

# Cardiovascular Damage in Acute Pneumonia in Children

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**Abstract** From the development of criteria for the diagnosis of damage to the cardiovascular system in acute pneumonia in children improving the methods of treatment of this pathology and using new ones is one of the urgent tasks of pediatrics. In early childhood myocarditis it is necessary to study the clinical characteristics of the course of acute pneumonia complicated by Also various diseases decreased reactivity of the child's organism associated with It is important that the risk factors for the development of cardiovascular system injuries in young children with acute pneumonia.

**Keywords** Cardiovascular system, Children, Pneumonia, Complications

## 1. Introduction

Viral-microbial infections of the respiratory tract make up 10-15% of the causes of children's death in the world [2,5]. Severe pneumonia in young children is an indication for urgent intensive care. In complicated pneumonia, changes in the cardiovascular system are also observed, and a joint infectious-inflammatory process is observed. Cardio- and hemodynamic disorders in pneumonia in children of early age, as the main link of pathogenesis, aggravate its course, worsen the outcome, and often (in 5-50% of cases) become one of the causes of death [1].

Worldwide Among the exogenous factors leading to the development of myocarditis, a number of scientific studies aimed at determining the superiority of viral infectious-allergic diseases (53%) and increasing the scientific and practical effectiveness of the obtained results are being carried out [2,3,4]. In this regard, it is important to determine the structure of cardiovascular system disorders in acute pneumonia in children, to develop methods for its early diagnosis and pathogenetically based treatment measures. Evaluating the clinical course of myocarditis due to acute pneumonia at an early age, determining the consequences and risk factors for the development of myocarditis, improving the methods of treatment of this pathology and developing new ones are urgent tasks of pediatrics.

## 2. The Purpose of the Study

It consists in developing criteria for diagnosing damage to the cardiovascular system in acute pneumonia in children aged 6-12 years.

## 3. Results of the Study

The study is based on clinical and laboratory examinations of 40 children who were treated inpatiently in the pediatric pulmonology department of the 1st clinic of the Tashkent Medical Academy for acute pneumonia in 2021-20223. They were divided into 2 groups: group 1: 20 children with acute pneumonia complicated by myocarditis; Group 2 consisted of 20 children with acute pneumonia without myocarditis. The comparison group consists of 20 practically healthy children of the same age.

The study of the risk factors for the development of myocarditis in early-aged children with acute pneumonia showed that the following are most important in the occurrence of this complication: the transmission of cardiovascular pathology from generation to generation, severe gestosis, nephropathy during pregnancy, anemia, ARVI, complications during childbirth, birth asphyxia, GIE, background diseases - OEYE, anemia, thymomegaly, allergies, the presence of retransmitted pneumonia and sepsis.

The following are the characteristic features in the course of acute pneumonia complicated by myocarditis in children of early age: lethargy, rapid fatigue, profuse sweating, restlessness, complaints of disturbed sleep, pallor of the skin, peripheral cyanosis, shortness of breath with the involvement of additional muscles. such as intensification of symptoms of hypoxia, prolongation of the return of symptoms of the main disease. Enlargement of heart borders, reduction of heart tones, bradycardia, hepatomegaly, signs of circulatory disorders established specific cardiological symptoms in children of early age with acute pneumonia. Typical laboratory features for pneumonia complicated by myocarditis in children of early age are a strong development of anemia, leukocytosis, an increase in the amount of AST and de Ritis coefficient. Violation of the activity of myocardial enzymes in the blood serum is an indicator of a complex process that includes the activation of the body's protective-adaptive

reactions, changes in the metabolism of cardiomyocytes, and injury to the myocardium. This process, which develops due to inflammation or non-inflammatory alteration, hypoxia and other factors, is aimed at maintaining biological homeostasis.

The presence of bilateral focal-combining pneumonia, KTII and II progressive enlargement is the X-ray features of pneumonia complicated by myocarditis in children of early age. In the ECG examination Sinus tachycardia - simultaneous disturbance of rhythm and conduction in the form of bradyarrhythmia, incomplete blockade of the right leg of the bundle of Hiss, a decrease in the amplitude of the teeth of the QRS complex for myocarditis is characteristic (Table 1).

Disturbance of metabolic processes was detected 5 times more often (25%) in group 1 compared to group 2 (5%). Metabolic changes were manifested by changes in the electrolyte balance, and their level of development prevailed in children with signs of intoxication, nausea, vomiting, profuse sweating against the background of high numbers of axillary temperature. The degree of development of ECG changes varied from minimal metabolic changes in the myocardium to complex combined disorders of rhythm and cardiac conduction. Combined rhythm and conduction disturbances in the form of sinus tachy- and bradyarrhythmias were most common in the ECG of children in group 1.

In standard ECG, prognostic negative events - extrasystole, ventricular arrhythmia were rarely noted in children. Among the disorders of intraventricular conduction, incomplete blockade of the right leg of the bundle of Hiss was found more often, blockade of the left leg of the bundle of Hiss was somewhat less common, and its complete blockade was not recorded in our studies. In some of the children of group 1, a decrease in the amplitude of the QRS complex teeth took a special place, which was more strongly developed in standard and enhanced unipolar hand and foot conductors, which indicates that the myocardial injury is acute and diffuse in nature.

