DOI: 10.38095/2181-466X-20241131-66-68 UDK 616.8-091.93-616-073.4-8.053.31

FEATURES OF NEUROSONOGRAPHY IN NEWBORNS WITH ACUTE AND CHRONIC HYPOXIA

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Key words: hypoxia, asphyxia, lateral ventricles, depth of the anterior horns, intraventricular hemorrhage, cerebral edema.
Tayanch so‘zlar: gipoksiya, asfiksiya, lateral qorinchalar oldingi shoxlarining chuqurligi, intraventrikulyar qon quyilishi, bosh miya shishi.
Ключевые слова: гипоксия, асфиксия, глубина передних рогов боковых желудочков, внутрижелудочкокое кровоизлияние, отёк мозга.

The authors carried out ultrasound examinations of the central nervous system in newborns with perinatal lesions of the nervous system. It was revealed that children born to mothers with burdened obstetric anamnesis and pathological course of childbirth are a risk group for perinatal damage to the nervous system. For early detection of changes in brain structures, neurosonographic studies of the central nervous system are recommended for all newborns at risk group.

O‘TKIR VA SURUNKALI GIPOKSIYA O‘TKAZGAN YANGI TUG‘ILGAN CHAQALOQLARDA NEYROSONOGRAFIYA XUSUSIYATLARI

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Mualliflar asab tizimining perinatal zararlanishlari bo‘lgan yangi tug‘ilgan chaqaloqlarda markaziy asab tizimining ultratovush tekshiruvini o‘tkazdilar. Aniqlanishicha, og‘ir akusherlik anamnezi va tug‘riqning patologik kechishini o‘tkazgan onalardan tug‘ilgan chaqaloqlarda asab tizimining perinatal zararlanishi bo‘yicha xavfi guruhiga kiradi. Bosh miya tuzilmalaridagi o‘zgarishlarni erta aniqlash uchun xavf guruhiga kiruvchi barcha yangi tug‘ilgan chaqaloqlar uchun markaziy asab tizimining neyrosonografik tekshiruvi tavsiya etiladi.

ОСОБЕННОСТИ НЕЙРОСОНОГРАФИИ У НОВОРОЖДЕННЫХ, ПЕРЕНЕСШИХ ОСТРУЮ И ХРОНИЧЕСКУЮ ГИПОКСИЮ

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Авторами проведены ультразвуковые исследования центральной нервной системы у новорожденных с перинатальными поражениями нервной системы. Выявлено что, дети рожденные от матерей с отягощенным акушерским анамнезом и патологическим течением родов являются группой риской по перинатальному поражению нервной системы. Для раннего выявления изменений структур головного мозга рекомендуется нейросонографическое исследования центральной нервной системы всем новорожденным группы риска.

Perinatal hypoxia occupies a prominent place among perinatal factors that affect not only the fetus's condition but also the characteristics of the neonatal period, ultimately impacting the child's health and future development [1]. More than half of all cases of central nervous system (CNS) dysfunction in infants are attributed not to acute hypoxia during childbirth but to prolonged, chronic hypoxia in the fetus and newborn [2,3]. This pathology takes a leading role among perinatal brain injuries and cerebrovascular pathology. One of the primary causes of hemorrhagic and ischemic brain injuries is cerebral hemodynamic disturbances [4]. Hypoxia is recognized as the primary etiological factor in perinatal nervous system pathology, cerebral vascular disorders, and leads to the development of hemorrhagic and ischemic CNS injuries in newborns [4,5].

The aim of this study is to investigate the clinical manifestations and neurosonography features in newborns with perinatal nervous system injuries.

Materials and methods. A total of 60 newborns with various gestational ages and perinatal nervous system injuries were observed in the Physiological and Neonatal Intensive Care Department of the Samarkand Regional Perinatal Center.

The criteria for including children in the study groups were as follows: Group I consisted of 20 healthy newborns born to healthy mothers aged 21 to 33 years, with no complicated obstetric history, and a normal course of pregnancy and delivery.

The second group consisted of 20 children who experienced acute asphyxia during childbirth but were born to healthy mothers. The causes of acute hypoxia were as follows: cesarean section (5); umbilical cord entanglement around the neck (5); prolonged labor (7); foot and breech presentation (3). Group II comprised 20 newborns born to healthy mothers who experienced acute as-

phyxia during childbirth, with Apgar scores averaging below 6-7 points. The clinical picture manifested as a syndrome of increased neuro-reflex excitability characterized by regurgitation, sleep disturbances, chin tremors, restlessness, spontaneous Moro reflex (phase I), and a syndrome of depression characterized by muscle hypotonia, hypodynamia, weak suckling, horizontal nystagmus, and gastrointestinal dyskinesias.

