

22. Gill, J.S. Reported levels of alcohol consumption and binge drinking within the UK undergraduate student population over the last 25 years / J.S. Gill // *Alcohol and Alcoholism*. – 2002. – Vol. 37, № 2. – P. 109–120.

23. Haorah, J. Reduction of brain mitochondrial β oxidation impairs complex I and V in chronic alcohol intake: the underlying mechanism for neurodegeneration / J. Haorah, T. J. Rump, H. Xiong. // *PLoS One*. – 2013. – Vol. 8 (8). – P. 8–85.

24. Igit T, Colcimen N. Stereological examination of effects of ethanol on optic nerve in experimental alcohol model //, 2019 May; 38(5):610-615. doi: 10.1177/0960327119828123. Epub 2019 Feb 11.

25. Keith L., Crabbe J., Robertson L., Young E. Ethanol dependence and the pituitary-renal axis in mice. II. Temporal analysis of dependence and withdrawal // *Life Sci.* – 2014. – Vol. 33, № 19. – P. 1889-1897.

26. Laas R. Neuropathology of chronic alcoholism / R. Laas, C. Hagel // *Clin. Neuropathol.* – 2009. – Vol. 19. – P. 252-253.

27. Tuksanova N. E. The Effect of Alcohol on the Structures and Vessels of the Brain. *International Journal of Health Systems and Medical Science* ISSN: 2833-7433 Volume 1 | No 5 | Nov-2022.

УДК 616.127

THE ROLE OF HYPOXIA IN THE FORMATION OF FUNCTIONAL MYOCARDIAL DISORDERS IN NEONATAL CEREBROCARDIAL SYNDROME

¹Tyagusheva E.N. <https://orcid.org/0000-0002-1193-3178>

¹Naumenko E.I. <https://orcid.org/0000-0002-5332-8240>

¹Vlasova T.I. <https://orcid.org/0000-0002-2624-6450>

¹*Federal State Budgetary Educational Institution of Higher Education «National Research Ogarev Mordovia State University», Medical Institute, Russia*

Resume Cerebrocardial syndrome is a disease characterized by a combination of CNS lesions and cardiac abnormalities, which is based on a violation of the central autonomic regulation of cardiac activity in perinatal hypoxic-ischemic CNS lesion. In this article, the main goal was to determine the effect of hypoxia in the formation of functional disorders of the myocardium in cerebrocardial syndrome of newborn children. To achieve the goal, 90 medical histories of premature newborns were analyzed. According to the results of laboratory and instrumental studies,

electrophysiological changes in the cerebrocardial syndrome according to the results in premature infants with ischemic-hypoxic central nervous system damage and intraventricular hemorrhages were maximally pronounced.

Keywords: myocardium, hypoxia, newborns, intraventricular hemorrhages, cerebrocardial syndrome

Introduction: The development of cardiovascular disorders in premature newborns may be caused by damage to the cerebral extracardial mechanisms of cardiovascular regulation in the absence of another etiology of heart and vascular damage - cerebrocardial syndrome (CCS). In most premature infants, a high stress index, an increase in the sympathetic and parasympathetic components of vegetative support are detected, and in some sick children, the depletion of adaptive mechanisms in the form of a low stress index is determined. Chronic intrauterine hypoxia causes a change in the vegetative status with a predominance of activity of the sympathetic part of the autonomic nervous system in the early neonatal period [1]. Registration of an electrocardiogram (ECG) and ECHO CG allows to reveal hypoxically mediated features of the formation of electrophysiological parameters of the myocardium in the neonatal period, violations of repolarization, vegetative imbalance in premature infants. The presence of hypoxia in the fetal body contributes to the development of intraventricular hemorrhages (IVH), which negatively affect the adaptation processes of the cardiovascular system. The source of the occurrence of IVH is the germinal matrix – a special embryonic tissue that is located in the sub-perpendicular region of the lateral, III and IV ventricles [2].

Purpose: To determine the significance of the severity of hypoxia in the development of functional myocardial disorders in premature newborns with cerebrocardial syndrome.

Materials and methods: A retrospective analysis of the results of laboratory (lactate) and instrumental (ECG, ECHO CG) methods of examination of 90 premature newborns who were at the MRCCB, Saransk was carried out. 2 groups were formed: I-the study group (n=50) of premature infants with ischemic-hypoxic (IG) damage to the central nervous system and with IVH and II-comparisons (n=40) of premature infants with IG without IVH. The average weight of children with IVH is $183,1 \pm 82,04$ g, without IVH $2119 \pm 100,23$ g.

