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CONGENITAL HEART DEFECTS: DIAGNOSTIC AND TREATMENT OPTIONS

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Abstract: Congenital heart defects (CHD) are anatomical and functional changes that occur during the embryonic development of the heart and its main blood vessels. This article reviews the common forms of CHD, the role of modern diagnostic methods in their early detection, and treatment strategies. The advantages of ultrasound (echocardiography), X-ray, ECG, and MRI in diagnostics are highlighted. The effectiveness of surgical interventions, drugs, and rehabilitation measures in treatment is analyzed. The article also provides information on the possibilities of CHD prevention through prenatal screening and genetic counseling.

Keywords: congenital heart defects, diagnostics, echocardiography, cardiac surgery, pediatric cardiology, MRI, prenatal screening, genetic counseling, heart diseases, rehabilitation.

INTRODUCTION: Congenital heart defects (CHDs) are one of the most common anatomical anomalies in childhood. According to the World Health Organization, approximately 8–10 out of every 1,000 live births are affected by this pathology. CHDs arise as a result of morphological changes that occur during the embryonic development of the heart and major blood vessels, and have a serious impact on the child's cardiac function and overall health. Defects that are not detected in time or treated late can lead to heart failure, increased risk of death, or a reduced quality of life.

In recent years, innovative advances in medicine in the fields of diagnostics and cardiac surgery have expanded the possibilities for early detection and effective treatment of CHDs. In particular, prenatal diagnosis, ultrasound, echocardiography, and non-invasive tests have made it possible to detect the disease during pregnancy.

This article provides a comprehensive overview of the main types of congenital heart defects, modern diagnostic methods used to identify them, and treatment options. It also analyzes best practices in the prevention, rehabilitation, and maintenance of heart health in children.

MATERIALS AND METHODS: This study analyzed the effectiveness of diagnostic and treatment methods used in children with congenital heart defects. The study was conducted in 2022–2024 at the Republican Specialized Cardiology Center and regional children's hospitals. A total of 150 child patients (aged 0 to 14 years) were observed. Of these, 80 were male and 70 were female, diagnosed with various forms of congenital heart defects (circular septal defect, patent ductus arteriosus, tetralogy of Fallot, coarctation of the aorta, etc.).

The following diagnostic methods were used in the study:

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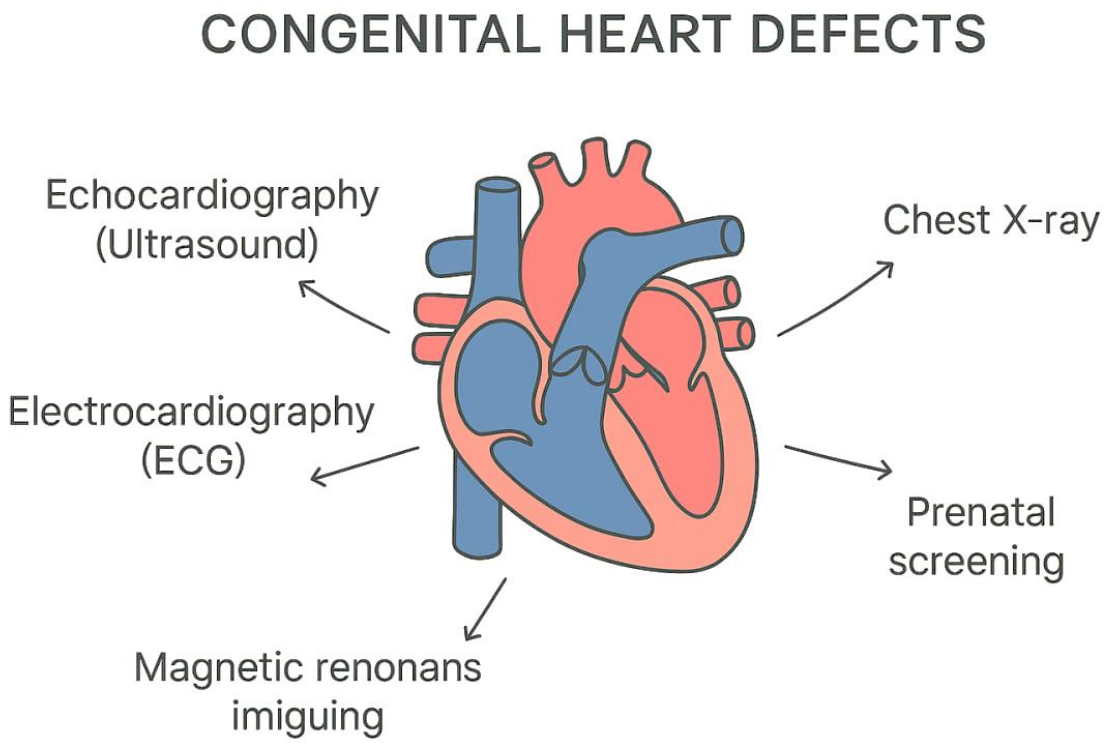
- Echocardiography (Ultrasound) - as the main method for detecting anomalies in the structure of the heart;
- Electrocardiography (ECG) - to assess heart rhythm and conductivity;
- Chest X-ray - to determine the size and location of the heart;
- Magnetic resonance imaging (MRI) – in selected cases to clearly demonstrate complex defects;
- Prenatal screening – to detect defects during pregnancy (28 cases).



