УЎТ: 616.12-007.21:159.923-053.2

Tairova Sakina Bakhodirovna – Ph.D., assistant professor
Mavlyanova Umida Nematovna – assistant
Khudoyberdiyeva Sabrina Gholibjonovna – student
Zayniyeva Nargis Ergashevna – student
Madjitova Naima Makhmudjon's daughter – student
Samarkand University Zarmed (Samarkand, Uzbekistan)

RESULTS OF CHANGES IN THE CENTRAL NERVOUS SYSTEM IN CHILDREN WITH CONGENITAL HEART DEFECTS

Abstract. *Congenital heart defects (CHD) are a serious problem in pediatrics due to their high prevalence and the need for early surgical correction due to serious health problems and disabilities of the child. The social significance of the problem is determined by the fact that among congenital developmental anomalies leading to disability, congenital heart defects account for about 50%. According to the World Health Organization, congenital heart defects occur in 0,7-1,7% of newborns. In Uzbekistan, from 5 to 15 newborns out of 1000 live births are born with congenital heart defects. Currently, given the increasing incidence of congenital septal heart defects, pathogenetic mechanisms, features of the clinical course, the occurrence of severe complications of the disease, the appointment of diagnostic and therapeutic procedures is a problem that needs to be solved in pediatrics.*

Key words: *congenital heart defect, central nervous system, neurosonography, electroencephalography.*

Таирова Сакина Баходировна – Ph.D., ассистент
Самаркандский Государственный медицинский университет (Самарканд, Узбекистан)
Мавлянова Умида Нематовна – ассистент
Худойбердийева Сабрина Голибжоновна – студент
Зайнийева Наргис Эргашевна – студент
Маджитова Наима Махмуджон кизи – студент
Самаркандский университет Зармед (Самарканд, Узбекистан)

РЕЗУЛЬТАТЫ ИЗМЕНЕНИЙ ЦЕНТРАЛЬНОЙ НЕРВНОЙ СИСТЕМЫ У ДЕТЕЙ С ВРОЖДЕННЫМИ ПОРОКАМИ СЕРДЦА

Аннотация. *Врожденные пороки сердца (ВПС) являются серьезной проблемой в педиатрии, вследствие высокой распространенности и необходимости ранней хирургической коррекции из-за серьезных нарушений здоровья и инвалидности ребенка. Социальная значимость проблемы определяется тем фактом, что среди врожденных аномалий развития, приводящих к инвалидности, врожденные пороки сердца составляют около 50%. Согласно сведениям, Всемирной организации здравоохранения врожденные пороки сердца встречаются у 0,7-1,7% новорожденных. В Узбекистане от 5 до 15 новорожденных на 1000 родившихся живыми рождаются с врожденными пороками сердца. В настоящее время, учитывая возрастающую заболеваемость врожденными септальными пороками сердца, патогенетические механизмы, особенности клинического течения, возникновение тяжелых осложнений заболевания, назначение диагностических и лечебных процедур является проблемой, решение которой необходимо в педиатрии.*

Ключевые слова: *врожденный порок сердца, центральная нервная система, нейросонография, электроэнцефалография.*

Таирова Сакина Баходировна – Ph.D., ассистент
Самарқанд давлат тиббиёт университети (Самарқанд, Ўзбекистон)
Мавлянова Умида Нематовна – ассистент
Худойбердийева Сабрина Ғолибжоновна – талаба
Зайнийева Наргис Эргашевна – талаба
Маджитова Наима Махмуджон қизи – талаба
Самарқанд Зармед университети (Самарқанд, Ўзбекистон)

ТУҒМА ЮРАК НУҚСОНЛАРИ БЎЛГАН БОЛАЛАРДА МАРКАЗИЙ АСАБ ТИЗИМИДАГИ ЎЗГАРИШЛАР НАТИЖАЛАРИ

Изоҳ. *Туғма юрак нуқсонлари (ТЮН) болаларнинг юқори даражада тарқалиши ва жиддий соғлиқ муаммолари ва боланинг ногиронлиги туфайли эрта жарроҳлик тузатиш зарурати туфайли*

педиатрияда жиддий муаммо ҳисобланади. Муаммонинг ижтимоий аҳамияти ногиронликка олиб келадиган туғма юрак аномалиялари орасида туғма юрак нуқсонлари тахминан 50% ни ташкил этиши билан белгиланади. Жаҳон соғлиқни сақлаш ташкилоти маълумотларига кўра, туғма юрак нуқсонлари янги туғилган чақалоқларнинг 0,7-1,7% да учрайди. Ўзбекистонда ҳар 1000 тирик туғилган чақалоққа 5 дан 15 тагача туғма юрак нуқсонлари билан туғилади. Ҳозирги вақтда юракнинг туғма юрак нуқсонлари, патогенетик механизмлари, клиник белгилари, касалликнинг оғир асоратлари пайдо бўлиши билан касалланишнинг кўпайишини ҳисобга олсак, диагностика ва даволаш муолажаларини тайинлаш педиатрияда ҳал қилиниши керак бўлган муаммодир.

