PERINATAL LESION OF THE CENTRAL NERVOUS SYSTEM AND CARDIOVASCULAR FUNCTION IN YOUNG CHILDREN

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Conclusion: *In this article, we studied the relationship between perinatal damage to the central nervous system and the cardiovascular system in young children. It has been established that the literature does not sufficiently cover the results of a comprehensive study of the cardiovascular system in children with this pathology, including clinical methods, a complex of modern instrumental methods in the dynamics of the first year of life.*

Key words: *intrapartum hypoxia, central nervous system, physical, valve prolapse, children.*

ПЕРИНАТАЛЬНОГО ПОРАЖЕНИЯ ЦЕНТРАЛЬНОЙ НЕРВНОЙ СИСТЕМЫ И ФУНКЦИИ СЕРДЕЧНО-СОСУДИСТОЙ СИСТЕМЫ У ДЕТЕЙ РАННЕГО ВОЗРАСТА

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Аннотация: *В данной статье мы изучили взаимосвязь перинатального поражения ЦНС и сердечно-сосудистой системы у детей раннего возраста. Установлено, что в литературе недостаточно освещены результаты комплексного исследования сердечно-сосудистой системы у детей с данной патологией, в том числе клиническими методами, комплексом современных инструментальных методов в динамике первого года жизни.*

Ключевые слова: *интранатальная гипоксия, центральная нервная система, физикальный, пролапс клапана, дети.*

YOSH BOLALARDA MARKAZIY NERV TIZIMINING PERINATAL ZARARLARI VA YURAK, QON - TOMIR TIZIMI FUNKSIYASI

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Izoh: *Ushbu maqolada biz yosh bolalarda markaziy asab tizimining perinatal shikastlanishi va yurak-qon tomir tizimining o‘zaro bog‘liqligini o‘rgandik. Ushbu patologiyaga ega bo‘lgan bolalarda yurak-qon tomir tizimini kompleks o‘rganish natijalari, shu jumladan klinik usullardan tashqari, hayotning birinchi yilidagi*

dinamikada zamonaviy instrumental usullar majmuasi adabiyotda yetarli darajada yoritilmagani aniqlandi.

Kalit so‘zlar: *intrapartum gipoksiya, markaziy asab tizimi, jismoniy, qopqoq prolapsasi, bolalarВведение*

Over the last decade, there has been an increase in cardiac morbidity among newborns due to functional and borderline conditions [3; 6; 12]. It is known that adaptation of the body of a young child to environmental conditions is achieved as a result of an increase in the load on the cardiovascular system (CVS) [9].

According to literature data, after perinatal hypoxia, from 25 to 70% of newborns have signs of CVS damage [8]. The influence of perinatal hypoxia on the cardiovascular system is manifested not only by a direct negative effect on the cells of the myocardium and the conduction system of the heart, but also by indirect effects - through a violation of neurovegetative regulation [8; 10].

In acute intrapartum hypoxia, the leading role is played by immediate reflex reactions of the cardiovascular system with minimal metabolic disturbances. The unfavorable effect of intrapartum hypoxia is based, among other things, on a violation of the neurohumoral regulation of the heart and blood vessels, which contributes to the further occurrence of electrical instability of the myocardium and the implementation of cardiac mechanisms of sudden death syndrome (SDS) in children of the first year of life [2; 3; 5].

An acute drop in the partial oxygen tension in the fetal blood at the urgent stage of adaptation causes dilation of small arteries and arterioles in all vascular systems, with the exception of the pulmonary circle (PB), increased activity of the sympathetic division of the ANS, immediate release of catecholamines, transition to a hyperkinetic type of circulation (increased heart rate, IOC, BCC, venous return). The phenomenon of centralization of blood circulation is observed [2; 4].

There is an opinion that the development of preeclampsia in the mother is a risk factor for postnatal CV dysfunction, which can be predicted even before birth [8].

A large number of works are devoted to postnatal adaptation of the cardiovascular system of healthy full-term newborns and victims of perinatal hypoxia [5; 9]. However, most authors who pay attention to this problem cover it from the standpoint of hypoxic damage to the myocardium itself with the subsequent development of post-hypoxic cardiopathy, which has certain clinical and instrumental characteristics [1; 4; 9]. Increases in the levels of indicators such as CK-MB and brain natriuretic peptide can often be associated with physiological changes during the adaptation period [2].

At the same time, their increased content was found in umbilical cord blood in cases of congenital heart defects and intrauterine growth retardation and, in addition, can correlate with the results of echocardiography (Echo-CG). In addition, an increase in the activity of CPK-MB and natriuretic peptide (not studied in this work) may

accompany an increased load on the myocardium, indicate maladaptation of the CVS and persist in the blood from the antenatal period, during the neonatal period and further into older age [5; 9].

Within 1.5 months, the majority of children with moderate CI showed clear positive dynamics in the form of improved peripheral circulation, sonority of heart sounds, stabilization of heart rate, however, in almost 70% of patients a tendency to tachycardia appeared. At the same time, in children with severe CI by this age, clinical changes persist with slight positive dynamics [7].