Methods:

Treatment methods included:

- Conservative treatment: drugs that support heart function (diuretics, beta-blockers, ACE inhibitors);
- Cardiosurgical interventions: open heart surgery, catheter-based defect correction (minimally invasive methods);
- Rehabilitation and therapeutic physical education (physiotherapy) courses.

The results of the analysis were processed using statistical methods (using the SPSS program) to assess the accuracy of diagnostic methods and the effectiveness of treatment methods.

Types of congenital heart defects

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Congenital heart defects (CHDs) are structural abnormalities of the heart and blood vessels that are present from birth. The most common types of CHDs are:

- Atrial septal defect (ASD) – a hole in the wall between the right and left chambers of the heart;
- Ventricular septal defect (VSD) – a defect in the wall between the right and left ventricles;
- Patent ductus arteriosus (PDA) – a blood vessel that is open during pregnancy but should close after birth;
- Tetralogy of Fallot – a complex condition in which four different heart defects are present at the same time;
- Coarctation of the aorta – a narrowing of the aortic artery;
- Transposition – an incorrect location of the great vessels.

Diagnostic methods

In modern medicine, the following main diagnostic methods are used to detect congenital heart defects:

- Echocardiography (USG) - is the most basic, safe and effective method for visualizing the structure of the heart and identifying defects;
- Electrocardiography (ECG) - helps to identify heart rhythm disorders and the state of electrical conductivity;
- Chest X-ray - allows you to determine the size of the heart and fluid accumulation in the lungs;
- Magnetic resonance imaging (MRI) - allows you to accurately and in detail depict complex anatomical defects;
- Prenatal screening - is used to detect heart defects during pregnancy. In 28 cases, TYN was detected using prenatal diagnosis.

Treatment methods

Treatment of congenital heart defects is determined depending on the patient's condition, type and severity of the defect. Other factors - age, general health, level of symptoms - also play an important role.

- Conservative treatment - in some mild defects, symptomatic treatment with drugs that support heart function is carried out;
- Surgical procedures - open heart operations are performed to completely eliminate or correct the existing defect in the heart;
- Interventional cardiology - minimally invasive methods, such as closing a hole in the heart through a catheter, are effective in many cases;
- Rehabilitation - during the postoperative recovery period, it is important to monitor heart function, coordinate physical activity, and return the child to a normal lifestyle.

CONCLUSION: Congenital heart defects are one of the most common congenital diseases in children, and early diagnosis and appropriate treatment can significantly improve the

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quality of life and life expectancy of patients. The study found that modern diagnostic tools - especially echocardiography and MRI - allow for accurate detection of heart defects. Also, the results of treatment using minimally invasive methods and modern cardiosurgical interventions are quite positive, and the rehabilitation phase ensures the patient's full return to social life. It is recommended that the diagnostic and treatment strategies proposed in this direction be widely used in practice.

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