

# METHODS OF TREATMENT OF CONGENITAL HEART DEFECTS IN MODERN MEDICINE

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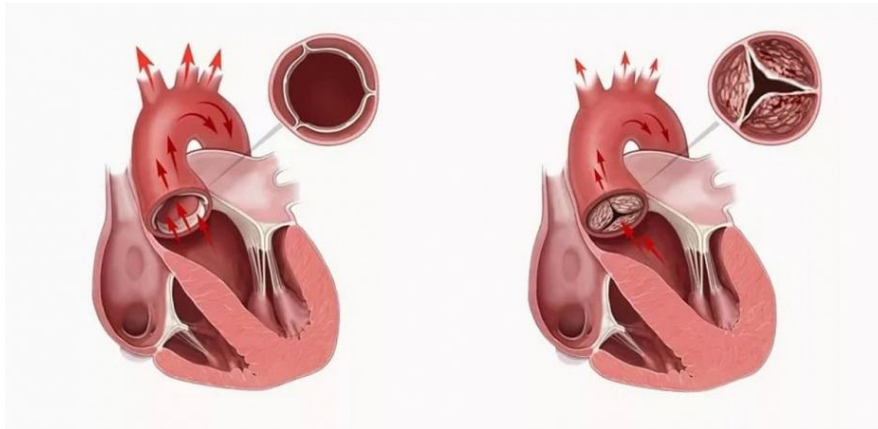
**Annotation.** The purpose of this article is to describe congenital heart defects, to study their causes and to provide information about accurate and rapid diagnostic diagnosis and treatment methods of these defects with the help of improved devices available in modern medicine .

**Key words:** echocardiography, Doppler echocardiography, \*Exo-KG, Doppler-echo-KG, pacemaker.

**Introduction:** Congenital heart defects are the leading cause of death in the first year of life among newborns and children and occur with a frequency of 6-8 cases per thousand births. This means that almost 1% of all live births have some form of congenital heart defect. The incidence rate can vary by region, which is influenced by factors such as genetic factors, environment and, most importantly, the quality of healthcare in that region.

**Heart: The heart** is a muscular organ located in the chest. A middle- aged person's heart is slightly compressed from front to back, conical in shape, about the size of an average clenched human fist. The average weight of the heart is 300 g in men, a little less in women, 220-250 g. The length of the heart in middle-aged people is 10-15 cm, the width (at the base) is 8-11 cm, the thickness of the front and back walls is 6-8.5 cm. The anterior sterno-costal surface of the heart coincides with the handle of the sternum on the back of the third-VI ribs. The second flat surface of the heart faces backwards and slightly downwards, and touches the center of the diaphragm, which is formed by the tendon, and is called the diaphragmatic surface. The heart works in the position of hanging on the large arteries and veins starting from its base. The heart is composed of four chambers: two chambers and two ventricles, the left chamber and the left ventricle are the left or arterial part of the heart, and the right chamber and the right ventricle are the right or forms a vein. Thus, the two parts of the four -lobed heart, which are connected to each other, are differentiated. Including, if the right ventricle and the right ventricle are connected to each other through the right interventricular opening, on the other hand, the left ventricle and the left ventricle are connected to each other through the left interventricular opening. are connected by means of In addition, there is an oval pit in the middle of the septum between the compartments .

defects, diagnosis and treatment methods in modern medicine that occur in these parts of the heart.



**Figure 1.** A normal heart (left) and a heart with aortic stenosis (right)

**Materials and methods:** Modern diagnostic methods allow ultrasound examination of the baby's heart in the 16th week of pregnancy. If changes are detected, parents can not only prepare psychologically, but also plan future treatment together with the doctor. Electrocardiography, \*CT or \*\*MRT of the myocardium, X-ray examination of the heart and lungs are used to detect congenital heart defects. One of the most widely used methods in practice is echocardiography. Echocardiography is the most common method of diagnosing the pathology of the heart valve apparatus, and the effective implementation of this process is mainly determined by the level and equipment of the ultrasound scanner. Phonocardiography is used to diagnose heart sounds and tones, and to identify valvular defects. \*\*\*Exo-ECG – to see the morphology of the defect and to determine the functional state of the heart. Doppler-echo-KG allows to determine the direction of blood flow - to determine regurgitation and turbulence.

\*Echo-KG - echocardiography

\* CT - computer tomography \* \* MRI - magnetic resonance imaging

\* Exo-KG – echocardiography \*\* Doppler-echo-KG – Doppler echocardiography

\*ECG - electrocardiography \* \*MRT - magnetic resonance imaging

These processes often help identify direct and indirect combinations of a given defect. If a more complete diagnostic examination is needed, angiocardiography and examination of the heart chambers will be performed in a cardiac surgery hospital.