Considering that chronic and acute perinatal hypoxia is a pathogenetically significant factor in the development of arrhythmias in newborns [3; 6], electrocardiography (ECG) has not lost its diagnostic value as a screening method that allows identifying rhythm and conduction disturbances, ischemic myocardial damage, hypertrophy or overload of the heart. ECG testing plays an important role in the early detection of CVS pathology and allows, at the preclinical stage, to identify children at risk and carry out preventive measures [2]. In children who suffered from hypoxia of varying severity, disturbances in rhythm, conduction, and repolarization processes were detected [5; 12].

Significant differences in ECG changes were noted depending on the method of delivery in children with CI [3]: the predominance of sinus bradycardia and repolarization disorders in children born by cesarean section, correlating with the severity of CI. There has been a high incidence of ST-T disorders and the occurrence of monotopic rhythm disturbances, mainly sinus tachycardia, in premature infants, regardless of the method of delivery [2].

The structure of rhythm disturbances in newborns with PCNSL is dominated by tach dependent forms, combined with processes of repolarization disturbance [7; eleven]. Sinus tachycardia reflects the activation of the sympathoadrenal system, as one of the adaptation mechanisms [3]. Less common are data on prolongation of the QT interval [7].

In clinical practice, there are available informative research methods that allow identifying cardiogenic life-threatening conditions and can give a reliable idea of physiological changes, including during sleep. These methods include daily Holter monitoring of ECG (HMECG), which is also the optimal method for assessing the autonomic regulation of heart rhythm in children of the first year of life [1;2; 8].

In children with moderate CNS PP, changes in Echo-CG and Doppler echocardiography (ECHO-CG) are observed in approximately a third of patients and are not severe. The bulk of the identified changes are minor anomalies of cardiac development (MAD). The nature and severity of disturbances in central, intracardiac and pulmonary hemodynamics are directly dependent on the degree of damage to the central nervous system: with severe damage to the central nervous system, a hypokinetic type of blood circulation is characteristic, with a moderate degree of severity - hyperkinetic. However, in 97.8% these changes are transient (from 23 to 38

days of life). Increased pressure in the pulmonary artery system is detected in 28% of patients who have undergone CI, PDA and valve prolapse - in 17 and 23%, respectively [7]. At the same time, by the age of 1.5 months, 57% show improvement or complete leveling of previously identified deviations from the norm.

When conducting Echo-CG, some children with PCNSL reveal transient dysfunction of the left ventricular (LV) myocardium, characterized by a decrease in contractile function and stroke volume (SV), disruption of the kinetics of the interventricular septum (IVS) and hypertension in the pulmonary artery system [10].

In children with PPCNS, the leading role in the structure of correlations in the formation of functional systems is played by the ANS. The search for the most effective methods for studying the activity of the ANS, capable of differentiating the activity of the sympathetic and parasympathetic divisions, led researchers to the development of a method for mathematical analysis of heart rate variability (HRV) [2].

Neurohumoral mechanisms of heart rate regulation are one of the most actively studied aspects of clinical cardiology, including early childhood cardiology. Heart rhythm reflects fundamental regulatory processes not only in the cardiovascular system, but also in the body as a whole, as it is the main marker of the state of autonomic regulation [5; 10].

For the purpose of preclinical diagnosis of CVS pathology and assessment of a person's adaptive capabilities, cardiointervalography (CIG) is widely used. According to numerous literature data, HRV, which reflects global regulatory processes in the body, can be used to predict postnatal adaptation of children who have suffered hypoxia [2; 6]. The results of CIG, indicating a violation of neurohumoral regulation in the form of a high tension index (TI), with excessive stress or, conversely, a decrease in TI below standard indicators with depletion of compensatory-adaptive reactions of the ANS, can serve as a criterion for assessing the severity of the condition [4; 11].

Depending on the clinical syndromes of central nervous system damage, the following points were determined: the highest activity level of the sympathetic division of the ANS was noted in benign intracranial hypertension (ICH), and the lowest in children with motor activity and attention deficit disorder (ADHD). At the same time, the highest level of activity of the parasympathetic division of the ANS was recorded in children with ADHD, and the minimum level was recorded in children with symptomatic seizures and situationally caused paroxysmal disorders. According to her data, children with a low tension index (TI) have a higher activity level of the parasympathetic division of the ANS.

Summarizing the above, it should be noted that, despite the large number of studies devoted to the study of PPCNS, the effect of cerebral ischemia on the function of the cardiovascular system in children in the dynamics of the first year of life is presented in separate publications, but the further development of cardiovascular function has not been sufficiently studied. The results of complex studies of CVS in children with this pathology, including, in addition to clinical ones, a

complex of modern instrumental methods, in the dynamics of the first year of life are not sufficiently covered in the literature and are often contradictory, which determines the relevance of the study.

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