

FEATURES OF ACUTE MYOCARDITIS IN CHILDREN IN THE BACKGROUND OF
PNEUMONIA

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Abstract. The purpose of the study was to evaluate the effectiveness of carnitine in the treatment and prevention of myocarditis in children. We examined 120 children aged from 6 months to 7 years with pneumonia, whom we divided into 2 groups. Group I (control) included 60 children who were on standard treatment. Group II (main) included 60 sick children with pneumonia who had disorders of the cardiovascular system, the presence of which was confirmed by instrumental methods. The results obtained emphasize that against the background of community-acquired pneumonia, all symptoms of acute heart failure are masked, the cause of which in most cases is acute coronary insufficiency; changes in the heart muscle with this pathology in children increase the risk of severe undesirable complications from the heart.

Key words: acute myocarditis, community-acquired pneumonia, children.

ОСОБЕННОСТИ ОСТРОГО МИОКАРДИТА У ДЕТЕЙ НА ФОНЕ ПНЕВМОНИИ

Аннотация. Цель исследования — оценить эффективность карнитина в лечении и профилактике миокардита у детей. Обследовано 120 детей в возрасте от 6 месяцев до 7 лет с пневмонией, которых мы разделили на 2 группы. В I группу (контрольную) вошли 60 детей, находившихся на стандартном лечении. Во II группу (основную) вошли 60 больных детей пневмонией с нарушениями сердечно-сосудистой системы, наличие которых было подтверждено инструментальными методами. Полученные результаты подчеркивают, что на фоне внебольничной пневмонии маскируются все симптомы острой сердечной недостаточности, причиной которой в большинстве случаев является острая коронарная недостаточность; изменения сердечной мышцы при этой патологии у детей повышают риск развития тяжелых нежелательных осложнений со стороны сердца.

Ключевые слова: острый миокардит, внебольничная пневмония, дети.

Relevance. For several decades now, severe pneumonia has remained one of the pressing problems of modern medicine due to the steady trend towards an increase in the number of patients and consistently high mortality, despite the use of new principles and methods of treatment [3,4]. The likely reason for this is late diagnosis and, as a consequence, late initiation of treatment, as well as the inability to adequately assess the effectiveness of therapy. The diagnosis of pneumonia in children is often difficult, especially if signs of respiratory failure develop against the background of acute respiratory viral infection. The problem of acute myocarditis is currently due to its widespread occurrence, especially in childhood.

One of the main causes of acute myocarditis today is acute respiratory viral infections (ARVI), which remain the most common and global diseases in children. Cardiovascular failure is typical of pneumonia, especially in young children. It develops rapidly, already in the early stages of the disease. In an uncomplicated course of the disease, clinically hidden heart failure occurs and is diagnosed using instrumental studies such as ECG, EchoCG. With community-acquired pneumonia in children, dysfunction of the cardiovascular system can clinically manifest itself in the form of coronary insufficiency, and more often cardiovascular failure. [2,7,8]. Each influenza epidemic accompanied by complications of pneumonia in children is associated with an increase in the number of cases of acute myocarditis, which determines the relevance of studying this problem.

An even more serious task is the timely diagnosis of complications of pneumonia, especially myocarditis, since identifying this cardiac complication allows one to avoid severe and sometimes fatal consequences for the patient. Previously developed clinical criteria and diagnostic criteria for diagnosing heart failure are not always objective enough to identify circulatory disorders in young children. For example, anxiety, decreased appetite, and poor sleep are almost always noted in children. Tachypnea and tachycardia can not only be a sign of pneumonia, but also occur in a healthy child during examination, feeding, etc. Dyspnea and tachypnea always accompany diseases of the bronchi and lungs. The frequency of myocarditis in pneumonia, according to different authors, varies from 1% to 15. From a diagnostic point of view, there are no specific electrocardiographic changes characteristic only of myocarditis.

Myocarditis is an inflammatory lesion of the heart muscle of infectious, toxic-infectious, infectious-allergic, autoimmune and toxic etiology [6]. It is a disease predominantly of children and young adults, although the disease can develop at any age. Myocarditis can be caused by any viral or bacterial agents, as well as non-infectious factors. The most common cause of the disease

is viruses. In 6-8% of cases, myocarditis develops during or shortly after various sporadic or epidemic viral infections [1].

Of the bacterial myocarditis, the most dangerous are diphtheria (infectious-toxic), myocarditis with scarlet fever, typhoid fever and salmonellosis, tuberculosis, yersiniosis (intestinal and pseudotuberculosis), with generalized streptococcal and staphylococcal infections and tonsillogenic myocarditis associated with these pathogens [7,10] .

Purpose: To determine the clinical characteristics of acute myocarditis in children against the background of community-acquired pneumonia.

