

HEART FAILURE: CLINICAL MANIFESTATIONS AND THERAPEUTIC STRATEGIES

Ruzmatova Khiloloy Qobilovna

Assistant, Department of Anatomy and Microanatomy

Ibragimov Sherzodbek Bahromjon ogli

Student, Faculty of Pediatrics

CAMU International Medical University

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This article analyzes the relevance of heart failure in modern medicine, including its etiology, pathogenesis, clinical manifestations, and contemporary therapeutic strategies. Heart failure is a complex clinical syndrome characterized by the inability of the heart to pump a sufficient amount of blood to meet the metabolic needs of the body. It most commonly develops as a complication of Ischemic Heart Disease, Arterial Hypertension, and Cardiomyopathy.

The article also highlights the main symptoms of the disease, including shortness of breath, rapid fatigue, peripheral edema, tachycardia, and reduced tolerance to physical activity. In addition, diagnostic methods such as Electrocardiography (ECG), Echocardiography, and cardiac biomarkers are discussed, along with the criteria used for disease classification. Modern treatment strategies are also described, including pharmacotherapy with ACE Inhibitors, Beta Blockers, Diuretics, and SGLT2 Inhibitors, as well as device-based therapy and lifestyle modification approaches. The article substantiates that early detection of Heart Failure and a comprehensive treatment approach play a crucial role in improving patients' quality of life and reducing mortality rates.

Heart Failure occurs when the heart muscle is unable to pump blood efficiently to meet the body's needs. In such cases, blood may often flow backward, causing fluid to accumulate in the lungs and leading to shortness of breath. Certain heart diseases can gradually weaken or stiffen the heart, making it unable to fill with or pump blood effectively. These conditions include the narrowing of the heart's arteries, known as Coronary Artery Disease, and high blood pressure, or Hypertension.

Appropriate treatment can help improve the symptoms of heart failure and may help some individuals live longer. Lifestyle modifications can also improve the overall quality of life of patients.

Try to lose excess weight, engage in regular physical exercise, reduce salt intake, and manage stress. These measures can help improve overall health and support the management of Heart Failure.

Heart failure can be a life-threatening condition. People with heart failure may experience severe symptoms, and in some cases advanced treatments may be required. Some patients may need a Heart Transplantation or the implantation of a Ventricular Assist Device to help the heart pump blood effectively. Heart failure is also commonly referred to as Congestive Heart Failure.

If a person has Heart Failure, the heart cannot supply enough blood to meet the body's needs. Symptoms may develop gradually; however, in some cases they can appear suddenly.

Common symptoms of heart failure may include:

- Shortness of breath during activity or when lying down.
- Fatigue and weakness.
- Swelling in the legs, ankles, and feet.
- Rapid or irregular heartbeat.
- Reduced ability to exercise.
- Wheezing
- A persistent cough, sometimes producing white or pink-tinged phlegm with blood streaks.
- Abdominal swelling.
- Rapid weight gain due to fluid retention.
- Nausea and loss of appetite.
- Difficulty concentrating or decreased alertness.
- Chest pain, if heart failure results from a heart attack.

Heart failure can begin suddenly after a medical event or injury that damages the heart muscle. However, in most cases, it develops gradually over time as a result of long-standing medical conditions.

Conditions that can lead to Heart Failure include:

- Arrhythmia (problems with heart rate or rhythm)
- Cardiomyopathy
- Congenital heart defects or other types of inherited heart disease
- Coronary Artery Disease
- Endocarditis
- Myocardial Infarction (heart attack)
- Heart valve diseases

- Hypertension (high blood pressure)
- Pulmonary embolism (blood clot in the lungs)
- Diabetes Mellitus
- Severe lung diseases such as Chronic Obstructive Pulmonary Disease (COPD)
- Obesity

Over time, left-sided heart failure can lead to right-sided heart failure.

