB with BO (n=45) %	P	P1
Anemia I–II	36	80.0	38	85.0	>0.01	>0.01
Residual effects of rickets	11	25.0	21	46.6	>0.01	>0.01
Atopic dermatitis	5	10.0	15	33.3	>0.01	>0.01
Overweight	10	21.6	12	26.6	>0.01	>0.01
PEM	8	18.3	14	31.6	>0.01	>0.01
Diseases of ENT organs	11	23.3	15	33.3	>0.01	>0.01

Note: P – significance of differences in indicators between groups I and II of patients; P1 – significance of differences in indicators between groups II and III of patients.

Among concomitant pathology, diseases of ENT organs were established in 11 (23.3%) patients with AOB, in 15 (33.3%) patients with AOB with a recurrent course.

Thus, the presented data once again confirm that children with varying degrees of severity of background conditions and concomitant pathology are a risk group for the development of diseases.

The main complaints of parents of sick children were cough 120 (100.0%), dyspnea 120 (100.0%), increased body temperature in 74 (61.5%) children, decreased appetite 108 (90.3%), weakness 92 (76.6%), sleep disturbance 113 (93.8%). Clinical assessment was based on a combination of symptoms of intoxication, respiratory and heart failure, auscultatory, percussion data, and radiological changes.

On admission to the department of children with AOB, the leading clinical manifestation of the disease was respiratory failure.

Such a condition as weakness was noted in 39 (55.4%) patients, appetite was reduced in 57 (81.8%) patients. Sleep disturbance, pallor of the skin, and dyspnea were noted in 70 (100.0%) cases. Cyanosis of the nasolabial triangle was observed in 22 (31.8%) children. Body temperature on admission was febrile in 13 (19.1%) patients. The nature of the cough was dry in 57 (81.8%) patients, wet in 13 (18.2%) patients. On auscultation of the lungs, against the background of harsh breathing, dry rales were heard in 55 (78.2%) patients; in 15 (21.8%), moist rales were heard.

On percussion of the chest, a box-like shade of the percussion sound was determined in 62 (88.2%). Percussion changes in the lungs in 59 (83.9%) had a local character in the form of dullness of the pulmonary sound; in 53 (75.8%), a box-like shade of the percussion sound was observed, which is characteristic of bronchial obstruction. If local percussion changes were identical in the compared groups of patients, then the box-like shade of the percussion sound was characteristic of patients with AOB.

When observing patients with RB with BOS, we identified phases of exacerbation and clinical remission.

Exacerbation of RB with BOS was characterized by an acute (subacute) onset, cough, initially dry – in 46 (92.0%), wet – in 4 (8.0%) patients. Dry cough on admission was paroxysmal in nature, more at night, and on the 5th–6th day of treatment transformed into a wet one.

Cyanosis of the nasolabial triangle was observed in 12 (24.0%); on the part of the skin – dryness – in 36 (72.0%) patients. Auscultatory signs were diverse and mainly depended on the level of damage to the bronchial mucosa. Dry rales were determined in 6 (12.0%) children, moist conducted rales in 44 (88.0%) children. Signs of hypoxia in the form of cyanosis of the nasolabial triangle in patients with AOB persisted for 2.3 ± 0.8 days, while in patients with RB with OB this indicator was 3.4 ± 0.3 days.

On auscultation, the duration of harsh and weakened breathing in patients with pneumonia was 11.2 ± 0.3 and 7.8 ± 0.5 days, respectively, which was significantly longer than in patients with OBRT.

On radiological examination, in 70 (100%) patients with AOB, emphysema of the lung tissue and increased bronchovascular pattern were noted.

On radiological examination, in 50 (100.0%) patients with OBRT, signs of bronchial obstruction were noted – inflation of the lung tissue, increased transparency, horizontal arrangement of the ribs, wide intercostal spaces, flattening and low position of the pulmonary pattern.

Conclusions

Comparison of clinical observations of children from all study groups showed that in recurrent bronchitis (RB), symptoms such as oral rales, wet cough, and moist rales in the lungs persist longer. Radiological examination in patients of all groups revealed bilateral enhancement of the pulmonary pattern, widening of the lung roots, and increased transparency of the pulmonary fields — signs characteristic of broncho-obstructive syndrome (BOS). The key prognostic risk factors for the development of recurrent bronchitis in children are perinatal complications, a burdened premorbid background, as well as the presence of concomitant and previously suffered diseases.

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