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ASSESSMENT OF SEVERITY IN CONGENITAL HEART DEFECTS AMONG CHILDREN

ОСОБЕННОСТИ ТЯЖЕСТИ ВРОЖДЕННЫХ ПОРОКОВ СЕРДЦА У ДЕТЕЙ

БОЛАЛАРДА ТУҒМА ЮРАК НУҚСОНЛАРИНИНГ ОҒИРЛИК ДАРАЖАСИ ХУСУСИЯТЛАРИ

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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. Scientific research is being conducted worldwide to improve the diagnostics of neurological disorders in children with congenital heart defects and, at the same time, to develop effective methods for preventing the disease and its complications. Analysis of clinical aspects of changes in the central nervous system (CNS) in children with congenital heart defects and optimization of early diagnostic methods in this group of children remains a priority area of modern medicine.

Key words: congenital heart defects, young children, severity of congenital heart disease

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. Во всем мире проводятся научные исследования, направленные на совершенствование диагностики неврологических нарушений у детей с врожденными пороками сердца и одновременно на разработку эффективных методов профилактики заболевания и его осложнений. Анализ клинических аспектов изменений центральной нервной системы (ЦНС) у детей с врожденными пороками сердца и оптимизации методов ранней диагностики в данной группе детей остается приоритетным направлением современной медицины.

Ключевые слова: врожденные пороки сердца, дети раннего возраста, тяжесть ВПС

Изоҳ. Туғма юрак нуқсонлари (ТЮН) болаларда юқори даражада тарқалиши ва жиддий соғлиқ муаммолари ҳамда боланинг ногиронлиги туфайли эрта жарроҳлик тузатиш зарурати сабабли педиатрияда муҳим муаммо ҳисобланади. Бутун дунёда туғма юрак нуқсонлари бўлган болаларда неврологик ўзгаришларни ташхислаш усулларини такомиллаштиришга, шунингдек касаллик ва унинг асоратларини олдини олишнинг самарали усулларини ишлаб чиқишга қаратилган илмий тадқиқотлар олиб борилмоқда. Туғма юрак нуқсонлари бўлган болаларда марказий асаб тизимидаги (МАТ) ўзгаришларнинг клиник жиҳатларини таҳлил қилиш ва ушбу гуруҳ болаларида эрта

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ташхис қўйиш усулларини оптималлаштириш замонавий тиббиётнинг устувор йўналишларидан бири бўлиб қолмоқда.

Калит сўзлар: туғма юрак нуқсонлари, ёш болалар, туғма юрак нуқсонларининг оғирлиги

Relevance. Congenital heart defects (CHD) occupy a leading place in the structure of congenital pathology in children and are one of the main causes of infant and early childhood morbidity and mortality [6,10,11]. In recent decades, due to advances in cardiac surgery and intensive care, the survival rate of children with CHD has significantly increased, which has led to a rise in the number of patients with a chronic course of the disease and varying degrees of defect severity [1,5,7].

Modern studies show that the severity of CHD is determined not only by the anatomical defect, but also by the degree of hemodynamic disturbances, the severity of hypoxemia, and the impact of the defect on systemic and cerebral perfusion [2,14]. Cyanotic forms of CHD are particularly unfavorable, as they are accompanied by chronic hypoxia, which negatively affects the development of organs and systems, including the central nervous system [3,4,15].

It has been established that with increasing age of children, in the absence of timely surgical correction, there is a progression of hemodynamic load and deterioration of clinical condition, which is manifested by an increase in the proportion of moderate and severe forms of CHD [9]. This is associated with the progression of heart failure, the development of pulmonary hypertension, and prolonged exposure to hypoxemia [12,13].

Despite a significant number of studies devoted to congenital heart defects, the issues of age-related dynamics of CHD severity and its clinical consequences remain insufficiently studied, especially in the population of young children [8]. This necessitates further investigation of the structure and severity of CHD, taking into account age-related characteristics, which is important for optimizing diagnosis, timing of surgical intervention, and disease prognosis.

Materials and Methods. The study was conducted at the multidisciplinary pediatric clinic of Samarkand State Medical University, as well as at medical institutions in the Samarkand region. Children of early age from 12 to 71 months (1 to 5 years) were examined. The main group included 226 children with congenital heart defects (CHD), who were divided into three groups depending on age; the mean age was 2,8±1,1 years.

The control groups were formed from clinically healthy children of comparable age and sex. The total number of children in the control group was 97. The control groups were formed based on comparability with the main group by age intervals (12–23 months, 24–35 months, 36–72 months), which ensured the validity of the comparative assessment of cognitive, emotional-behavioral, and neurological status.

A comprehensive examination was carried out with the participation of a pediatric cardiologist, cardiac surgeon, and neurologist. It included assessment of somatic and neurological status, as well as collection of anamnestic data (perinatal period, developmental characteristics, and comorbidities). Methods for evaluating the state of the central nervous and cardiovascular systems were used, including electroencephalography (EEG), echocardiography (EchoCG), and pulse oximetry (SpO_2). These methods made it possible to assess the functional and structural state of the brain and hemodynamics. Laboratory investigations included general and biochemical blood tests.

Statistical analysis was performed using the IBM SPSS Statistics software package, applying both parametric and non-parametric methods. Differences were assessed using Student's t-test, the chi-square (χ^2) test, the Mann–Whitney U test, and other methods, with a significance level of $p<0,05$.

