International Journal of Medical Sciences And Clinical Research

VOLUME Vol.05 Issue06 2025
PAGE NO. 26-30
DOI 10.37547/ijmscr/Volume05Issue06-05

Dynamics Of Pathological Conditions In Children

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Received: 14 April 2025; **Accepted:** 10 May 2025; **Published:** 17 June 2025

Abstract: Our work reflects the data of a literature review on aspects of pathological conditions in children, especially lung lesions, which are of great importance to physicians, especially pediatricians, as well as pathologists.

Keywords: Population, period, vessels, mortality, newborn, hypoxia.

Introduction: Despite the development of technologies in the medical field, the problem of diseases in young children remains an open question. Pathological conditions in children with perinatal hypoxia are reflected in the activity of all organs and systems of the body.

According to statistics, about 55% of infant mortality cases worldwide are caused by perinatal pathology. Certain conditions that arise in the perinatal period not only occupy a leading place in the causes of infant mortality, but also are at the origin of most childhood diseases and disabilities. In the fetus and newborn, they inevitably lead to the development of hypoxia.

And also analyzing literary sources, it can be noted that among diseases of the cardiovascular system (CVS), arterial hypertension (AH) occupies a special place. This is due not only to its high prevalence, but also to the fact that it serves as a leading risk factor occurrence of myocardial infarction and stroke, which account for 40% of the causes of death among the adult population and more than 80% of all deaths from cardiovascular pathology. Moreover, recent years have been characterized by a progressive increase in morbidity and mortality from diseases of the circulatory system in childhood and adolescence.

Numerous works described in both foreign and domestic literature, which identify the origins of hypertension in adults, have shown that their formation occurs in childhood and adolescence. Hypertension is observed in 8-12% of school-age children and subsequently in 17-25% of adolescents it acquires a progressive course.

The prevalence of hypertension among adolescents in the United States is lower than in Russia, however, it has increased significantly over time and reached 4.5%. Among the factors that increase the risk of hypertension, special attention is paid to genetic aspects, chronic stress and physical inactivity, excess body weight, bad habits, some biochemical parameters that are indicators of early metabolic disorders in this pathology. The influence of previously established risk factors for CVD can explain the development of only 30-50% of cardiovascular pathology.

The authors noted that the most significant links in the pathogenesis of hypoxia are energy deficiency in cells, metabolic shifts, and changes in intraorgan blood flow.

The development of ultrastructural, metabolic, electrophysiological and a number of other disorders can lead to cell death. Information that more than half of newborns who have suffered perinatal hypoxia have myocardial ischemia is presented by many scientists.

This is explained by the fact that the cardiovascular system of a newborn, being an indicator of pathological processes, reflects the adaptive capabilities of the body.

An analysis of the literature has shown that various

diseases of the neonatal period lead to the development of hemodynamic disorders. Essentially, any factor that exceeds the functional potential of the autonomic nervous system in a child in terms of strength and duration can be considered as "stress" that contributes to the implementation of the syndrome of vegetative dysfunction and dysregulatory disorders of the cardiovascular system.

Experts have noted the fact that transient myocardial ischemia, developing in newborns with perinatal hypoxic damage to the central nervous system, significantly limits the functional capabilities of the heart muscle

Cardiac dysfunction may occur both in the acute period of perinatal damage to the nervous system and as late, delayed complications. Children with symptoms of post-hypoxic heart damage require dispensary observation by a cardiologist.

In the neonatal period, early diagnosis and timely treatment can prevent long-term adverse consequences of existing disorders, which determines the relevance of the problem of clinical and functional research in the field of neonatal cardiology.

The structure of cardiovascular pathology in children has recently undergone significant changes. As noted by the authors of the literature, a decrease in the proportion of rheumatic diseases and infectious lesions of the heart against the background of an increase in the frequency of congenital defects, rhythm disorders, cardiopathies and metabolic disorders in the myocardium.

In this regard, increasing attention is being paid to the factors that lead to the occurrence and progressive course of non-inflammatory cardiovascular lesions in children. Thus, it has been shown that ante- and intranatal hypoxia is a key etiopathogenetic link in the development of a number of pathological conditions affecting both the child's body as a whole, as well as the cardiovascular system. According to various authors, hypoxic damage to the cardiovascular system occurs in a significant number of newborns (40-70%) who have experienced perinatal hypoxia.