**Results and discussion:** Congenital heart defects are abnormalities in the structure of the heart and blood vessels that occur at birth (in utero). Congenital heart defects occur as a result of incorrect formation of the fetal heart and large vessels of the heart during embryonic development. In 2000, the International Nomenclature was developed to create a general classification system for congenital heart defects. There are 2 types of heart defects in the human body: congenital and acquired. In infancy (up to 1 year old), complete underdevelopment of the cardiovascular system (open arterial paths or incomplete completion of the foramen ovale) is also included in heart defects. Heart defects can occur in the following situations.



**Figure 2.** Mitral valve insufficiency.

Stenosis is a narrowing of the valve opening, making it difficult for blood to flow. The shortcoming is that the valves do not close tightly. Transposition of the great vessels - the origin of the aorta from the right side of the heart and the exit of the pulmonary artery from the left. Tetralogy of Fallot - combines four extremely dangerous diseases: stenosis of the right ventricular outflow tract, ventricular septal defect, dextrose of the aorta and hypertrophy (enlargement) of the right ventricular myocardium .

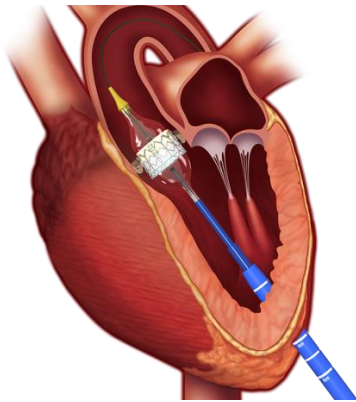
**Causes of the disease:** Children with congenital heart disease are born to diabetics, women who have had severe viral infections during pregnancy, smokers, alcohol and drug users, and some women who have been exposed to X-rays. Risk factors include women who give birth over the age of 35, children with chromosomal abnormalities in the form of Down syndrome. In addition, poisoning of the mother's body, biological effects of ionizing rays and genetic diseases are also causes in the early period of pregnancy. Heart disease can develop at any stage of pregnancy, but 6-8 weeks is the most dangerous. During this period, the divisions of the heart and valves are formed, and any negative factor can affect them.

Many factors affect the development of congenital heart defects. Among them:

- chromosomal diseases (5%);
- gene mutations (2-3%);
- influence of environmental factors (1-2%).
- the main cause of birth defects is polygenic-multifactorial predisposition (about 90%).

Chromosomal diseases. They can manifest themselves as qualitative (changes in the structure) or quantitative (changes in the number) chromosomes. They cause many abnormalities in the body, including affecting the heart. For example, autosomal trisomy often leads to atrial and ventricular septal defects, as well as their combination. If abnormalities affect the sex chromosomes, then ventricular septal occurs.

Gene mutations. Gene mutations are the result of point changes in the human genome. However, even they can cause several disorders in the work of internal organs. Congenital heart defects can occur as a result of autosomal dominant diseases (Marfan syndrome, Holt-Oram, etc.), as well as autosomal recessive diseases (Roberts Kartagener) .



**Figure 3.** Inserting a stent into the heart.

Polygenic-multifactorial predisposition. It has the greatest influence on the formation of the fetus. According to this model, the main symptoms of congenital heart defects: the risk increases with the increase in the number of patients with congenital heart defects among relatives of the 1st degree, relatives of the affected sex are more often affected, the more severe the defect in a close relative, the higher the risk of its recurrence in the child.

**Symptoms of Congenital Heart Defect: Patients** with Congenital Heart Defect have the following symptoms:

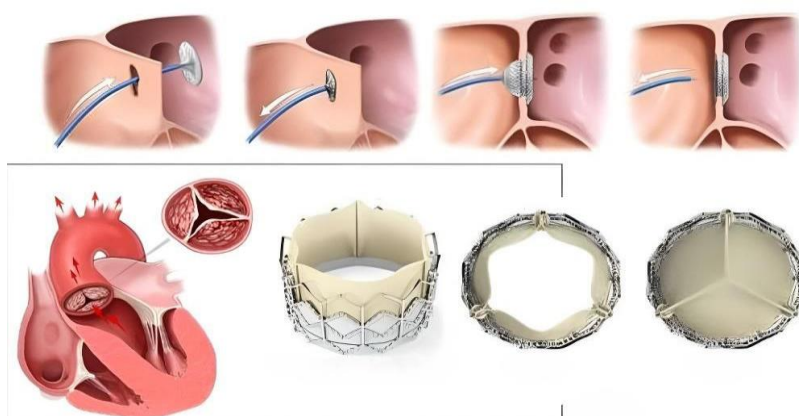
- bruises of the skin on the lips, ears and under the nails
- low appetite, slow weight gain
- increased sleepiness in children and babies or, on the contrary, constant restlessness
- poor nutrition or increased fatigue, shortness of breath and forced pauses during meals
- a delay in the child's development compared to the established requirements of the age group
- respiratory dysfunction
- increased fatigue in the child

