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CHARACTERISTICS OF HEMOSTASIS DEPENDING ON HEMORRHAGIC AND ISCHEMIC BRAIN DAMAGE IN PREMATURE NEWBORNS

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RESUME

In this article, some indicators of the hemogram in premature newborns are studied. The analysis and comparison of the obtained indicators in children with hemorrhagic and ischemic lesions of the central nervous system was carried out. Small distinctive features were revealed in intraventricular hemorrhage and cerebral ischemia.

Key words: premature birth, gestational age, hemostasis, neurological status.

In recent decades, due to significant advances in neonatology and the improvement of perinatal care, the number of surviving newborns with a short gestation period has increased. However, the severity of neurological consequences in these children decreased slightly, and it is premature babies who have a significant degree of serious neurological pathology (O.N. Malinovskayaandco-authors 2005). Therefore, at present, the criteria for success should be considered not only the survival of the child, but also the possibility of its subsequent normal development (A.A. Baranov, 2001).

Changes in the hemostatic system play a significant role in the complex of pathogenetic mechanisms of perinatal damage of the central nervous system, among which the most threatened is the disseminated intravascular coagulation syndrome (DIC), accompanied by thrombo-hemorrhagic manifestations of mixed genesis.

In children from high perinatal risk groups, studies in this direction can determine some clinical and pathogenetic aspects of the features of vascular adaptation, the formation of endothelial dysfunction, and hemodynamic disorders, depending on the state of the hemostatic system, which is the basis for the criteria for predicting the health status of this contingent of children [2, 3, 7]. These changes are particularly significant for the central nervous system, since in the conditions of chronic hypoxemia, which the fetus experiences with pronounced changes in the placenta, the morphofunctional state of the vascular-capillary network of the brain is disturbed, which contributes to changes in nerve cells [5, 6, 8].

Objective: evaluation of characteristic changes in hemostasis in premature newborns with hemorrhagic and ischemic brain damage among premature newborns.

Materials and methods:60 newborns with gestational age from 27 to 37 weeks during 4 weeks of life were examined. Prior to the study, a voluntary informed consent was obtained from the parents for the children to participate in the study. Parents were warned about possible complications. To prevent complications, blood sampling was carried out by specially trained personnel in sterile conditions. The study included children with signs of cerebral ischemia (CI) or intraventricular hemorrhage (IVH) during neurosonographic examination, and was divided into two groups.

The examined children were admitted to the department from maternity hospitals and intensive care units. 19% of children were in the intensive care unit within 1-2 weeks of life due to severe respiratory failure at birth and severe depression and convulsive syndrome. Four children were on a ventilator. After the stabilization of the condition, all the children were transferred to the children's department for the 2nd stage of nursing. All the examined children were in the hospital for at least 4 weeks. As they recovered, all the children were discharged home.

During the initial examination of the child, the mother's anamnesis, the course of pregnancy and childbirth were studied. Clinical examination of newborns was carried out upon admission to the department, then daily.

Instrumental methods of research-neurosonography, conducted 1 time per week. The results of the survey conducted earlier in other institutions were also taken into account.

Laboratory examination of all children was carried out 4 times at 1, 2, 3 and 4 weeks of life. The following parameters were studied: fibrinogen, prothrombin time(PT), activated partial thromboplastin time (APTT).

From the methods of parametric statistics, the Student's criterion t was used to estimate quantitative continuous quantities under normal distribution. The value was considered reliable at $p<0.05$. To assess the correlation relationship, the Spearman method was used [4].

The results of the study. Most of the children were born to mothers with a complicated somatic and obstetric-gynecological history. Most often, pregnancy occurred against the background of exacerbation of chronic pathology, such as chronic tonsillitis, chronic pyelonephritis. Children with a gestation period of 30 weeks or less were born mainly from 3 pregnancies and 2 births.

In severe asphyxia with Apgar score of 1-3 scores at 1 minute were born 3 children, mid-weight rating 4-5 points 13 people and 44 children in asphyxia easy level assessment 6-7-8 points.

Neurosonography examination (NSG) revealed signs of IVH in 14 newborns. In 5 newborns of 30 weeks of gestation or less, signs of IVH were noted in the first week of life and in 2 children at the age of 2 weeks of life. Only in one child, intraventricular hemorrhage corresponded to a clinical deterioration in the form of an increase in the depression syndrome at the age of 10 days of life. At an older gestational age, signs of IVH in NSH were registered on the 2nd and 4th day of life in 5 and 2 children, respectively. These changes were interpreted as the consequences of hypoxia [3].

IVH was more often detected in children with extremely low body weight, as well as those born on 1-3 points on the Apgar scale. No signs of thrombosis were found in any of the children. In children of older gestational age, signs of ischemia were more often observed in the NSG study.

When analyzing the parameters of the coagulogram, higher values of the studied parameters were revealed during the 4 weeks of the examination in children with ischemic brain damage and gestation period of less than 33 weeks.

Table

Average values of hemostasis parameters in the dynamics of observation

Indicator	The value of the indicator at 1 week of life	The value of the indicator for 2 weeks of life	The value of the indicator at 3 weeks of life	The value of the indicator at the 4th week of life
PT				
IVH	11,8±0,2	12,0±0,1	12,4±0,2	12,3±0,1
ЦИ	12,8±0,1	12,6±0,2	12,6±0,1	12,5±0,1
Fibrinogen				
IVH	1,8±0,04	2,1±0,03	2,3±0,02	2,3±0,02
CI	2,0±0,01	2,2±0,02	2,6±0,02	2,9±0,03
aPTT				
IVH	43,8±2,3	39,0±2,5	44,0±3,1	44,5±2,5
CI	50,6±2,4	40,4±2,1	52,5±2,6	51,2±3,2

The normative indicators typical for premature newborns differ from adults. Therefore, the comparison of values should be carried out taking into account the gestational age and knowledge about the features of fetal hemostasis [2]. The obtained data are comparable with the known values. However, it is impossible to exclude the influence of inflammatory processes on the hemogram, such as pneumonia, a frequent companion of a premature newborn.

Conclusions:

1. IVH is more often observed in children less than 32 weeks of gestation, with extremely low body weight and born with an Apgar rating of severe asphyxia.

2. The study revealed higher values of coagulogram parameters in children with cerebral ischemia and in infants of younger gestational age.

3. The relative shift towards hypocoagulation can be caused by the course of pneumonia, especially in children of early gestation.

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