Калит сўзлар: *туғма юрак нуқсони, markaziy asab tizimi, neyrosonografiya, elektroensefalografiya.*

Introduction: Congenital heart disease (CHD) is a major global health and economic burden, accounting for approximately 300,000 deaths worldwide each year despite advances in treatment that have reduced mortality risk. Children with CHD experience both acute and chronic cardiac complications. Although treatment options have improved, some remain highly invasive. Some studies suggest that developmental factors may play a role in the development of CHD, but the role of physical development requires further study.

The purpose of the study is to optimize methods for early diagnosis of comorbid diseases in children with congenital septal heart defects.

Materials and methods. The study was carried out in the Samarkand Regional Children's Multidisciplinary Medical Center in 2021-2022 in the cardiac surgery department, a clinical and laboratory-instrumental study was conducted. 108 children with septal congenital heart defects aged from 1 month to 3 years and 30 conditionally healthy young children were examined. All patients underwent general clinical examination methods, immunological examination methods, EchoCG, ECG, NSG, EEG, Denver screening testing and, if indicated, chest X-ray.

During the study, all children (n=138) were divided into three groups: the first main group included 73 (67.6%) children with septal congenital heart defects (children who underwent surgery with correction of the comorbid condition) and the second comparison group included 35 (32.4%) children (children who underwent surgery without correction of the comorbid condition); the control group consisted of 30 conditionally healthy young children, comparable in gender and age, observed in Family Polyclinic No. 4 in Samarkand. Criteria for inclusion in the control group: age from 1 month to 3 years; first health group; absence of acute diseases during the last month.

Results. To study changes in the central nervous system (CNS) in children with septal congenital heart defects, EEG and neurosonography (NSG) were performed depending on age.

In septal congenital heart disease, EEG examination mainly revealed changes in the frequency of alpha, beta and theta rhythm oscillations, including a decrease in the frequency of alpha rhythms - in the first main group by 66.7%, in the second comparison group by 55% (3.6±1.8; 3.4±1.6, respectively) (see Table 1).

Deviations of the alpha rhythm from the norm are directly related to mental retardation (MR). Such a delay in children is evidenced by: disorganization of alpha waves, shift of focus from the occipital region, increased synchrony, short activation reaction, overreaction to intense breathing. An increase in the beta rhythm was revealed by 1.28 times in the 1st main group, by 1.17 times in the 2nd comparison group (17.2 ± 0.7; 16.3 ± 0.5, respectively) ($p < 0.05$). An increase in the beta rhythm was detected in the central and anterior parts of the brain, which indicates a high probability of developmental delay in the child. In the theta rhythm indicators, an increase was also noted by 1.72 times in the 1st main group, by 1.8 times in the 2nd comparison group (7.3 ± 0.3; 6.4 ± 0.6, respectively) ($p < 0.05$). Elevated theta rhythm values registered in the occipital region indicate a delay in the child's development, as well as a violation of the circulatory function. Also, in small quantities, pointed waves (peaks) were observed - in the first main group in 5.5% of children, in the second comparison group in 5.7% of children.

Table 1.

Main indicators of EEG and neurosonography in examined children with septal congenital heart defects before surgery

Indicators	I main group (n=73)	II comparison group (n=35)	Reference values
EEG indicators			
Alpha rhythm	3,6±1,8	3,4±1,6	6–9 Гц
Beta rhythm	17,2±0,7	16,3±0,5	10–15 Гц
Theta rhythm	7,3±0,3	6,4±0,6	3–5 Гц
Pointed waves (peaks)	4 (5,5%)	2 (5,7%)	-
Neurosonography indicators			
lateral ventricles (anterior horns)	4,3±0,12	5,1±0,2	2-4 мм
lateral ventricles (occipital horns)	17,6±0,2	16,3±0,2	10-15 мм
size of the third ventricle	5,5±0,1	5,7±0,4	3-5 мм
size of the fourth ventricle	4,2±0,3	4,7±0,7	до 4 мм

During neurosonography, the main changes were revealed in the volumes of the ventricles in all children in the study groups, including in the first main group, the size of the anterior horns of the lateral ventricles was increased by 1.35 times, the occipital horns of the lateral ventricles by 1.25 times, the third ventricle by 1.32 times, the fourth ventricle by 1.12 times (4.3±0.12; 17.6±0.2; 5.5±0.1; 4.2±0.3, respectively) ($p<0.05$). In the second comparison group, the size of the anterior horns of the lateral ventricles was increased by 1.28 times, the occipital horns of the lateral ventricles by 1.14 times, the third ventricle by 1.42 times, the fourth ventricle by 1.35 times (5.1±0.2; 16.3±0.2; 5.7±0.4; 4.7±0.7, respectively) ($p<0.05$) ($p<0.05$).

