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Neuroimaging Methods in the Diagnostics of Pathological Changes in the Brain in Children

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The paper presents the results of a review of domestic and foreign literature on the use of various methods of neuroimaging to detect pathological changes in the brain in children. The clinical consequences of perinatal lesions of the central nervous system (CNS) have been the topic of heated discussions among pediatricians, neonatologists, and neurologists for many decades [1, 2].

Perinatal lesions of the CNS are one of the main causes of somatic health disorders, deviations in the physical and neuropsychic development of children both in the first year of their life and in subsequent periods of childhood [3].

The role of perinatal lesions of the CNS in the development of childhood pathology can hardly be overestimated: in the structure of childhood disability, lesions of the nervous system account for about 50%, while 70–80% of cases are perinatal lesions [4]. The most common cause of perinatal CNS damage (47%) is hypoxic - ischemic brain damage [5]. Further, the causes of perinatal brain damage, depending on the frequency of occurrence, should be distributed as follows: anomalies and dysplasia of the brain - 28%, TORCH infections - 19, birth trauma - 4, hereditary metabolic diseases - 2% [1, 5].

The difficulty of topical diagnosis is explained by the anatomical and functional immaturity of the CNS and the nonspecific polymorphic reaction of the brain in response to various pathological processes [8–10]. Studies of pediatricians and pediatric neurologists, especially in recent years, are increasingly convincing that an accurate diagnosis of damage to the nervous system can and should be carried out at the earliest stages - only then effective therapy and real prevention of later complications are possible [11]. Neuroimaging methods are currently acquiring decisive importance in the diagnosis and prognosis of the severity of the course of the disease . The active development and implementation of modern methods of neuroimaging in the practice of a neurologist has made it possible to expand the diagnosis of cerebral disorders, assess their impact on neurological and mental status, determine the strategy and tactics of treatment, monitor its effectiveness, predict the further development of the child and the outcome of the disease, expand the possibilities of medical genetic counseling [12–16].

At present, three methods of radiation diagnostics are used in pediatric neurology and neurosurgery for direct visualization of brain structures: neurosonography (NSG), X-ray computed tomography (RCT), and magnetic resonance computed tomography (MRI) [15, 16]. They are modern high-precision diagnostic methods that make it possible to assess structural changes in brain tissues and determine the state of the CSF space [17, 18].

One of the most accessible and widely used methods of brain imaging is NSG, which makes it possible to assess the macrostructure and echogenicity of the medulla, the size and shape of the CSF spaces. The method makes it possible to objectify structural changes in the brain in newborns in cases where the use of routine anamnestic and clinical-neurological methods may not be enough to make a diagnosis [13, 14]. In addition, NSG allows diagnosing signs of periventricular disease already on the first day. leukomalacia , suggest the presence of peri- or intraventricular hemorrhage and clarify its degree [22].

Currently, neurosonography is considered mainly as a screening method, with the help of which a group of children is selected who are subject to a deeper RK-, MR-, proton-spectroscopic examination. The combination of modern X-ray and computer technology led to the creation of a fundamentally new method - CT, which can be used to obtain a layer-by-layer (every 1–10 mm) image of the object under study in the axial plane. More sophisticated designs of CT devices allow to obtain images of sections in other planes. CT, proposed by the English physicist Hounsfield , was first used in clinical practice in 1972. A CT scanner combines precision mechanics, electronics, computer technology, software of unique complexity, and ultrastable X-ray technology. Currently, the standard of CT is an examination using a multislicetomograph with the ability to obtain from 4 to 128 slices with a time resolution of 0.1–0.5 (the minimum available duration of one rotation of the X-ray tube is 0.3). Thus, the duration of tomography of the whole body with a slice thickness of less than 1 mm is about 10–15 s, and the result of the study is from several hundred to several thousand images.

The use of contrast agents in CT makes it possible to improve the accuracy of diagnosis, and in many cases this is an indispensable component of the study. To increase tissue contrast, water-soluble ionic and non- ionic iodine-containing contrast agents are used. High scanning speed, reduced slice thickness, the need for a clear differentiation of vascular structures impose new requirements on contrast agents, which is reflected in the creation of substances with a higher iodine concentration and lower viscosity. The advantages of CT in comparison with other diagnostic methods compensate for the existing disadvantages, which determines the high clinical significance of the method [23-27].

MRI has been increasingly used to study the brain of newborns [14, 34]. The use of MRI in the diagnosis of lesions of the brain substance was an important breakthrough in medicine, which made it possible to obtain an almost complete, unambiguous visual picture of the state of the brain at various stages of its development [28]. Modern structural MRI using thin sections makes it possible to detect minimal anatomical changes in gray and white matter. Functional MRI methods help to visualize the subtle processes of the central nervous system. In young children, MRI provides an accurate assessment of myelination processes and the maturity of the nervous system. All these possibilities of MRI are important for diagnosing congenital and acquired (as a rule, posthypoxic) changes in the brain [29]. MRI is a complex neuroimaging technique with high sensitivity, which allows good differentiation of brain structures [3].

