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ИЗМЕНЯЮЩЕЕСЯ ЛИЦО ТРАНСПЛАНТАЦИИ СЕРДЦА.

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***Резюме.** Прошло 50 лет, с тех пор как первая пересадка сердца от человека к человеку была произведена. С тех пор были усовершенствованы методы отбора доноров и реципиентов, улучшено отношение к донорскому сердцу и были получены достижения в иммуносупрессии, что значительно повысило выживаемость.*

***Ключевые слова:** хирургия, трансплантация, сердце, достижения.*

Resume. *It has been 50 years since the first human-to-human heart transplantation was performed. Since then, refinement of donor and recipient selection methods, better donor heart management, and advances in immunosuppression have significantly improved survival.*

Keywords: *surgery, transplantation, heart, achievements.*

Topicality: Heart transplantation is one of the most developing directions in transplantation in Belarus.

Objective: To review the heart transplantation in Belarus and show its perspective.

Tasks:

1. To find out what the heart transplantation is
2. To analyze the changing population of patients
3. To review the organ preservation
4. To consider recent advances in transplantation immunology
5. To review the allograft vasculopathy
6. To review the immune tolerance.

Materials and methods: Recent scientific publications and the Internet resources were studied and descriptive critical analyses and systematization of the data available were performed.

Results and its discussion: Organ transplantation has become possible due to increased knowledge of fundamental biological processes and the development of new technologies. The foundations of organ transplantation were established by the work of Alexis Carrel on cell and tissue culture in the early years of the 20th century. In 1905 he and Charles Guthrie (the University of Chicago) performed the first experimental heart transplantation.

Recent advances in transplantation immunology, organ preservation, allograft vasculopathy, and immune tolerance resulted in better outcomes of clinical transplants.

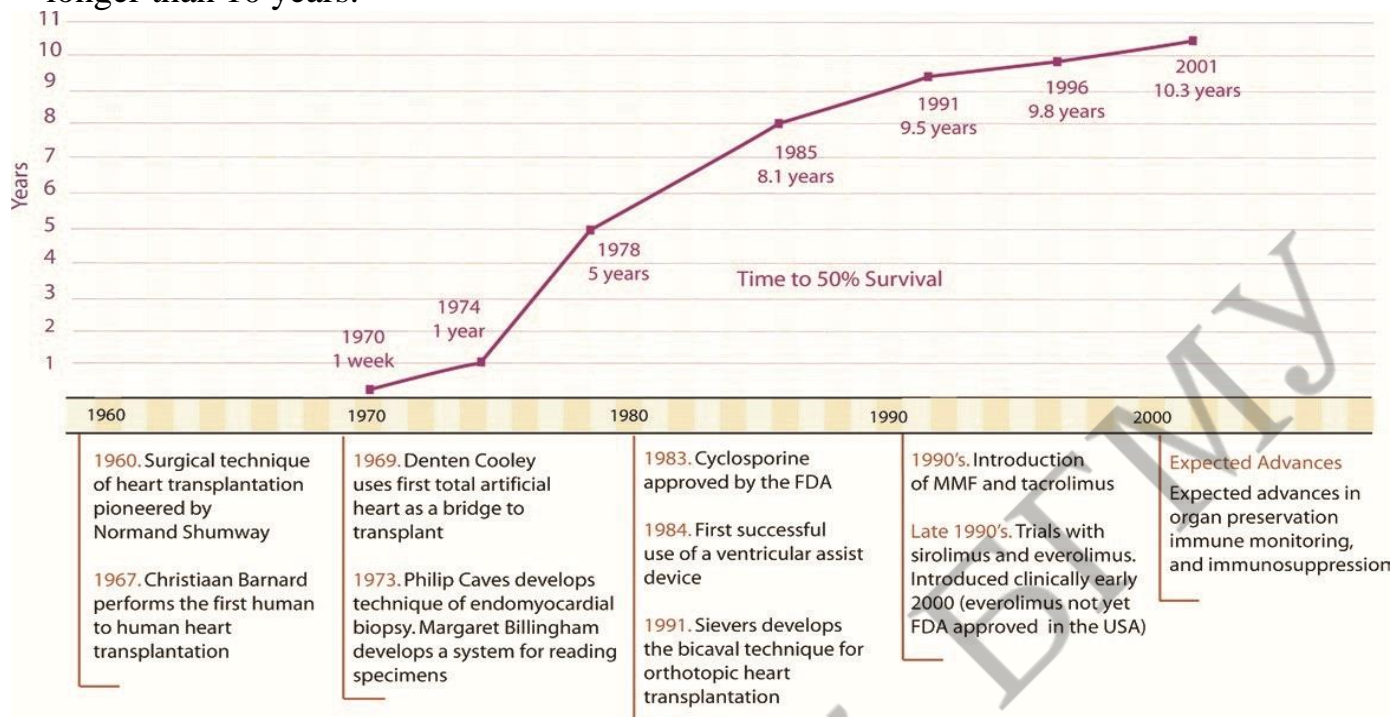
Heart transplantation is the operation in which a diseased heart that can't cope with its functions is replaced by a healthy donor organ. This treatment is usually offered to patients for whom conservative therapy or other surgical intervention didn't improve the status. It is a highly complicated operation but the chances of survival for such patients are quite good.