Results and discussion: According to our data, the average heart rate values did not exceed the age norm and prevailed in group II newborns

(heart rate $136,7\pm 1,9$ and $149,9\pm 1,6$, $p=0,000001$). Due to hypoxic suppression of pacemaker activity of the sinus node and immaturity of the central mechanisms of regulation of heart rate, 22% of children with IVH had sinus bradycardia with a heart rate below 2 percentiles on average $83,5\pm 2,47$ beats/min, sinus tachycardia 31% of children. In group II newborns, sinus tachycardia was registered in 47%, $p<0,05$. In 3% of children with IVH, migration of the rhythm driver was observed. The duration of the intervals P ($0,063\pm 0,0033$, $p<0,005$), PQ ($0,0989\pm 0,001$, $p>0,05$) in children of group I is longer than in children of group II, although it does not exceed normal values, and the duration of the QRS interval is slightly shorter in children with IVH than in children without IVH. The duration of the QT interval is an indicator of the electrical stability of the myocardium on the ECG. According to our data, the duration of the electrical systole was QT 0.261 ± 0.0031 and QTc 407.45 ± 5.36 in group I more than in group II $0,251\pm 0,0023$ and QTc $394,1\pm 6,08$ ($p=0,011$, $p=0,015$, respectively). QTs exceeded the norm and reached 490 ms and 487 ms, respectively, in 16% of children ($n=8$) with IVH and 2,5% without IVH. Changes in the terminal part of the ventricular complex- ST-T - are most characteristic of the CCS. According to our data, ST segment elevation was observed in 26% of group I children and only in 8% of group II ($p<0,05$). ST-segment depression was registered less frequently - in 9% of children with IVH and in 1 child without IVH. Ischemically mediated changes in the amplitude and polarity of the T wave were recorded in the group of children with IVH. Isoelectric wave T in I, II, V5, V6, less often in AvF leads was registered more often in children of group 1 (28%) than in children of the comparison group (16%, $p<0,05$). Positive T wave in V1 in 48% of children of both groups in the first three days, which reflects overload of the right ventricle, more often in children with IVH ($p<0,05$). Electrophysiological disorders of excitability and conduction were manifested by single supraventricular extrasystoles in 7% (group I-5%, group II-1%), violation of intraventricular conduction by the type of blockade of the right leg of the His bundle (PNPG) in 32% of premature infants. 5% of group I children had a complete blockade of PNPG.

According to the results of ECHOCG, the sizes of all cavities corresponded to age norms in both groups. However, in newborns with IVH, the average myocardial contractility is lower ($57,7\pm 1,15$) than in children without IVH ($66,6\pm 1,34$, $p=0,00000$), as well as ΔS (%) $31,6\pm 0,89$ and $35,9\pm 0,44$ ($p=0,00000$). Violation of LV diastolic myocardial function

was registered in 36% of children in the study group, whereas in the comparison group only in 10% ($p < 0,05$). The main manifestation was the predominance of atrial blood flow ($E/A < 1$). 35 (70%) children of group 1 had pancreatic diastolic dysfunction ($p < 0,01$), less often - in 30% of children-diastolic dysfunction of both ventricles. Metabolic acidosis plays an important role in the genesis of myocardial damage, which negatively affects the state of the vascular endothelium. As a result, conditions arise that contribute to the violation of the microcirculation of organs, including the myocardium [3]. This is accompanied by interstitial edema and deterioration of the metabolism of metabolites and gases between the cell and the circulating blood. In premature infants with IVH, the severity of metabolic disorders was maximal, the lactate level was higher than in children of group II ($p < 0,05$).

On the 5th-7th day of life, dynamic instrumental and biochemical studies were carried out-improvements in ECG and blood lactate indicators were observed. The registration of sinus bradycardia in group I children decreased by 3 times. On the contrary, sinus tachycardia persisted, the migration of the rhythm driver was not recorded. ST-T disorders persisted in 14% of children of group I and 7,5% of group II.

Conclusions: Thus, the severity of electrophysiological manifestations of cerebrocardial syndrome in premature newborns correlated with the severity of hypoxia according to ECG results. With IG damage to the central nervous system and IVH, functional disorders of the myocardium were maximal.

List of literature:

1. Anuryev A.M., Gorbachev V.I. Hypoxic-ischemic brain lesions in premature newborns. Journal of Neurology and Psychiatry named after S.S. Korsakov. Special issues. 2019;119(8-2):63-69.

2. Levchenko L.A., Prityko A.G. HYPERTENSIVE-HYDROCEPHALIC SYNDROME IN PREMATURE NEWBORNS IN THE PRACTICE OF A PRIMARY CARE PHYSICIAN (literature review): Medical and social problems of the family. 2019. 24(1):5-13.

3. Filyushkina M.N., Tarasova A.A., Efimov M.S., Chabaidze Zh.L., Ehrlich A.L. Features of the morphofunctional state of the heart in premature infants (literature review): Bulletin of the RNCRR. 2014. 3:7-21.