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# CLINICAL-DIAGNOSTIC AND PATHOGENETIC CHARACTERISTICS OF CEREBRAL DISORDERS IN PREMATURE NEWBORNS

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**Abstract**
The article presents the results of an analysis of the clinical and diagnostic features and pathogenetic mechanisms of cerebral disorders in premature newborns. The leading risk factors, morphofunctional changes in the central nervous system (CNS), early diagnostic methods, and modern therapeutic approaches are discussed. It has been shown that a combination of hypoxic-ischemic, infectious-inflammatory, and metabolic factors plays a key role in the formation of neurological dysfunctions. Particular attention is paid to the importance of neurosonography and magnetic resonance imaging (MRI) in the early diagnosis of brain lesions.

**Keywords**: Premature newborns; cerebral disorders; periventricular leukomalacia; hypoxia; neurosonography; pathogenesis; early diagnosis.

## Introduction

### Aim of the Study

To study the clinical and diagnostic characteristics and pathogenetic mechanisms of cerebral disorders in premature newborns, as well as to identify the main risk factors and approaches for early diagnosis and treatment.

### Research Objectives

- To analyze the main forms of cerebral lesions in premature infants and their clinical manifestations.
- To identify the leading pathogenetic factors that contribute to the development of cerebral dysfunction in preterm newborns.
- To evaluate the diagnostic value of neurosonography and MRI in detecting early cerebral damage.



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• To determine effective therapeutic and rehabilitation strategies for improving neurological outcomes.

**Scientific Novelty**

The study highlights the combined effect of hypoxic-ischemic, inflammatory, and metabolic factors in the development of cerebral disorders in premature infants. It emphasizes the role of early neuroimaging (neurosonography and MRI) as a key diagnostic tool for detecting periventricular leukomalacia and intraventricular hemorrhage. The research also underlines the importance of an integrated pathogenetic and clinical approach in developing preventive and neuroprotective strategies for premature newborns.

**Practical Significance**

The results of this study can be used in clinical neonatology and pediatric neurology to improve early detection, diagnosis, and treatment of cerebral disorders in premature infants. Implementing standardized neurosonographic screening and modern neuroprotective therapy can reduce the frequency of severe neurological complications, such as cerebral palsy and cognitive impairment. The findings also emphasize the importance of early rehabilitation programs aimed at restoring brain neuroplasticity and improving developmental outcomes.

**Materials and Methods of the Study**

The study is based on the analysis of clinical, diagnostic, and pathogenetic data on premature newborns with cerebral disorders. A comprehensive assessment was carried out, including clinical examination by a neonatologist and neurologist, neuroimaging (neurosonography and MRI), EEG monitoring, and laboratory testing for metabolic and infectious markers (TORCH, C-reactive protein, procalcitonin).

Neurosonography through the anterior fontanelle served as the main method for detecting intraventricular hemorrhage, periventricular leukomalacia, and hydrocephalus. MRI was used to identify diffuse white matter changes and cortical abnormalities. The obtained data were analyzed to establish correlations between perinatal risk factors, the severity of CNS lesions, and neurological outcomes.

**Results and Discussion**

Cerebral disorders in premature infants arise due to CNS immaturity and the combined influence of hypoxia, ischemia, infection, and metabolic disturbances. The most common forms include hypoxic-ischemic encephalopathy, intraventricular hemorrhage, and periventricular leukomalacia.

Early clinical signs (in the first days of life) include disturbances in muscle tone, suppression of neonatal reflexes (Moro, sucking, grasping), seizures, apnea, and thermoregulatory instability. Later symptoms (weeks to months) are characterized by delayed psychomotor development, cerebral palsy, and sensory impairments (retinopathy of prematurity, sensorineural hearing loss).

The diagnostic approach must be comprehensive, combining clinical observation, neuroimaging, EEG monitoring, and laboratory analysis. Neurosonography and MRI remain the most informative tools for early detection of CNS damage.



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Therapeutic interventions include oxygen therapy, anticonvulsants (phenobarbital, levetiracetam), hemodynamic stabilization, and infection control. Rehabilitation measures — such as physiotherapy, massage, and early developmental stimulation — play a key role in improving outcomes.

**Conclusion**

Cerebral disorders in premature newborns result from the combined influence of hypoxic-ischemic and inflammatory factors. The most frequent lesions are periventricular leukomalacia and intraventricular hemorrhage. Early diagnosis (neurosonography, MRI) enables timely neuroprotective treatment and rehabilitation. A comprehensive therapeutic strategy that includes antihypoxants, antioxidants, and agents improving microcirculation enhances the chances of CNS recovery.

It is recommended to:

- Implement standardized early neurosonographic screening protocols for all premature newborns.
- Improve neonatologists' skills in interpreting neuroimaging findings (NSG, MRI).
- Develop early rehabilitation programs to restore brain neuroplasticity.
- Conduct long-term cognitive and motor follow-up for infants who have experienced hypoxic-ischemic brain injury.

**References.**

1. Volpe, J.J. Neurology of the Newborn. 6th ed. Moscow: GEOTAR-Media, 2019. – 1256 p.
2. Back, S.A. "White matter injury in the preterm infant: Pathology and mechanisms." Journal of Child Neurology, 2020, Vol. 35, No. 4, pp. 234–245.
3. Inder, T.E., Volpe, J.J. "Perinatal brain injury in preterm infants." The Lancet Neurology, 2021, Vol. 20, pp. 102–114.
4. Medvedev, M.I. Neonatal Neurology: Diagnosis and Treatment. Moscow: GEOTAR-Media, 2021. – 512 p.
5. Kuznetsova, I.V., Chumakova, N.Yu. "Modern aspects of the pathogenesis of periventricular leukomalacia." Bulletin of Neonatology, 2022, No. 3, pp. 45–54.
6. Kovaleva, N.V., Chumakova, N.Yu. "Hypoxic-ischemic lesions of the CNS in premature infants: modern approaches." Medicine and Practice, 2021, No. 6, pp. 27–34.
7. Dudink, J., Mercuri, E., Cowan, F. "Magnetic resonance imaging of the infant brain: anatomical and physiological considerations." Seminars in Fetal and Neonatal Medicine, 2020, Vol. 25, No. 2, pp. 101–112.
8. Hagberg, H., Mallard, C. "Effect of inflammation on central nervous system development and vulnerability." Current Opinion in Neurology, 2019, Vol. 32, pp. 126–133.
9. Sukhorukov, V.S. Perinatal Lesions of the Central Nervous System in Newborns. Moscow: Medicine, 2020. – 384 p.
10. Panova, O.V. "Diagnostic capabilities of neurosonography in premature infants." Russian Journal of Perinatology and Pediatrics, 2022, No. 4, pp. 18–25.



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11. Volpe, J.J., Kinney, H.C. “Pathogenesis of periventricular leukomalacia: implications for prevention and repair.” Pediatric Research, 2021, Vol. 89, pp. 36–45.
12. Guseva, N.V., Bobrova, E.S. “Morphofunctional features of the CNS in premature newborns.” Pediatrics and Neonatology, 2020, No. 5, pp. 12–19.
13. Perlman, J.M. “Brain injury in the preterm infant: new horizons for prevention and treatment.” Clinical Perinatology, 2020, Vol. 47, No. 2, pp. 289–306.
14. Shabalov, N.P. Neonatology: A Guide for Physicians. 4th ed. St. Petersburg: SpetsLit, 2021. – 980 p.
15. Ovchinnikov, Yu.V. “The influence of hypoxia and inflammation on the development of white matter in premature infants.” Journal of Clinical Neurology, 2022, No. 1, pp. 41–50.

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