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Features of Community Acquiered Pneumonia with Congenital Heart Defects in Children of Early Age

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Abstract: In this study, we studied the clinical course of pneumonia in 47 infants of early age with community-acquired pneumonia and various congenital heart defects as comorbidities. The importance of timely pathogenetic complex therapy is shown, including the elimination of circulatory failure, etiotropic antibacterial, cardioprotective drugs.

Keywords: premature infants, pneumonia, congenital heart defect.

Introduction. In recent years, there has been an increase in the number of patients with congenital heart defects, which is associated not only with the actual increase in this pathology, but also with the widespread introduction of important instrumental methods for examining the cardiovascular system, primarily Doppler echocardiography [14]. Congenital heart defects (CHDs) are developmental anomalies, ranking third after defects of the central nervous system and musculoskeletal system. Some children have the following clinical signs: shortness of breath, cyanosis, fainting, heart murmurs, underdevelopment of limb muscles, stunted growth, low body weight or short stature, frequent respiratory tract infections. Often, children with congenital heart defects, accompanied by increased blood flow to the lungs, have a long course and a difficult form of pneumonia, and they become ill in the first year of life. Therefore, in such a situation, taking into account hemodynamic disturbances and the morphological form of pneumonia, the patient requires timely assessment of the child's condition and high-quality treatment measures [1].

Respiratory tract pathology traditionally occupies a high share in the morbidity structure of children of all age groups, but at an early age it can be up to 80% of all cases. Among acute and chronic respiratory diseases, pneumonia, which can lead to life-threatening complications and even death, is of particular importance as one of the main reasons for hospitalization of children in pulmonology and emergency pediatric departments.

Among congenital pathologies in children of infancy, congenital heart and vascular malformations occupy a leading place, and congenital heart defects are the most common and make up almost 30%. This pathology has been growing recently and, according to O.V.

Sharapova, only in 2004 it increased by 7.7%. (Sharapova O. V. "Children's Cardiology Report 2002" Cardiorheumatology Service Organization), which is largely due to the widespread introduction of modern and less invasive diagnostic methods into cardiology practice [3,4]. Therefore, in such situations, timely assessment of the condition of the sick child and high-quality complex treatment measures are required, taking into account the morphological form of pneumonia and hemodynamic disorders [4,11,14]. Despite the significant progress made in the diagnosis and treatment of this disease in our country and around the world over the past decade, it remains an urgent problem not only in pulmonology, but also in pediatrics in general.

Research objective. To study the clinical, laboratory and instrumental characteristics of pneumonia in children with congenital heart defects.

Materials and methods. In our study, we examined 47 infants with various congenital heart defects who were treated at the Samarkand branch of the Republican Scientific Center for Emergency Medical Care in 2023-2024. The difference in gender among patients was 27 (46.5%) boys and 20 (53.5%) girls. Group I included 22 patients with severe community-acquired pneumonia with congenital heart defects. Group II included 25 patients with mild and moderate community-acquired pneumonia without congenital heart defects. All patients were identified with clinical and anamnestic features of recurrent pneumonia, the main risk factors for severe pneumonia in the group of children with heart defects. According to the results of special examination methods, electrocardiography and echocardiography, congenital malformations and other symptoms of the heart muscle were identified. The exclusion criteria from the study were rheumatic and non-rheumatic carditis and hereditary diseases of the cardiovascular and bronchopulmonary systems, patients with congenital cardiovascular changes. The reason for the patients' appeal to emergency care was a sharp deterioration in their condition, worsening symptoms of respiratory failure, persistent cyanosis of the skin against the background of severe anxiety, increased body temperature, and weakness.