Results. The analysis of the distribution of congenital heart defects (CHD) by type and severity showed that acyanotic forms predominated in the structure of the examined patients

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(69,0%); however, a significant proportion consisted of cyanotic defects (31.0%) accompanied by chronic hypoxemia.

Assessment of severity revealed that moderate and severe forms of CHD accounted for the majority of cases (37,2% and 32,7%, respectively), indicating a substantial clinical burden in the study group. Comparative analysis across age groups demonstrated a significant increase in the proportion of cyanotic and severe forms of CHD with increasing patient age ($p<0,05$), suggesting a cumulative effect of hypoxia and later surgical correction in older children.

Analysis of the distribution of children with congenital heart defects by type and severity (Table 1) showed that acyanotic forms of CHD predominated in the main group, accounting for 69,0% (156 children), whereas cyanotic forms reached 31,0% (70 children), indicating a considerable prevalence of defects associated with chronic hypoxemia.

Table 1.

Distribution of children with CHD (main group) by type and severity.

Indicator	group I (n=93)	group II (n=75)	group III (n=58)	Total main group (n=226)
Type of CHD				
Acyanotic forms	72 (77,4%)	52 (69,3%)	32 (55,2%)	156 (69,0%)
Cyanotic forms	21 (22,6%)	23 (30,7%)	26 (44,8%)	70 (31,0%)
Severity of CHD				
Mild	32 (34,4%)	23 (30,7%)	13 (22,4%)	68 (30,1%)
Moderate	37 (39,8%)	28 (37,3%)	19 (32,8%)	84 (37,2%)
Severe	24 (25,8%)	24 (32,0%)	26 (44,8%)	74 (32,7%)

Comparative analysis by age groups revealed a clear trend toward an increase in the frequency of cyanotic forms with age. Thus, in children aged 12–23 months, their proportion was 22,6%; in Group II (24–35 months) – 30,7%; whereas in the older age group (36–72 months) it reached 44,8%. Accordingly, the proportion of acyanotic forms decreased with increasing patient age. These differences indicate an accumulation of more severe forms of CHD in older children. A similar pattern was observed when assessing the severity of congenital heart defects.

Mild forms of CHD were more common in younger children (34,4%) and less frequent in older children (22,4%). At the same time, the proportion of severe forms increased from 25,8% in the 1–2 year age group to 44,8% in children aged 3–5 years. The frequency of moderate CHD remained relatively stable, although it also showed a tendency to decrease in the older age group.

Conclusion. The obtained data indicate that with increasing patient age, there is a rise in the proportion of hemodynamically significant and severe forms of congenital heart defects, which is likely due to later diagnosis and delayed surgical correction. The prolonged course of the defect is accompanied by chronic hypoxemia and overload of the cardiovascular system, creating conditions for the development of neurological and cognitive impairments.

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References.

1. Gravholt CH, Viuff MH, Brun S, Stochholm K, Andersen NH. Turner syndrome: mechanisms and management. Nat Rev Endocrinol. (2019) 15:601–14.
2. Pawlikowski M, Kunert-Radek J, Radek M. Plurihormonality of pituitary adenomas in light of immunohistochemical studies. Endokrynol Pol. 2021;61(1):63–66.
3. 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.
4. Scarpina F, Tagini S. The Stroop Color and Word Test. Front Psychol. 2017; 8:557.
5. Tairova S. B. et al. Tug ‘ma yurak nuqsoni bo ‘lgan bolalarda gematologik ko ‘rsatkichlar va immun fondagi o ‘zgarishlar //Science and Education. – 2025. – T. 6. – №. 2. – C. 102-107.
6. Tairova S. B. et al. Changes in hematological parameters and immune background in children with congenital heart defects //Science and Education. – 2025. – T. 6. – №. 2. – C. 43-48.
7. Tairova S. B. et al. Changes in hormonal and immune background in children with congenital heart disease //Science and Education. – 2025. – T. 6. – №. 2. – C. 49-53.
8. Tairova S. B. et al. Features of the course of comorbid pathology with congenital septal heart defects //Science and Education. – 2025. – T. 6. – №. 2. – C. 61-67.
9. Tairova S. B., Sattarova R. T., Husanova M. B. Q. Incidence of allergic diseases in children with congenital heart defects //Science and Education. – 2023. – T. 4. – №. 10. – C. 17-21.
10. Tairova S. B. et al. Ways to correct comorbid states during surgical interventions in children with congenital heart disease //Science and Education. – 2025. – T. 6. – №. 2. – C. 114-119.
11. Turaeva N. et al. The use of cholecalciferol in the treatment of bronchial asthma in children //E3S Web of Conferences. – EDP Sciences, 2023. – T. 413. – C. 03032.
12. 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).
13. 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.
14. Скворцов В. В., Тумаренко А. В., Байманкулов С. С. Врожденные пороки сердца //Медицинская сестра. – 2017. – №. 7. – С. 14-17.
15. 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.
16. 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.
17. Таирова С. Б., Мухторов А. А. У., Зиёдуллаева М. С. Нейрокогнитивные расстройства у детей с врождёнными пороками сердца (литературный обзор) //Science and Education. – 2023. – Т. 4. – №. 2. – С. 543-548.
18. 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.
19. Таирова С. Б. Allergic reactions on the background of congenital heart defects in young children //Журнал кардиореспираторных исследований. – 2023. – Т. 4. – №. 1.
20. Bahodirovna, T. S. "Atamuradovna ML Иммунологические аспекты у детей раннего возраста с врожденными пороками сердца." Journal of biomedicine and practice 8.4 (2023).