Conclusion. Summarizing the EEG data in the children we examined, we found a decrease and disorganization of the alpha rhythm, an increase in the beta rhythm and theta rhythm, and the presence of sharpened waves, which indicated a delay in psychomotor development in the children with congenital heart disease we examined. Changes in the neurosonography indicated minor increases in the sizes of the lateral ventricles, the sizes of the third and fourth ventricles in the children with septal congenital heart disease we examined.

REFERENCES

1. Сакина Баходировна Таирова, Жавохир Илхомжон Угли Шермахматов, Мохинур Шухрат Кизи Аъзамова, Шахзод Бахриддинович Аслиддинов Изменения гематологических показателей и иммунного фона у детей с врожденным пороком сердца // Science and Education. 2025. №2.
2. Скворцов В. В., Тумаренко А. В., Байманкулов С. С. Врожденные пороки сердца //Медицинская сестра. – 2017. – №. 7. – С. 14-17.
3. Таирова С. Б., Буронов М. И. У. Эпидемиология и факторы риска развития врождённых пороков сердца у детей (литературный обзор) //Science and Education. – 2023. – Т. 4. – №. 2. – С. 536-542.
4. Таирова С. Б., Мухамадиева Л. А. Диагностика врожденных септальных пороков сердца у детей с коморбидной патологией (литературный обзор) //журнал биомедицины и практики. – 2022. – Т. 7. – №. 2.
5. Таирова С. Б., Мухторов А. А. У., Зиёдулаева М. С. Нейрокогнитивные расстройства у детей с врождёнными пороками сердца (литературный обзор) //Science and Education. – 2023. – Т. 4. – №. 2. – С. 543-548.
6. Таирова С. Б., Хушвактова Б. Б. Қ. Особенности течения коморбидной патологии с врожденными септальными пороками сердца (литературный обзор) //Science and Education. – 2023. – Т. 4. – №. 2. – С. 549-555.
7. Таирова С. Б. Allergic reactions on the background of congenital heart defects in young children //Журнал кардиореспираторных исследований. – 2023. – Т. 4. – №. 1.
8. Bahodirovna, T. S. "Atamuradovna ML Иммунологические аспекты у детей раннего возраста с врожденными пороками сердца." Journal of biomedicine and practice 8.4 (2023).
9. Gravholt CH, Viuff MH, Brun S, Stochholm K, Andersen NH. Turner syndrome: mechanisms and management. Nat Rev Endocrinol. (2019) 15:601–14.
10. Pawlikowski M, Kunert-Radek J, Radek M. Plurihormonality of pituitary adenomas in light of immunohistochemical studies. Endokrynol Pol. 202 1;61(1):63–66.
11. Robinson GA, Peng J, Donnes P, Coelewij L, Naja M, Radziszewska A, et al.. Disease-associated and patient-specific immune cell signatures in juvenile-onset systemic lupus erythematosus: patient stratification using a machine-learning approach. Lancet Rheumatol. (2020) 2:485–96.
12. Scarpina F, Tagini S. The Stroop Color and Word Test. Front Psychol. 2017; 8:557.
13. Tairova S. B. et al. Tug ‘ma yurak nuqsoni bo ‘lgan bolalarda gematologik ko ‘rsatkichlar va immun fondagi o ‘zgarishlar //Science and Education. – 2025. – Т. 6. – №. 2. – С. 102-107.
14. Tairova S. B. et al. Changes in hematological parameters and immune background in children with congenital heart defects //Science and Education. – 2025. – Т. 6. – №. 2. – С. 43-48.
15. Tairova S. B. et al. Changes in hormonal and immune background in children with congenital heart disease //Science and Education. – 2025. – Т. 6. – №. 2. – С. 49-53.
16. Tairova S. B. et al. Features of the course of comorbid pathology with congenital septal heart defects //Science and Education. – 2025. – Т. 6. – №. 2. – С. 61-67.
17. Tairova S. B., Sattarova R. T., Husanova M. B. Q. Incidence of allergic diseases in children with congenital heart defects //Science and Education. – 2023. – Т. 4. – №. 10. – С. 17-21.
18. Tairova S. B. et al. Ways to correct comorbid states during surgical interventions in children with congenital heart disease //Science and Education. – 2025. – Т. 6. – №. 2. – С. 114-119.
19. Turaeva N. et al. The use of cholecalciferol in the treatment of bronchial asthma in children //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 413. – С. 03032.
20. Van der Mheen, M., van Beynum, I.M., Dulfer, K. et al. The CHIP-Family study to improve the psychosocial wellbeing of young children with congenital heart disease and their families: design of a randomized controlled trial. BMC Pediatr 18, 230 (2018).