As clinicians note, the unfavorable impact of perinatal hypoxia on the cardiovascular system is based on disturbances in the neurohumoral regulation of the heart and blood vessels, including coronary vessels, energy depletion of cardiomyocytes and focal myocardial dystrophy, leading to disturbances in the processes adaptation of the cardiovascular system to extrauterine existence. However, at an early age, due to the complexity of the diagnostic and differential diagnostic process, cardiovascular pathology is often recognized untimely, which leads to more profound disorders in the future.

At the same time, the long-term consequences of hypoxic damage to the cardiovascular system in newborns can be quite serious and consist of the formation of focal cardiosclerosis, myocardial dystrophy, functional cardiopathy and electrical instability of the myocardium, contributing to the implementation of cardiac mechanisms, sudden infant death syndrome.

The combination of hypertension in adolescents with lipid, purine and carbohydrate metabolism disorders is especially unfavorable in terms of prognosis. Therefore, the factors of CVD development and their role in the formation of this pathology have been intensively studied recently.

In this regard, the role of changes in the vegetative status and the morphofunctional state of the cardiovascular system in the development and progression of hypertension in adolescents becomes obvious, especially starting from the moment of birth, for example, as hypoxic manifestations.

Foreign authors have noted the fact that post-hypoxic lesions of the cardiovascular system occupy one of the leading places in the structure of morbidity in newborns, occurring, according to various data, in 40-70% of children who have suffered intrauterine or perinatal hypoxia, and are the source of many, often serious, diseases in children and adults.

As noted by the authors of literary sources, to date the mechanisms of formation of post-hypoxic cardiac disorders are poorly studied and therefore a pressing problem in pediatric cardiology.

Clinical manifestations described by the authors, who note that post-hypoxic disorders of the cardiovascular system in newborn children often do not have clear specific manifestations, it is often necessary to conduct differential diagnostics with congenital heart defects, congenital carditis, cardiomyopathy.

Therefore, identifying the clinical, functional and biochemical features of cardiovascular disorders in newborns in stable and critical condition is of scientific interest. Further analysis of literary sources showed another interesting fact about pathologies, but now it was about lung pathology.

The bronchopulmonary system is formed during the intrauterine development of the embryo and fetus, as well as some time after the birth of the child. The occurrence of anomalies in the anatomical and morphological structure of the respiratory system organs, due to which their function suffers, can occur at any of these stages.

In the 3rd to 7th week of pregnancy, the embryo

develops the trachea, main bronchi, lobes and main lobes of the lung, and the pulmonary arteries develop. Damaging effects on the embryo at these times can lead to serious defects in these structures, including the absence or underdevelopment of the entire lung.

At 7-16 weeks, smaller bronchi are formed. Teratogenic effects during this period of pregnancy can cause developmental anomalies of segmental and subsegmental bronchi, and the development of congenital bronchiectasis.

At 16-28 weeks, acini are formed - structural units of the lungs, consisting of respiratory bronchioles and alveolar passages, which end in saccular protrusions. Gas exchange between the air and the baby's circulatory system will take place in the acini after birth. The influence of negative factors at this stage is dangerous due to underdevelopment of the lung tissue in the fetus.

Late intrauterine developmental defects of the bronchopulmonary system in the fetus can appear from the 6th-7th month of pregnancy, when the alveolar tissue of the lungs continues to develop. The respiratory system is finally formed by 4-8 years, so some defects can occur after the birth of the child.

As noted by experts, defects of the lungs and bronchi can be the result of developmental abnormalities at all stages of organ formation: between the 3rd and 6th weeks of embryonic development, when a tracheal diverticulum appears on the primary intestine, between the 6th and 16th weeks, when rapid division of the bronchi occurs, after the 16th week, when active formation of the alveolar apparatus begins.

Congenital hypoplasia and dysplasia of the lung (synonyms: Congenital cystic adenomatous malformation of the lung, CAML). A defect in which the terminal bronchioles grow to form cysts of varying sizes that do not affect the alveoli.

The lung tissue involved in the pathological process is supplied with air from the main respiratory tract through the narrow pores of Kohn, and with blood from the pulmonary artery. In almost all cases, the disease affects one lung (80-95%).

