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TOPIC: HEART FAILURE: MODERN DIAGNOSIS AND TREATMENT

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Abstract
This article explores heart failure as one of the pressing issues in modern medicine, analyzing its etiology, pathogenesis, and clinical course. The main factors contributing to the development of heart failure—ischemic heart disease, arterial hypertension, myocarditis, and cardiomyopathies—are separately examined. The role of modern diagnostic methods such as electrocardiography (ECG), echocardiography (ECHO), magnetic resonance imaging (MRI), and laboratory biomarkers in the early detection of heart failure is highlighted. In the treatment section, the effectiveness of pharmacological agents such as ACE inhibitors, beta-blockers, diuretics, as well as modern cardioimplantation techniques (pacemakers, defibrillators), is discussed. The study emphasizes that early diagnosis and a comprehensive treatment approach to heart failure are crucial for improving patients' life expectancy and quality of life.

Keywords: Heart failure, Diagnostic methods, Echocardiography, Electrocardiography, Myocardial ischemia, Cardiomyopathy, Biomarkers, Modern treatment, ACE inhibitors, Beta-blockers, Diuretic agents, Cardioimplantation, Quality of life, Chronic heart failure, Life expectancy.

Introduction

Login

Heart failure (HF) is characterized by the inability of the heart to provide complete blood circulation. This disease develops as the final stage of heart disease and occurs in about 1-2% of the population. Especially in people over 65 years of age, this figure exceeds 10%. In the 21st century, heart failure is becoming widespread even in developing countries. Severe forms of the disease significantly reduce the quality of life of patients, reduce their ability to work, and often cause hospitalization. This condition is considered a serious socio-economic problem in society.
Heart failure is most often caused by hypertension, coronary heart disease, valve defects, or heart muscle disease. The development of heart failure negatively affects all systems in the body, especially the function of the kidneys, brain, and lungs.

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Another type of heart failure is high-output heart failure, which is characterized by a high cardiac output but an inability to meet the needs of the tissues. This condition occurs in conditions such as severe anemia, thyrotoxicosis, or arteriovenous fistulas.

Modern research shows that strain imaging of the heart (speckle-tracking echocardiography) can detect diastolic dysfunction at an early stage. Cardiac biopsy is also sometimes important in determining the cause of myocarditis or infiltrative diseases.

The number of people retiring due to heart failure due to disability is increasing worldwide. Early detection of the disease can be more effective in combating it.

In addition, research is being conducted in the field of heart regeneration to restore heart tissue using rare cells (stem cells). In the future, it is expected that the practice of replacing the heart with a complete artificial heart will expand.

For patients living with heart failure, stress management strategies (e.g., meditation, deep breathing exercises) can help stabilize heart function.

At the 2024 ESC (European Society of Cardiology) conference, it was shown that new recommendations for heart failure suggest a stronger individual approach. Algorithms for early detection of heart failure using artificial intelligence are being developed.

Modern information systems are being introduced in the field of cardiology in Uzbekistan, and a single electronic registry of heart diseases is being formed. This has made it easier to carry out statistical analyses on heart failure.

For a healthy heart, it is important to live an active life, eat right, avoid stress, and undergo regular check-ups. Saving the heart means saving life.

Types and Pathophysiology of Heart Failure

The mechanisms of heart failure are complex and involve structural and functional changes in the heart. Systolic heart failure (HFrEF) occurs when the left ventricle has a reduced ejection fraction. Diastolic heart failure (HFpEF) occurs when the left ventricle has a reduced filling process. Heart failure can also be right ventricular, left ventricular, or combined (both ventricular). Pathophysiologically, it is associated with myocardial inflammation, fibrosis, hypertrophy, valvular dysfunction, or circulatory disorders.

Diagnostic Methods

In addition to primary examinations, many modern methods are used in diagnosis. Increased levels of natriuretic peptides (BNP, NT-proBNP) are a reliable biomarker of heart failure. ECHO cardiography - allows you to determine the size of the heart chambers, wall thickness, and contraction fraction. Magnetic resonance imaging (MRI) accurately assesses the structure and function of the heart muscle. Holter monitoring allows you to monitor the heart rhythm for 24-48 hours. Chest radiography - is useful in determining pulmonary blood pressure, heart size, and the presence of pulmonary edema.