Research results. In children with congenital heart defects and community-acquired pneumonia, the main etiological agents of the disease were Streptococcus pneumoniae 5 (22.7%), Mycoplasma pneumoniae 7 (31.8%), less frequently Staphylococcus aureus 2 (9.1%), Chlamydophyla pneumoniae 6 (27.2%, and less frequently Haemophilus influenzae 1 (4.5%), Streptococcus pyogenes 1 (4.5%). The presence of atypical flora, such as Mycoplasma pneumoniae and Chlamydophila pneumoniae, in 38.58% of patients under 6 months of age, indicates that these patients were infected from their mothers during childbirth and is consistent with the literature. In terms of clinical symptoms, 7 (31.8%) patients were hospitalized with a sharp deterioration in the child's condition and bruising, 12 (54.5%) with worsening symptoms of respiratory failure and severe anxiety, and 3 (13.6%) patients with increased body temperature and weakness 2 patients with congenital heart defects and signs of pneumonia were admitted to the pediatric intensive care unit in critical condition. In patients of groups I and II, factors such as intrauterine infection in the mother from the history of childbirth, viral infections in the I and II trimesters of pregnancy, and anemia were found in almost the same proportion, which means that the same reason led to the severe course of pneumonia in both groups.

In the electrocardiogram, tachyarrhythmia was observed in 12 patients (54.5%), bradycardia in 3 patients (13.6%), left bundle branch block of the bundle of His was observed in 7 patients (31.8%) and in group II in 13 (48.1%), and sinus tachycardia in 14 patients (51.8%). Echocardiography revealed VSD in 9 patients (40.1%), ASD – in 4 patients (18.1%), Fallot tetralogy – in 5 patients (22.7%), other defects in 4 patients (18.1%).

Chest radiography showed enlargement of the heart borders in all patients at different indices, and according to the morphological form of pneumonia, bronchopneumonia was diagnosed in 16 patients (34.1%), focal in 8 patients (17.1%), segmental in 4 patients (8.5%), and polysegmental – in 2 patients (4.2%). In patients hospitalized in critical condition, in addition to respiratory and cardiovascular diseases, encephalopathy was also detected.

In the treatment of antibacterial drugs, mainly 2-3rd generation cephalosporins (cefuroxime, cefotaxime, ceftriaxone, ceftazidime, cefoperazone), combinations of aminoglycosides (amikacin) were used. If necessary, cardiotropic support and symptomatic treatment were prescribed to 9 patients (19.1%).

Regression of clinical symptoms in patients was observed on average 6.2 days of hospitalization. 9 patients (40.1%) with a severe combined form of CHD were referred to a cardiac surgery center, the rest were sent home after treatment.

Discussion of the results. In recent years, there has been an increase in the number of congenital heart defects, which is associated not only with the actual increase in the incidence of this pathology, but also with the widespread introduction of highly informative instrumental methods of cardiac examination, primarily Doppler echocardiography [5,6,7]. Currently, a multifactorial model of the heredity of congenital heart defects is accepted [12].

The main forms of intercurrent pathology are viral, bacterial or mixed infections of the lower respiratory tract, mainly pneumonia, occurring in infants. Therefore, in such a situation, timely assessment of the patient's condition and high-quality treatment, taking into account hemodynamic disorders and the morphological form of pneumonia, are required [2,9,10].

According to the results of a study of children with pneumonia accompanied by CHD (Lim M.V. et al. 2023), patients are mainly admitted to the intensive care unit after diagnosis and deterioration of their general condition. The most commonly diagnosed defects are "white" defects, an observation that has been confirmed in large studies [13], i.e. ventricular septal defects and septal defects are common forms of childhood cardiovascular disease and are more prone to community-acquired pneumonia.

Conclusion. The clinical picture of pneumonia in congenital heart defects is characterized by a severe course and the rapid development of various complications. Echocardiography is the main method for detailed study of the internal structure of the heart (for example, to determine the location and type of ventricular and septal defects, developmental anomalies of the heart valves, analysis of the outflow tracts of the right and left ventricles), as well as for taking measurements (morphometry). According to our results, optimization of treatment requires the timely use of complex therapy, starting from pathogenetic therapy, including circulatory support, etiotropic antibacterial, cardiotropic, diuretic agents. The risk groups for severe, complicated pneumonia and its adverse consequences include infants with congenital heart defects in the first year of life, with high pulmonary hypertension and infectious factors. Such children require special attention from pulmonologists.

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