Conclusion.

The priority of various neuroimaging methods in diagnosing structural changes in the brain in children is determined both by clinical indications for the study and the resolving capabilities of the methods.

Conflict of interests. The authors declare no conflict of interest.

References

1. Norkulov N. U., Shodiev A. Sh., Ravshanov D. M. Determination of the efficacy of the use of nootropes in the treatment of brain concusion in the acute period https://doi.org/10.17605/OSF.IO/JQF9S
2. Шодиев А. и др. К особенностям клинического течения и лечения нетравматических внутримозговых кровоизлияний у детей //Журнал проблемы биологии и медицины. – 2018. – №. 2.1 (101). – С. 128-131.
3. Шодиев, А. Ш., Ш. И. Абдувалиев, and З. С. Пардаева. "К ВОПРОСУ КЛИНИЧЕСКОГО ТЕЧЕНИЯ И ЛЕЧЕНИЯ НЕТРАВМАТИЧЕСКИХ ВНУТРИМОЗГОВЫХ КРОВОИЗЛИЯНИЙ У ДЕТЕЙ." *XX ДАВИДЕНКОВСКИЕ ЧТЕНИЯ*. 2018.
4. Абдувалиев, Ш. И., А. Ш. Шодиев, and З. С. Пардаева. "НЕКОТОРЫЕ ОСОБЕННОСТИ КЛИНИЧЕСКОГО ПРОЯВЛЕНИЯ НЕТРАВМАТИЧЕСКИХ ВНУТРИМОЗГОВЫХ КРОВОИЗЛИЯНИЙ У ДЕТЕЙ." *XX ДАВИДЕНКОВСКИЕ ЧТЕНИЯ*. 2018.
5. Aliev, M. A., A. M. Mamadaliev, and S. A. Mamadalieva. "RESEARCH OF ESSENTIAL ELEMENTS COMPOSITION IN THE CEREBROSPINAL FLUID IN PATIENTS WITH OUTCOMES OF TRAUMATIC BRAIN INJURY."
6. Агзамов, М., И. Агзамов, and Ш. Абдувалиев. "Нетравматические внутримозговые кровоизлияния у детей: Клиника, диагностика и методы лечения." *Журнал вестник врача* 1.3 (2017): 30-36.
7. Примов, ЗухриддинАмриддинЎғли, ДавронМавлоновичРавшанов, and АмиркулШодиевичШодиев. "ДИСКЧУРРАЛАРИРИВОЖЛАНГАНБЎЙИНОСТЕОХОНДРОЗЛАРИНИНГЭТИОПАТОГЕНЕЗИВАКЛИНИКМАНЗАРАСИ." *A cademic research in educational sciences* 2.6 (2021): 578-583.
8. Алиев, М. А., А. М. Мамадалиев, and С. А. Мамадалиева. "ЭФФЕКТИВНОСТЬ ЭНДОЛЮМБАЛЬНОЙ ИНСУФФЛЯЦИИ ОЗОНА И ПИРАЦЕТАМА ПРИ ЛЕЧЕНИИ ПОСТТРАВМАТИЧЕСКИХ ЦЕРЕБРАЛЬНЫХ АРАХНОИДИТОВ." *Международный научно-исследовательский журнал* 10 (41) (2015).
9. Алиев, МансурАбдухоликович, АбдурахмонМаматкуловичМамадалиев, and СаодатАбдурахмоновнаМамадалиева. "Динамические изменения состава макро-и микроэлементов в сыворотке крови у больных с различными последствиями краниоцеребральной травмы." *Universum: медицина и фармакология* 12 (23) (2015).
10. Алиев, Мансур Абдухоликович. "АНАЛИЗ МЕТОДОВ ДИАГНОСТИКИ И ВЫБОРА ОПЕРАТИВНЫХ ДОСТУПОВ ПРИ РАЗЛИЧНЫХ ОПУХОЛЯХ СПИННОГО МОЗГА." *Достижения науки и образования* 6 (86) (2022): 76-78.
11. Шодиев, Амиркул Шодиевич. "К ОСОБЕННОСТЯМ ТЕЧЕНИЯ ОПУХОЛЕЙ МОЗЖЕЧКА." *Достижения науки и образования* 6 (86) (2022): 24-27.
12. Aliev, M. A., et al. "The Result of Surgical Treatment of Secondary Stenosis of the Cervical Spinal Canal Due to Instability after Vertebra-Spinal Trauma (Clinical Case)." (2022).
13. Равшанов, Даврон Мавлонович. "ПАРАСАГИТТАЛНЫЕ МЕНИНГИОМЫ БОЛЬШИХ ПОЛУШАРИЙ ГОЛОВНОГО МОЗГА (ОБЗОР ЛИТЕРАТУРЫ)." *Достижения науки и образования* 6 (86) (2022): 104-106.
14. Набиев, Акмал Адхамжанович. "АНАЛИЗ ИЗМЕНЕНИЙ ПОЛЕЙ ЗРЕНИЯ У БОЛЬНЫХ ОПУХОЛЯМИ ГОЛОВНОГО МОЗГА." *Достижения науки и образования* 6 (86) (2022): 116-119.
15. Норкулов, Нажмиддин Уралович. "РЕЗУЛЬТАТЫ ОФТАЛЬМОЛОГИЧЕСКИХ МЕРОПРИЯТИЙ У НЕЙРООНКОЛОГИЧЕСКИХ БОЛЬНЫХ." *Достижения науки и образования* 6 (86) (2022): 109-111.