The third group included 20 newborns who experienced chronic intrauterine hypoxia. The causes of chronic intrauterine hypoxia were severe anemia (5); exacerbation of chronic pyelonephritis with severe preeclampsia (5); elevated blood pressure and edema (4); threatened abortion and vomiting in pregnant women (4); prolonged gestosis (1); complete low fetal presentation (1). This group exhibited low Apgar scores of 1-3 points, a complicated obstetric-gynecological history, and more pronounced signs of immaturity. When studying neurological symptoms in these children, there were observations of no reaction to examination and painful stimuli, adynamia, areflexia, atony, a sluggish or absent pupillary reaction to light, sometimes localized ocular symptoms. The skin was cyanotic, pale with a "marble shade" (indicative of microcirculation disturbances). Spontaneous breathing was shallow, with intercostal retraction. Heart sounds were diminished, and moderate hepatomegaly was palpable.

The diagnosis of perinatal encephalopathies, depending on the nervous system lesions, was established according to the classification of perinatal nervous system injuries in newborns by Sarnat and Sarnat in 1976.

The structural ultrasound examination of the brain using B-mode (neurosonography) was performed on the GE Logic F 8 device (USA) with the use of multi-frequency convex probes of 5.5 MHz.

Statistical data analysis was carried out using specialized SPSS software (version 29, IDV Co., Armonk, NY, USA).

Results and discussion. During the analysis of neurosonography parameters, including the depth of the anterior horns (right and left) and the depth of the lateral ventricles (right and left), in healthy newborns and in newborns with acute and chronic hypoxia, significant alterations were identified, demonstrating statistically significant differences. Conversely, data for the parameters of the third and fourth ventricles in healthy infants and with acute or chronic hypoxia did not exhibit statistical variance.

Specifically, the depth of the right anterior horn of the lateral ventricles in healthy subjects was 0.3 cm, while in cases of acute asphyxia, it averaged 0.388 ± 0.100 cm, with statistical significance ($p \leq 0.05$), and in instances of chronic hypoxia, it measured 0.418 ± 0.124 cm ($p \leq 0.05$). On the left side, the depth of the anterior horns of the lateral ventricles was 0.3 cm in healthy subjects, 0.388 ± 0.103 cm in cases of acute asphyxia ($p \leq 0.05$), and 0.437 ± 0.133 cm in cases of chronic hypoxia, all showing statistical differences ($p \leq 0.05$).

1 table.

Comparative characteristics of neurosonography parameters in newborns(M±m).

№	Variables / Groups of examined patients		Healthy newborns n=20	Acute hypoxia n=20	Chronic hypoxia n=20
1	The depth of the anterior horns of the lateral ventricles	Right (sm)	0,3±0,000	0,388±0,100 p≤0,05	0,418±0,124 p1≤0,05, p2>0.5
		Left (sm)	0,3±0,000	0,388±0,103 p≤0,05.	0,437±0,133 p1≤0,05, p2>0.5
2	The depths of lateral ventricles	Right (sm)	0,300±0,000	0,426±0,134 p≤0,05	0,448±0,172 P1≤0,05, p2>0.5
		Left (sm)	0,300±0,000	0,417±0,147 p≤0,05	0,425±0,185 p1≤0,05, p2>0.5
3	III ventricle (sm)		0,450±0,000	0,515±0,124 p>0.5	0,492±0,173 p1>0.5; p2>0.5
4	IV ventricle (sm)		0,460±0,000	0,461±0,101 p>0.5	0,462±0,111 p1>0.5 p2>0.5;

Note: "P" stands for the significance of the differences between healthy and acute hypoxia groups.
"P1" stands for the significance of the differences between healthy and chronic hypoxia groups.
"P2" stands for the significance of the differences between the acute and chronic hypoxia groups.

The depth of the lateral ventricles' bodies on the right side in healthy newborns was 0.3 cm, whereas in cases of acute asphyxia, it averaged 0.426 ± 0.134 cm with statistical significance ($p \leq 0.05$), and in instances of chronic intrauterine hypoxia, it measured 0.448 ± 0.172 cm ($p \leq 0.05$). On the left side, the depth of the lateral ventricles' bodies was 0.3 cm in healthy subjects, 0.417 ± 0.147 cm in cases of acute asphyxia ($p \leq 0.05$), and 0.425 ± 0.185 cm on average in cases of chronic intrauterine hypoxia ($p \leq 0.05$). Conversely, the parameters of the third and fourth ventricles in healthy newborns and in children with acute asphyxia and chronic hypoxia did not exhibit statistically significant differences (1 table).

During neurosonography in Group II newborns, the following findings were observed: 1st-degree lateral ventricular dilatation (LVH) in 4 newborns (20%); ventriculomegaly in 6 newborns (30%); hypoxic changes in the basal ganglia and periventricular area in 9 newborns (45%), and one newborn without pathology (5%).

The ultrasonographic picture in Group III was characterized by immaturity of brain structures in 2 newborns (10%), hypoxic changes in the basal ganglia and periventricular area in 4 newborns (20%), ventriculomegaly in 6 newborns (30%), 1st to 2nd-degree lateral ventricular dilatation (LVH) in 6 newborns (30%), brain edema in one newborn (5%), and a pseudocyst of the cerebral ventricles in one newborn (5%).

Conclusions. Therefore, infants born with chronic intrauterine hypoxia and acute birth asphyxia are at risk of perinatal nervous system damage. To facilitate early detection and timely staged treatment of infants with hypoxic nervous system damage, it is recommended to perform neurosonography of the brain structures for all newborns in the risk group.

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