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INDICATORS OF THE DYNAMICS OF PERINATAL HYPOXIA IN NEWBORNS

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ПОКАЗАТЕЛИ ДИНАМИКИ ПЕРИНАТАЛЬНОЙ ГИПОКСИИ У НОВОРОЖДЕННЫХ

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Abstract. A comprehensive study of clinical and neurological changes in newborns in the relationship between the nature and duration of perinatal hypoxia (PH) was carried out. To assess the state of clinical and neurological changes, 52 newborns who underwent perinatal hypoxia were examined. The anamnesis of mothers who underwent combined perinatal hypoxia was significantly worse than in the group of children with acute asphyxia. Anemia, acute respiratory viral infection (ARVI), preeclampsia, fetoplacental insufficiency (FPI), the duration of the anhydrous interval, pathological childbirth served as predisposing factors contributing to the development of perinatal hypoxia. For an objective quantitative assessment of the dynamics of the neurological status of newborns, the "Scoring of the severity of perinatal encephalopathy", developed at the Research Institute of Pediatrics of the Russian Academy of Medical Sciences by A.A. Stepanov (1998), was used. It is based on an integrated assessment of motor activity, innate reflexes and behavioral reactions of newborns, taking into account the quantitative characteristics of each newborn. The data obtained indicate that the duration of hypoxia, the state of health, the course of pregnancy and childbirth in the mother determine the severity of perinatal brain damage and affect the severity of clinical and neurological patterns. Combined perinatal hypoxia leads to deeper brain disorders and contributes to the formation of two or more syndromes in one child.

Аннотация. Проведено комплексное изучение клинико-неврологических изменений у новорожденных в зависимости от характера и длительности перинатальной гипоксии (ПГ). Для оценки состояния клинико-неврологических изменений обследовано 52 новорожденных, перенесших перинатальную гипоксию. Анамнез матерей, перенесших сочетанную перинатальную гипоксию, был достоверно хуже, чем в группе детей с острой асфиксией. Предрасполагающими факторами, способствующими развитию перинатальной гипоксии, служили анемия, острая респираторная вирусная инфекция (ОРВИ), гестоз, фетоплацентарная недостаточность (ФПН), длительность безводного периода, патологические роды. Для объективной количественной оценки динамики неврологического статуса новорожденных используется «Шкала тяжести перинатальной энцефалопатии», разработанная в НИИ педиатрии РАМН А. А. Степанов (1998). Он основан на комплексной оценке двигательной активности, врожденных рефлексов и поведенческих реакций новорожденных с учетом количественных особенностей каждого новорожденного. Полученные данные свидетельствуют о том, что продолжительность гипоксии, состояние здоровья, течение беременности и родов у матери определяют тяжесть перинатального поражения головного мозга и влияют на выраженность клинико-неврологической картины.

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Сочетанная перинатальная гипоксия приводит к более глубоким мозговым нарушениям и способствует формированию двух и более синдромов у одного ребенка.

Keywords: clinic, neurology, newborn, perinatal, hypoxia.

Ключевые слова: клиника, неврология, новорожденный, перинатальный, гипоксия.

The development of perinatal lesions of the central nervous system is based on numerous factors that affect the condition of the fetus during pregnancy and childbirth and the newborn in the first days of his life, causing the possibility of developing various diseases both in the first year of a child's life and at an older age [2-4, 6]. Intrauterine intoxications and infections, in addition to clearly defined, specific metabolic and infectious disorders, also have a nonspecific damaging effect on the fetal nervous system, leading to impaired uteroplacental blood flow and the development of chronic intrauterine hypoxia. In turn, in traumatic childbirth, in addition to direct mechanical damage to brain structures, situations can arise that lead to disruption of vertebrobasilar blood flow, the development and intensification of cerebral ischemia and hypoxia. [3, 5, 6].

In newborns with hypoxic-ischemic encephalopathy, a state of moderate severity was observed at birth and subsequent violations of the period of early adaptation. Hypoxic-ischemic encephalopathy in newborns was manifested by excitation syndrome (53.4%) and CNS depression syndrome (46.6%). Newborns with hypoxic-ischemic encephalopathy are characterized by hypoxic damage to the cardiovascular system, which was confirmed by persistent tachycardia, arrhythmia, signs of hypertrophy, and moderate changes in the ventricular myocardium. Neurosonography in infants with hypoxic-ischemic encephalopathy often reveals signs of immaturity, subependymal cysts and choroid plexus cysts, periventricular hemorrhages in the lysis stage [9]. Neurological disorders are detected in 25% of surviving full-term infants with severe HIE [8]. For the diagnosis of hypoxic-ischemic encephalopathy (HIE) in newborns, clinical characteristics are used, based on the use of standard neurological scales, which make it possible to distinguish between normal and deviant neurological status, the prognostic assessment of which is about 15%. At the same time, the involvement of anemic syndrome in the severity of perinatal CNS damage remains poorly understood [7].

Material and research methods

The work was carried out on the basis of the State Children's Clinical Hospital No. 1 in Tashkent. The studies were carried out in 52 newborns. Depending on the course, clinic and CNS lesions, according to the duration and nature of hypoxia, newborns were divided into 2 groups.

Group 1, who underwent acute asphyxia and Group 2, combined perinatal hypoxia. When examining children, the somatic and neurological status was assessed daily throughout the entire period of inpatient treatment. For an objective quantitative assessment of the dynamics of the neurological status of newborns, the "Scoring of the severity of perinatal encephalopathy" was used, developed at the Research Institute of Pediatrics of the Russian Academy of Medical Sciences A. A. Stepanov (1998) [1]. It is based on an integrated assessment of motor activity, innate reflexes and behavioral reactions of newborns, taking into account the quantitative characteristics of each newborn. The coefficient k was calculated individually at admission, after 5-8 days of treatment and before discharge (satisfactory condition at $k<0.5$; moderate $0.6<k<1.0$; severe at $k>1.0$).