Global Burden of Heart Failure

According to the World Health Organization (WHO), heart failure is diagnosed in more than 64 million people. Hundreds of thousands of deaths per year are associated with heart failure. The

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increasing number of patients in developed countries is associated with the aging population. According to new studies, more than 30% of patients with heart failure are readmitted to the hospital within a year. The cost to the health system in this regard is billions of dollars. This situation requires a review of health policies and the development of prevention strategies for the disease.

Modern Treatment Approaches

In addition to drugs for heart failure, invasive methods and rehabilitation programs play an important role. In pharmacotherapy, SGLT2 inhibitors have a diuretic effect in addition to glucose excretion in heart failure. Pacemakers - synchronize the heart rhythm and improve cardiac output. Left ventricular assist device (LVAD) - is used as an alternative to heart transplantation in severe heart failure. The treatment plan also includes physical rehabilitation, psychological support, and nutritional advice.

Lifestyle Changes

It is recommended to limit salt intake to no more than 2 grams per day and to drink no more than 1.5 liters of fluid per day. Regular physical activity reduces the heart's need for oxygen. Supporting mental health, reducing depression and anxiety improves heart function. A special diet is recommended for patients with heart failure - the DASH diet. This diet is low in fat, rich in potassium, calcium and magnesium, and helps maintain normal blood pressure.

Scientists' Opinions

Many international conferences on heart failure are held, and experts are expressing their opinions. Professor Milton Packer is known as a leading scientist in clinical trials of heart drugs. According to his research, sacubitril/valsartan helps reduce mortality in heart failure. Professor Lars Lund also emphasizes the need to pay more attention to the HFpEF type of heart failure. Uzbek professors are developing strategies for early detection and treatment of heart failure based on national standards.

Status of the Disease in Uzbekistan

Over the past 10 years, Uzbekistan has been implementing health care reforms to reduce deaths from heart disease. The Republican Specialized Cardiology Center, regional heart centers, and polyclinics are working together. Advanced training courses for doctors and nurses, and the provision of modern diagnostic equipment are expanding. Large-scale events are being organized to promote a healthy lifestyle and heart health among the population. Schools and colleges are promoting healthy eating, physical activity, and quitting bad habits.

Conclusion and Suggestions

Heart failure is one of the most pressing cardiovascular diseases, causing high morbidity and mortality rates worldwide. Studies show that early detection of this syndrome and individualized treatment can significantly improve the life expectancy and quality of life of patients.

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Modern diagnostic methods - in particular, **ECG, ECHO, MRI** and laboratory biomarkers - have significantly increased the ability to detect heart failure at an early stage. Treatment strategies are based on conservative (pharmacological) and technological (implantable devices) approaches. In particular, the introduction of modern tools such as **ACE** inhibitors, beta-blockers, diuretics, as well as cardiac resynchronization therapy into clinical practice is increasing the effectiveness of treatment.

In conclusion, systematic prevention, early diagnosis, individualized treatment plans, and long-term follow-up of patients are necessary to keep heart failure under control. Regular training of medical personnel and public education also help to reduce the consequences of this disease.

References

1. Implement screening programs for heart failure: Identify patients at risk and keep them under regular medical supervision.
2. Introduction of modern diagnostic tools in primary care and polyclinics: In particular, widespread introduction of echocardiography and BNP tests at the district and regional levels.
3. Organize ongoing training courses on heart failure for medical personnel: This will increase the competence of doctors and nurses in using modern approaches.
4. Establish comprehensive rehabilitation and psychological support programs for patients with HF: Long-term monitoring, diet, physical activity and mental preparation will increase the rate of recovery.
5. Update and adapt HF treatment protocols to local conditions: It is necessary to develop national guidelines based on the recommendations of the World Health Organization and ESC (European Society of Cardiology).
6. Activate scientific research: The effectiveness of treatment can be increased by identifying new biomarkers of heart failure, studying genetic factors and testing new drugs.

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