16. Aliev, M. A., et al. "Use of Magnetic Resonance Spectroscopy for the Diagnosis of Brain Tumor Recurrence." *Journal of Applied Spectroscopy* 89.5 (2022): 898-904.
17. Саидов, Комрон Жуманазарович. "РЕЗУЛЬТАТЫ АНАЛИЗА НЕВРОЛОГИЧЕСКОЙ СИМПТОМАТИКИ В ОСТРОМ И ОТДАЛЕННОМ ПЕРИОДАХ СОТРЯСЕНИЯ ГОЛОВНОГО МОЗГА У 63 БОЛЬНЫХ." *Достижения науки и образования* 6 (86) (2022): 102-104.
18. Норкулов, Нажмиддин Уралович. "ПРОГНОСТИЧЕСКОЕ ЗНАЧЕНИЕ КОРРЕЛЯЦИИ КЛИНИЧЕСКИХ ПРИЗНАКОВ С ИСХОДОМ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМЫ." *Достижения науки и образования* 6 (86) (2022): 112-113.
19. Шодиев, Амиркул Шодиевич. "К ВОПРОСУ КОМПЛЕКСНОГО ЛЕЧЕНИЯ НЕЙРОЭПИТЕЛИАЛЬНЫХ ОПУХОЛЕЙ ГОЛОВНОГО МОЗГА." *Достижения науки и образования* 6 (86) (2022): 22-24.
20. Набиев, Акмал Адхамжанович. "НЕКОТОРЫЕ АСПЕКТЫ КОМБИНИРОВАННОГО ЛЕЧЕНИЯ ГЛИАЛЬНЫХ ОПУХОЛЕЙ ГОЛОВНОГО МОЗГА." *Достижения науки и образования* 6 (86) (2022): 113-115.
21. Aliev, M. A., A. M. Mamadaliev, and S. A. Mamadalieva. "The effectiveness of endolumbal insufflation of ozone and pyracetam in the treatment of posttraumatic cerebral arachnoiditis." *Международный научно-исследовательский журнал* 10-4 (41) (2015): 45-51.
22. Tashmurodovich, Husanov Zafar. "ANALYSIS OF DIAGNOSTICS AND SELECTION OF SURGERY APPROACHES IN VARIOUS SPINAL CORD TUMORS." *Достижения науки и образования* 6 (86) (2022): 96-98.
23. Juraev, A. M. "TO THE QUESTION OF COMPLEX TREATMENT OF NEUROEPITHELIAL TUMORS OF THE BRAIN." *Достижения науки и образования* (2022): 120.
24. Juraev, A. M. "TO THE PECULIARITIES OF THE COURSE OF CEREBELLAR TUMORS Juraev AM." *Достижения науки и образования* (2022): 118.
25. Abdukholikovich, Aliev Mansur. "ANALYSIS OF CHANGES IN THE FIELD OF VISION IN PATIENTS WITH BRAIN TUMORS." *Достижения науки и образования* 6 (86) (2022): 78-81.\
26. Mamatkulovich, MamadalievAbdurakhmon. "RESULTS OF ANALYZING NEUROLOGICAL SYMPTOMS IN ACUTE AND LONG-TERM PERIODS OF BRAIN CONCUSSION IN 63 PATIENTS." *Достижения науки и образования* 6 (86) (2022): 27-29.
27. Mamatkulovich, MamadalievAbdurakhmon. "RESULTS OF OPHTHALMOLOGIC MEASURES IN NEUROONCOLOGY PATIENTS." *Достижения науки и образования* 6 (86) (2022): 29-31.
28. Husanov, Z. T. "SOME ASPECTS OF COMBINED TREATMENT OF GLIAL BRAIN TUMORS Husanov ZT." *Достижения науки и образования* (2022): 98.
29. Aliev, M. A., A. M. Mamadaliev, and S. A. Mamadalieva. "Research of essential elements composition in the cerebrospinal fluid in patients with outcomes of traumatic brain injury." *Міжнародний науковий журнал* 9 (2015): 17-23.