Clinical analyzes of blood, urine, feces, bacteriological studies were carried out weekly according to the indications of X-ray examination.

Results

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The study of the health status of mothers, children examined by us showing that mothers whose children had suffered acute asphyxia were more likely to have anemia (46.1%) and pathology of the birth act (30.7%), and in mothers of children who had combined PH, in in anamnesis, preeclampsia (57.6%), anemia (57.6%), acute respiratory viral infections (73%), infections of the genitourinary sphere (57.6%), pathological births (46.1%), FPI (46.1%)).

In the process of monitoring the children of the 1st group, it was revealed that acute asphyxia caused more neuro-reflex excitability (75%). At the same time, in newborns, the clinic was manifested by general anxiety, spontaneous large-scale nystagmus, increased muscle tone of the flexors, high knee reflexes, increased proboscis reflex, Babinsky, Moreau reflexes. Against this background, there was a decrease in protective, search and sucking reflexes, as well as support reflexes, automatic walking and crawling. The condition of these children upon admission to the neonatal pathology department was assessed as k>1.0

Table 1

CLINICAL AND NEUROLOGICAL CONDITION
IN NEWBORNS WITH PERINATAL HYPOXIA (M ±m), n=26

Index	*1 group*	*2 group*
Scream	6,5±0,5	12±1,3
Unconditioned, tendon, behavioral reflexes	10,3±0,5	16±1,3
Cyanosis	10±0,6	15,3±1,3
Suction	5,8±0,2	12±1,3
Regurgitation	6,3±0,4	9,2±1,0
Tachycardia	6,5±0,5	9,2±3,6
Bradycardia	5,2±0,4	10,6±1,3
Violation of thermoregulation	5,6±0,4	8,9±1,1
Bed days	10,3±0,5	16±0,8

In newborns who underwent combined PH, hypertensive-hydrocephalic syndrome was more often noted (30.7%), signs of CNS depression were detected from birth, which, as ventriculomegaly developed, gradually transformed into symptoms of hypertension. Newborns of this group had CNS depression syndrome (15.3%) on the first day of life. The clinic was manifested by a state of general depression, intermittent convergent or divergent strabismus, medium- and large-scale horizontal and vertical nystagmus, muscle hypotension, hyporeflexia, and inhibition of all reflexes. On examination, attention is drawn to an increase in flexor muscle tone, a sharp weakening, soreness in children, a monotonous cry, pronounced marbling of the skin, diffuse cyanosis at rest, a weak sucking reflex or lack thereof, regurgitation with a fountain, vomiting, persistence of oculomotor and autonomic disorders. These newborns are characterized by frequent large-scale tremor of the limbs, lability of the pulse and respiration. Their condition upon admission to the intensive care unit (ICU) was regarded as very serious (k>1.5).

The clinical characteristics of children of the 1st group shows that the neonatal period may be complicated by bronchopneumonia in 31.4%, omphalitis in 11.5%, anemia in 19.2% of newborns. Newborns who underwent combined PG developed generalized forms of infection. At the same time, sepsis (34.6%), bronchopneumonia (75%), omphalitis (23%), anemia (80.7%), nonspecific enterocolitis (NEC) (34.6%) were observed, in 2 children - a condition from the first minutes of life was assessed as very difficult, against the background of artificial lung ventilation (ALV), hyperalized tonic convulsions in the form of decerebrate rigidity were noted, resulting in death. The examination revealed a decrease in hemoglobin, because in case of purulent-septic diseases, the blood thickens as a result of the ingress of the liquid part of the blood into the tissues. In this case,

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when the total (absolute) number of red blood cells decreases, the relative number increases. Therefore, the relative content of hemoglobin in the amount of analyzed blood on the days of arrival of children was high.

Table 2

LABORATORY TESTS IN CHILDREN WITH PERINATAL HYPOXIA (n=26)

Index	*Groups*		
	1 group	*2 group*	*p*
Hemoglobin<100: on admission	144±8,2	148±10,2	0>0,5
After 5-8 days	105±4,3	89,9±4,8	0>0,5
Leukocytes: $*10^9$on admission	12,4±0,6	16,0±0,7	0<0,1
After 5-8 days	9,7±0,6	12,1±0,7	0<0,1

During neurological examination of newborns, ultrasound examination of the brain in real time. Conducted on the sagittal and frontal surfaces of the brain. The study of the neurological status in newborns who underwent acute asphyxia according to brain ultrasound data was characterized by increased echo density in the periventricular zones, ventriculodilatation of the lateral ventricles, and for newborns who underwent combined perinatal hypoxia, an increase in overall echogenicity, narrowing of the ventricles, cerebral edema. The neurosonographic revealed changes correlated with the severity of perinatal lesions of the central nervous system (CNS) and the severity of infectious inflammatory diseases (IID) in them. The data obtained indicate that the duration of hypoxia, the state of health, the course of pregnancy and childbirth in the mother determine the severity of perinatal brain damage and affect the severity of clinical and neurological patterns. Combined perinatal hypoxia leads to deeper brain disorders and contributes to the formation of two or more syndromes in one child.

Conclusions:

1. The duration and nature of the transferred perinatal hypoxia determine the severity of perinatal brain damage, affect the severity of neurological symptoms in newborns.

2. For a quantitative assessment of the dynamics of the clinical and neurological status, it is recommended to use a scoring test for newborns who have undergone PH.

3. Newborns who have undergone combined hypoxia should be included in the high risk group for the development of IVZ.

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