Congenital pulmonary sequestration (CP) is a developmental defect characterized by the fact that part of the lung tissue, usually abnormally developed and representing a cyst or group of cysts, is separated from normal anatomical and physiological connections (bronchi, pulmonary arteries) and is vascularized by arteries of the systemic circulation originating from the aorta. A mass of non-functioning embryonic or cystic tissue that has no connection with the functioning airways and is supplied with blood from the systemic circulation is called a sequestrum.

The incidence of this defect varies from 0.15 to 6.4% among all lung malformations. In almost all cases, the lesion is unilateral and located in the lower lobe of the lung; about 2/3 on the left.

Congenital pulmonary cyst (CLC) (synonyms: bronchogenic, bronchopulmonary, bronchial, air bronchogenic, etc.) is a developmental defect of one of the small bronchi and is a round, hollow, thin-walled formation lined from the inside with epithelium and containing mucous fluid or air. Congenital lobar emphysema can be caused by the following three developmental defects: 1) aplasia of the smooth muscles of the terminal and respiratory bronchi, in which there are no smooth muscle bundles and only single muscle cells; 2) absence of intermediate generations of bronchi; 3) agenesis of the entire respiratory section of the lobe. The changes consist of the absence of intralobular bronchi, terminal respiratory bronchioles and alveoli.

According to WHO, respiratory distress syndrome (RDS) occupies one of the leading places in the structure of perinatal mortality. The mortality rate of children with RDS, according to various authors, ranges from 35 to 75%. It is more common in premature babies, less common in full-term babies. K. A. Sotnikova points out that the term “respiratory distress syndrome” is conditional.

According to her definition, “respiratory distress syndrome refers to a special clinical condition of a newborn, which is characterized by the early onset (in the first 2 days of life) and often rapid increase in symptoms of respiratory failure against the background of significant suppression of vital functions of the body.”

One of the main causes of SDR is pneumopathy (hyaline membranes, atelectasis, extensive hemorrhages in the lungs, edematous-hemorrhagic syndrome, congenital malformations of the lungs, spontaneous pneumothorax) and intrauterine pneumonia In the pathogenesis, regardless of the cause that caused the SDR, the main significance is surfactant deficiency and obstructive syndrome, hypoxia, metabolic acidosis, metabolic disorders, leading to a change in homeostasis and dysfunction of the central and autonomic nervous system, endocrine and cardiovascular systems, and a violation of the relationship between

In the pathogenesis, regardless of the cause that caused the SDR, the main significance is surfactant deficiency and obstructive syndrome, hypoxia, metabolic acidosis, metabolic disorders, leading to a change in homeostasis and dysfunction of the central

and autonomic nervous system, endocrine and cardiovascular systems, and a violation of the relationship between ventilation and blood flow, suppression of immunity. Of great importance are the violation of the ratio between ventilation and blood flow in the lungs, increased vascular permeability. Deficiency of surfactant is currently given leading importance in pathogenesis.

It is believed that the surfactant system fully matures by the 35th-36th week of intrauterine development. In a child born before this time, the available reserves of surfactant ensure the onset of breathing, its deficiency leads to the collapse of the alveoli during exhalation, a sharp increase in the work of the respiratory muscles.

Due to the collapse of the alveoli, continuous gas exchange in the lungs does not occur, which leads to the development of hypoxemia and hypercapnia. Foreign and domestic authors of the literature note that endothelial dysfunction underlies the development of many cardiovascular diseases. It has now been proven that the vascular endothelium plays a an important role in the regulation of vasodilation and vasoconstriction, platelet adhesion, growth of vascular smooth muscle cells, including during pregnancy. Under the influence of hypoxia, infection and other damaging factors, the functioning of the endothelium, accompanied by the development of pathology on the part of organs and systems, including the cardiovascular system. However, literature data concerning the role of the endothelium in the development of cardiovascular pathology in newborns are few and concern mainly congenital heart defects.

In this regard, it is advisable to assess the functional state of the vascular endothelium in newborns with post-hypoxic disorders of the cardiovascular system in critical and stable conditions, as well as to assess the role of vascular endothelial dysfunction during pregnancy for antenatal prediction of these disorders.

Thus, at the end of our literature review we can say that the relevance of this problem in medicine remains in the first place.

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