When analyzing the results of ExoKG, 1/3 of the children in group 1 had dilatation of the left ventricular cavity, significant expansion of the right ventricle, reduction of the contraction fraction, as well as a decrease in myocardial contractility in all children in group 1. Dilatation of the right and left ventricular cavity, decreased myocardial contractility, decreased ejection fraction are ExoKG symptoms of myocarditis in children with acute pneumonia.

When the results obtained from the ExoKG of the patients were compared with the indicators of healthy children who made up the comparative group, an insignificant decrease in the ejection fraction, a decrease in the contractility of the myocardium was noted in all children of the 1st group.

**Table 1.** Changes in ECG in examined children

EKG disturbances	1 group (n=20)		2 groups (n=20)		ch2	R
	abs.	%	abs.	%		
Morphology of the ventricular complex						
Depolarization phase -Q pathological tooth	2	10	0	0	1.9	>0.05
- low voltage QRS	9	45	2	10	9.2	<0.001
Repolarization phase - T tooth change	5	25	0	0	5.03	<0.01
- ST change	3	15	0	0	6.3	<0.001
Cardiac conduction disorders						
Arrhythmia	7	35	2	10	27.2	<0.001
Sinus tachycardia	9	45	5	25	5.3	<0.01
Sinus bradycardia	4	20	0	0	19.5	<0.001
AV blockade	5	25	0	0	5.03	<0.001
- GTCHO blockade	3	15	0	0	7.1	<0.001
- GTO'O blockade	2	10	0	0	12.9	<0.001
Extrasystole	3	15	0	0	5.03	<0.01
SSSU	1	5	0	0	1.9	>0.05

**Table 2.** Indications for X-ray examination in children with pneumonia

	1 group (n=20)		2 groups (n=20)		ch2	R
	abs.	%	abs.	%		
Unilateral pneumonia	7	35	15	75	12.97	<0.001
bilateral pneumonia	13	65	5	25	12.97	<0.001

In children of group 2, KSO, KDO almost did not change, FV decreased slightly, the valves were intact, and no decrease in myocardial contractility was observed. It should be noted that in patients with myocarditis and without myocarditis, compared to the control group, the increase in all exometric indicators except FV is explained by a decrease in the contractility of the myocardium due to the inflammatory process and hypoxia, and this condition develops more strongly in myocarditis. Decreased ejection fraction was also more strongly developed in children with myocarditis ( $R < 0.001$ ).

When analyzing X-ray examinations, bilateral pneumonia, which often has a focal-combination character, with the expansion of the lung root and the strengthening of the lung picture in children of group 1, was found in 13 (65%) cases, while the second in the group, a bilateral process was observed reliably less ( $R < 0.05$ ) and mainly had a focal description in 5 (25%) cases (Table 2).

Correlation analysis revealed a series of relationships between symptoms and the development of myocarditis in children with acute pneumonia at an early age.

Among the conducted and accompanying diseases in early childhood children with acute pneumonia and KFK-MV, LDG-1 indicators: pneumonia ( $r = +0.775$  and  $+0.689$ , respectively), GIE ( $r = +0.475$  and  $+0.559$ ), hypotrophy ( $r = +0.535$  and  $+0.619$ , respectively) and thymomegaly ( $r = +0.435$  and  $+0.512$ , respectively), a strong correlation was noted, a weak correlation was diatheses ( $r = +0.335$  and  $+0.312$ ) and in food and drug allergies ( $r = +0.289$  and  $+0.291$ , respectively).

Among the indicators of peripheral cyanosis and KFK-MV, LDG-1 ( $r = +0.675$  and  $+0.589$ , respectively), as well as symptoms of severe shortness of breath with the involvement of accessory muscles ( $r = +0.492$  and  $+0.525$ , respectively), restlessness and restlessness among respiratory symptoms such as sleep ( $r = +0.437$  and  $+0.425$ , respectively), hoarse wheezing ( $r = +0.524$  and  $+0.526$ , respectively) and II degree respiratory failure ( $r = +0.624$  and  $+0.591$ , respectively) significant correlations were found, which indicates the existence of an interaction between these signs leading to the development of myocarditis.

When studying the relationship between cardiothoracic index and cardiac isoenzymes in children with acute pneumonia complicated by myocarditis, levels I, II and KFK-MV ( $r = +0.745$  and  $+0.702$ , respectively), LDG-1 ( $r = +0.845$ , respectively and  $+0.756$ ) was found to have a strong positive correlation

relationship.

## 4. Conclusions

1. Development of signs of hypoxia (cyanosis - 60%, paleness of the skin - 70%), shortness of breath with the involvement of auxiliary muscles - 55%, rapid fatigue - 80%, laxity - 40%, profuse sweating - 30%, restlessness, restless sleep - 50%, bilateral inflammatory process - 35%) in early age children myocarditis are clinical features of acute pneumonia complicated by.
2. Aggravated heredity for cardiovascular diseases - 40%, extragenital pathology in the mother during pregnancy - 85%, perinatal pathology in the child - 45%, transferred (pneumonia - 50%) and concomitant diseases (anemia - 75%, protein-energy deficiency - 65%, thymomegaly - 30%) decreased reactivity of the child's organism associated with risk factors for the development of cardiovascular system injuries in children of early age with acute pneumonia.

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