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Heart Transplantation

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Heart transplantation is an operation in which a diseased heart that can not cope with its functions is replaced with a healthy donor organ.

Although heart transplantation is a complex operation, the chances of survival in such patients are quite good, especially with careful and proper medical care, which is strictly observed in Belarus [1].

Who needs a heart transplant? Heart transplants are used to treat heart failure that is not amenable to other therapies. In adults, severe heart failure can result from:

- weakening of the heart muscle (cardiomyopathy);
- valvular heart disease;
- congenital heart defects;
- ischemic heart disease;
- unsuccessful previous heart transplant.

In children, heart failure is most often caused by birth defects or cardiomyopathy.

A lot of information is needed to determine if a patient is suitable for a heart transplant. The examination process is carried out by cardiac surgeons, cardiologists, anesthesiologists, psychologists and other specialists. Preparation of the patient, in addition to the standard preoperative examination, includes:

- 1) Assessment of the psychological state and social status;
- 2) Blood tests;

3) Instrumental examinations.

In Belarus, doctors performing heart transplants carefully study all information about the patient and his health condition in order to determine the possibility of an operation. After they recognize the patient as a candidate for transplant, they are included in the list of recipients waiting for a suitable donor organ (so-called waiting list).

How is a heart transplant carried out?

After a suitable donor appears, doctors surgically remove the heart from its body. It is cooled and stored in a special solution until the time of transplantation to the recipient. Before starting the operation itself, the cardiac surgeon must make sure that the donor heart is in good condition.

During the operation, the patient is transferred to artificial circulation. This allows the body to receive oxygen and nutrients from the blood. After that, surgeons remove the patient's own heart and replace it with a donor heart. Then they connect the blood vessels, allowing blood to circulate through the new heart and lungs. After warming, the heart begins to contract. Surgeons carefully check all blood vessels and their connections, then turn off the heart-lung machine, and then suture the wound.

For some patients with advanced heart failure, heart transplantation may not work. In addition, donated hearts are not always available, so it may be necessary to wait several years before a suitable heart is found. Mechanical circulatory support is a way to improve blood circulation throughout the body using a special heart pump called an artificial left ventricular assist device (VAD). ALV helps the damaged heart pump blood throughout the body. It does not replace the heart chamber, which will continue to function normally.

ALV are used for 3 main reasons:

1) They support the vital functions of patients until the moment of donor organ transplantation. In this case, ALV is used as a temporary solution while awaiting transplantation.

2) Allows the heart to "rest" so that it can restore a number of its functions. In patients who are showing improvement, the device can be removed, and transplantation may not be necessary at all. In such cases, VAD is used as a transitional stage to recovery.

3) Provides mechanical support for blood circulation for several years. This is usually an option for patients whose heart condition is too severe to survive a transplant. In this case, the ALV is implanted as the ultimate targeted therapy.

The design of most ALV devices includes 3 parts:

- a pump that is installed inside the body (implantable ventricular accessory) or outside (external or wearable device);
- the system controller, which is outside the body and is used to program the parameters of the device;
- an external power supply for the pump (it can be a console or batteries).

When and how is it applied?

The implantation of an ALV requires surgery under general anesthesia. A cardiac surgeon will connect the machine to the apex of the left ventricle and implant a cannula into the aorta to draw blood from the ventricle and re-enter the systemic circulation (artificial left ventricle) or pulmonary artery (artificial right ventricle). As a result, blood flow in the body increases and the perfusion of internal organs improves.

Living with an ALV will lead to some changes for you and your family. The battery management process is pretty straightforward. However, despite significant technological advances, a percutaneous cable (transmission) is still needed to connect the internal pump to the external controller. Moreover, the place of its exit requires special processing to prevent infection. Certain heart failure medications and anticoagulant

therapy must be continued. However, most people with VAD are able to live at home, move freely, enjoy their favorite activities, and even return to work or school. Many VAD patients also find they have more energy than before because more oxygenated blood is now circulating in their bodies.

References:

1. Shumakov, V.I. Heart Transplantation: A Guide for Doctors / V. I. Shumakov. – Moscow : 2006. – 400 p.