**Diagnosis:** In the treatment of congenital heart defects, it is very important to make an accurate diagnosis first. When making a diagnosis, the heart is thoroughly examined. If a heart problem is not detected during pregnancy, in almost 50% of cases, the diagnosis of heart anomalies is made during the routine medical examination of the newborn in the first week of life. In 60% of other children with congenital heart disease, the diagnosis is made in the first months of life. In all other cases, the diagnostic process begins when the symptoms of a disorder in the development of a child diagnosed with the disease appear by the parents or the attending physician. In this case, as a result of timely diagnosis, not only the correction of the congenital defect, but also treatment for other systems and organs affected by heart pathology may be required. If the child is diagnosed with a disease, he will undergo the following diagnostic tests:

- \*ECG;
- Holter \*ECG monitoring;
- echocardiography;
- transesophageal echocardiography;
- 3D echocardiography;
- 3D Doppler color image;
- \*\* MRI;

- cardiac catheterization.

**Treatment of congenital heart defects:** In cases where defects are detected based on diagnostic results, the doctor can prescribe a set of necessary drugs or perform an appropriate surgical procedure. In some cases, the child's condition is observed first, because there is a possibility of self-compensation over time. Operations to correct heart defects are aimed at:



**Figure 4.** The process of closing the interatrial defect.

- Valve replacement.
- Removal of part of the aorta.
- Dilation of valve annulus due to stenosis.
- Reconstruction of large ships.
- Fix partition defects.

In most cases, normal heart function can be completely restored. For this, timely treatment and a competent approach are important. Early contact with a specialist reduces the risk of serious complications and provides a chance for full rehabilitation and a normal lifestyle in the future.

**Transposition of the great vessels** - is a congenital condition in which the two main arteries that drain blood from the heart - the main pulmonary artery and the aorta - are replaced or moved.

**Atherosclerotic heart diseases** - in the treatment of atherosclerotic heart diseases, if the artery is damaged in 1-2 places, stenting is performed in this case. A stent is a cylindrical-shaped medical device that is placed in the gates of an artery. This treatment method belongs to endovascular surgical interventions and is minimally invasive. Unlike traditional surgery, this method is performed through a small incision (3-5 cm) in the chest. This makes the process less invasive and speeds up the patient's recovery.

**Pulmonary stenosis** causes a narrowing of the pulmonary artery, the large blood vessel that carries blood from the right ventricle to the lungs. The narrowing forces the myocardium to pump blood harder, which causes an increase in the size of the organ and an increase in pressure on the right side of the heart. Mild cases may have no symptoms.

**Patent atrioventricular canal** is a group of defects that includes several anomalies, most often atrial septal defect and interventricular septal defect, abnormal formation of mitral or tricuspid valves, and a combination.

**Endovascular surgery** - when using this method, the surgeon's work is performed without the use of artificial blood circulation and without opening the chest. This significantly shortens the duration of the intervention and significantly reduces the surgical injury and its consequences. The type of anesthesia is also changing: anesthesia for endovascular treatment is not as severe as for open interventions. The surgeon works with a digital X-ray machine, monitors his movements and the result of the manipulation thanks to the use of a contrast substance that allows the heart and blood vessels to be seen on the screen. Special echocardiography methods are also used. All this allows to evaluate the effectiveness and result of treatment immediately after the manipulation.

**Installation of an electronic pacemaker. In patients** with bradycardia or atrioventricular blockade, when it is necessary to maintain the rhythm, the pacemaker is installed when the heart is working intermittently. This 30-50 gram device has a battery life of 7-10 years and is the best treatment for bradyarrhythmia. Electrodes connected to a stimulator sewn into muscle tissue are inserted into the heart through a vein. The most difficult part is placing and securing the tip of this electrode into the lobe or ventricle. This device is inserted through a small skin incision. After this device is implanted in the body, the patient is discharged from the hospital within 24-48 hours.

**Summary.** You can come to this conclusion after reading the article. First of all, modern medicine is much faster than traditional medicine, that is, when patients with heart defects apply, this defect can be detected very quickly using modern diagnostic methods. The process of treating this defect, as well as improving the patient's condition after the operation, i.e., the time spent on rehabilitation, have been greatly reduced. The presence of such advances does not allow the patient to stay in one place for a long time, which is also of great benefit in preventing bed sores. Second, modern medicine puts patient safety first. An example of this is the process of placing a catheter or pacemaker on a patient. All these practices increase patient safety to 98-99%.

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