Materials and methods of research. We examined children aged from 6 months to 7 years with community-acquired pneumonia who were undergoing inpatient treatment in the emergency pediatric and pediatric intensive care units of the SF RNCMC. The average age of the children examined was 2.7. Exclusion criteria were: previous infectious disease within a month before hospitalization, the presence of organic heart pathology (congenital and acquired heart defects, cardiomyopathies), the presence of signs of rheumatic fever and pathology of the coronary vessels. A total of 120 patients with community-acquired pneumonia who met the exclusion criteria were included in the study.

The patients were randomly divided into 2 groups. Group I (control) included 60 children who were on standard treatment. Group II (main) included 60 sick children with pneumonia who had disorders of the cardiovascular system.

The effectiveness of the therapy for pneumonia was assessed according to the standard based on objective signs of cyanosis, congestive wheezing in the lungs and tachycardia. The severity of cyanosis in patients was assessed by central and peripheral distribution, and cough by a 4-point system: 0 points - no cough, 1 point - a single cough, 2 points - moderate cough and 3 points - frequent, painful cough. Tachycardia and cyanosis were the main signs of heart damage in pneumonia, which tended to continue even after the disappearance of intoxication from the underlying disease.

Additional criteria for the effectiveness of therapy were the duration of oxygen therapy and the duration of hospitalization. Patients were managed in accordance with the specifics of the Emergency Medical Care service, diagnostic and treatment standards (recommended deadlines for inpatient treatment of bronchopulmonary diseases were observed). The discharge criteria were: satisfactory condition, $SpO_2 \geq 95\%$, reduction in cough, shortness of breath and tachycardia. The presence of changes in the electrocardiographic study of a "metabolic nature" according to the conclusion of the cardiologist and slight persistence of oral cyanosis were not a contraindication

for discharge. Monitoring of patients continued until complete resolution of the main symptoms of the disease.

Research results. After the study, the main indicators of patients in the compared groups upon admission to the hospital were analyzed and compared. The analysis showed that the patients selected for the main and control groups were comparable in terms of gender, age, and address indicators. Upon re-examination of children with cardiac disorders at discharge, the following hemodynamic parameters remained: LVEF in the treatment group decreased from $45.6 \pm 9.6\%$ to $26 \pm 6.7\%$ compared to in the placebo group, where the EF value decreased from $27.7 \pm 5.6\%$ to $21.3 \pm 5.3\%$; Of course, the diastolic volume in the treatment group decreased from 25.7 ± 50.1 to 140.7 ± 50.6 vs. in the placebo group, where there was an increase in EDV from 245 ± 46.3 to 280.6 ± 48.9 . The most common changes recorded on the ECG are sinus tachycardia, which was observed in 46 (38.7%) patients, ST segment changes in 15 (12.4%), AV block in 11 (9.2%), left bundle branch block in 28 (23.3%) patients. Thus, the most valuable electrocardiographic parameter in patients suffering from myocarditis is changes in the QRS complex.

The discussion of the results. The results of our study show that it is necessary to conduct an echocardiographic, as well as an electrocardiographic study of children with pneumonia, which causes a decrease in complicated cardiorespiratory syndromes and post-hypoxic changes in the ventricular myocardium, which allows us to conclude that there is a certain advantage of a preventive examination to prevent the development of chronicity of cardiovascular pathology.

Studies have shown that currently the criteria for early detection of heart pathology in patients with community-acquired pneumonia are not sufficiently developed. Due to the fact that the amount of cardiac pathology at autopsy significantly exceeds its intravital detection, the problem of early diagnosis of cardiovascular pathology and risk factors for its development in sick children with community-acquired pneumonia still remains a pressing issue in clinical medicine [4].

Among the pulmonary and extrapulmonary complications of community-acquired pneumonia, lesions of the cardiovascular system occupy an important place [2,4]. According to many authors [1,11], dysfunction of the cardiovascular system is an almost constant companion of community-acquired pneumonia and develops from the first hours; Moreover, circulatory disorders often determine the prognosis and outcome of pneumonia itself.

Conclusion. Thus, the clinical manifestations of heart failure in early childhood are non-specific, and in order to clarify the diagnosis, it is necessary to conduct a complete clinical and instrumental study, including an ECG with the calculation of central hemodynamic parameters.

Carrying out an echocardiographic examination of children with pneumonia causes a decrease in complicated cardiorespiratory syndromes and post-hypochic changes in the ventricular myocardium, which allows us to conclude that a preventive examination is a definite advantage for preventing the development of chronicity of cardiovascular pathology under the “mask” of community-acquired pneumonia in children and further transformation of the disease in various cardiopathy.

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