The first heart transplantation was made in South Africa by Christiaan Barnard in 1967. In December 1967, a heart from a person who had just died from a head injury was transplanted, with full permission of the donor's family, into the chest of a 54-year-old Louis Washkansky. Washkansky regained full consciousness and had lived for eighteen days even spending time with his wife before he died of pneumonia, with the reduction of his immune system by the anti-rejection drugs being a major contributing factor. Barnard's second transplant patient Philip Blaiberg at the beginning of 1968 lived for nineteen months and was able to go home from the hospital.

For the first time heart transplantation in Belarus was performed at the Republican Scientific and Practical Center "Cardiology" in Minsk in 2009. Since that time 234 operations have already been performed, which indicates the solid experience of surgeons. The first heart-lung transplantation in Belarus was performed in November 2016.

Heart transplant sometimes is the only chance to save a person's life. Its effectiveness, despite the complexity of the operation is quite high: the survival rate of patients at one year

is 81.8%, at 5 years - 69.8%. A significant number of patients live after transplantation longer than 10 years.



Picture 1 – The changing popula-

The face of heart transplantation is slowly changing. (picture 1)

Usually, older patients are considered for heart transplantation. However, a greater proportion of younger patients with complex congenital heart diseases (CHD) are currently referred for medical evaluation and treatment. Patients with CHD are also at an increased risk of perioperative bleeding and mortality. With the advances made in cardiac surgery, an increasing number of patients with CHD are now surviving into adulthood.

The surgical techniques for heart transplantation include 2 basically different surgical approaches (i.e., orthotopic [the donor heart implanted in the normal place of the native heart] and heterotopic [the donor heart implanted beside the native heart]). One of the most promising recent advances in organ preservation is normothermic organ preservation, which provides warm blood perfusion of the donor organ, potentially decreasing reperfusion injury and graft dysfunction. This technology may decrease early graft failure and allow increased utilization of available organs, or reduce ischemic time.

Immunologic barriers remain the central issue in transplantation medicine. The goal of immunosuppression is to prevent or treat rejection while minimizing the risk of infection or cancer. Immunosuppression may be achieved by blocking lymphocyte activation or response pathways, depleting lymphocytes, or diverting lymphocytic traffic. In the early 1980s, the introduction of cyclosporine as the mainstay of immunosuppressive regimens was followed by a significant improvement in survival of heart transplant recipients.

The goal of maintenance immunosuppression is to minimize the risk of infection or cancer. Most cardiac transplant programs use a triple therapy consisting of corticosteroids

(usually prednisone), a CNI (cyclosporine or tacrolimus), and an antiproliferative agent (usually mycophenolate mofetil). Prednisone is used early after heart transplantation and usually tapered to low doses or withdrawn during the first year.

Tolerance refers to a state of permanent immunological acceptance of the graft (in our case the heart) without the need for ongoing immunosuppression. Achieving tolerance would considerably reduce the complications associated with chronic immunosuppression. One of the difficulties in studying tolerance at this time is the lack of specific markers of tolerance.

Current immune monitoring of cardiac transplants is imperfect and revolves around the use of the endomyocardial biopsy, drug level monitoring, and echocardiography. Although this strategy has proved to be very useful, many patients still present with rejection, infection or drug toxicity despite having the desired level of immunosuppression.

An ideal immune monitoring strategy would be noninvasive, reliably allow discrimination between the presence and absence of rejection, and detect a state of overimmunosuppression. Such a strategy does not currently exist.

Beyond the first year, transplant vasculopathy and malignancy are the 2 most important causes of death. Compared with atherosclerotic coronary artery disease, allograft vasculopathy is usually characterized by diffuse intimal hyperplasia that may affect the epicardial vessels as well as the microcirculation in a longitudinal and concentric fashion. Plaque rupture is uncommon in allograft vasculopathy because of its usually diffuse and hyperplastic nature.

Infection remains an important cause of mortality after heart transplantation. In general, the risk of infection changes over time in a predictable pattern. Infections in the early period posttransplant (1 month) are mainly associated with technical or nosocomial factors; infections between 1 and 6 months are often associated with opportunistic organisms or activation of latent infection; infections after 6 months are more often community acquired. Several factors are contributing to the changing face of infection in solid organ transplantation:

1. the introduction of bacterial and viral prophylaxis (most often with trimethoprim-sulfamethoxazole and valgancyclovir);
2. early withdrawal of corticosteroids;
3. the emergence of more effective antifungal agents;
4. the emergence of resistant strains of bacteria and viruses.

The major effects of bacterial and viral prophylaxis have been a significant decrease in pneumocystis pneumonia infection, infection with herpesviruses (e.g., cytomegalovirus), as well as a decrease in infections with listeria, nocardia, and toxoplasmosis. The survival of patients with invasive aspergillus has also improved with the introduction of echinocandins (e.g., caspofungin) and new azoles (e.g., voriconazole or posiconazole). In the future, more sensitive microbiological assays and better immune monitoring tools will continue to decrease the mortality of infectious complications in solid organ transplant recipients.

Malignancies represent the leading cause of death in recipients who live longer than 5 years. The 2 most important malignancies are posttransplant lymphoproliferative disorders and aggressive skin cancers.

The introduction of proliferation signal inhibitors slow the progression of the treatment in cancer and may even lead to the regression of some malignancies.

Conclusion:

Heart transplantation offers patients with end stage heart failure a chance for a better quality and length of life. Achievements in transplantation, immune tolerance will eventually open the door to normal lives and life spans for all transplant recipients.

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THE CHANGING FACE OF THE HEART TRANSPLANTATION.

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Літаратура

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