Reduced cardiac contractility → decreased ejection fraction → impaired oxygen delivery to tissues → activation of compensatory mechanisms (such as tachycardia and RAAS activation) → over time, further weakening of the heart muscle. Chronic heart failure is a serious condition, but early diagnosis and appropriate therapy can significantly improve quality of life and increase survival. Treatment of ischemic heart disease aims to restore normal blood supply to the myocardium and improve patients' quality of life. Unfortunately, therapeutic interventions alone are not always sufficient. Several surgical and interventional procedures are available, including coronary artery bypass grafting (CABG), transmyocardial laser revascularization, and coronary interventions such as balloon angioplasty and coronary artery stenting.

A common symptom of Ischemic Heart Disease is frequent shortness of breath in patients. This can occur not only during brisk walking or climbing stairs, but also during periods of rest. Other associated conditions include Arrhythmia, disturbances in heart function, rapid heartbeat, Hypertension, and sudden spikes or drops in blood pressure. Angina pectoris presents as pressure-like chest pain that may radiate to the neck and left shoulder.

Myocardial infarction resembles an angina attack but is not relieved by medications. It is accompanied by severe pain in the heart region and indicates the progression of coronary artery disease. Due to direct damage to the heart muscle, it is considered life-threatening.

Ischemic Heart Disease can manifest even in individuals who do not have obvious risk factors for cardiovascular disease. Therefore, it is important to be aware of the signs of coronary artery disease. The earlier disturbances in blood circulation are detected, the higher the likelihood of successful treatment. The progression of ischemic heart disease is often gradual and may be nearly asymptomatic in the early stages—few people notice mild chest discomfort or slight shortness of breath. In these early stages, regular preventive check-ups with a cardiologist or general practitioner are essential for timely diagnosis. Clinical forms of ischemic heart disease include: sudden cardiac death, angina pectoris, myocardial infarction, post-infarction cardiosclerosis, arrhythmias, heart failure, and circulatory insufficiency.

The clinical presentation of acute left ventricular failure includes cardiac asthma and alveolar pulmonary edema. Attacks of cardiac asthma are usually triggered by physical or neuropsychological stress. Severe episodes often occur at night, causing the patient to awaken in fear. Cardiac asthma is characterized by a sensation of air hunger, palpitations, a

cough with frothy sputum, sudden weakness, and cold sweating. The patient often assumes an orthopneic position, sitting upright with legs dangling. On examination, the skin may appear pale with a slightly grayish tone, cold and clammy, with cyanosis of the extremities and pronounced wheezing. The pulse is weak and irregular, the cardiac borders may be enlarged to the left, heart sounds are muffled, and a gallop rhythm may be present. Blood pressure is often reduced.

Pulmonary edema develops as a result of increased pressure in the small (pulmonary) circulation. Acute episodes are often accompanied by the production of large amounts of frothy, pink sputum. On auscultation, moist rales can be heard at a distance. The patient usually assumes an orthopneic position, with a bluish face, distended neck veins, and skin covered with cold sweat. The pulse is weak, irregular, and rapid, blood pressure is low, and auscultation of the lungs reveals various crackles. Because pulmonary edema can be life-threatening, it constitutes a medical emergency requiring intensive care. Acute left atrial failure occurs in conditions such as mitral stenosis (affecting the left atrium–ventricle valve). Its clinical presentation is similar to that of acute left ventricular failure.

Acute right ventricular failure often results from thromboembolism of the major branches of the pulmonary artery. Clinical manifestations in the systemic (large) circulation include edema of the legs, pain under the right rib cage, distension and pulsation of the neck veins, wheezing, cyanosis, and chest discomfort with pressure in the heart area. Peripheral pulses are rapid and weak, arterial blood pressure is sharply decreased, central venous pressure is elevated, and the right heart is enlarged.

Therapy is primarily aimed at addressing the underlying cause, such as Ischemic Heart Disease, hypertension, rheumatic disease, myocarditis, and others. In cases of congenital heart defects, cardiac aneurysms, or constrictive pericarditis causing mechanical obstruction to heart function, surgical intervention is often required. In acute or severe chronic heart failure, strict bed rest and complete physical and mental rest are indicated. In other cases, moderate activity that does not worsen the patient’s condition is recommended. Fluid intake is limited to 500–600 ml per day, and salt intake is restricted to 1–2 g. A diet rich in vitamins and easily digestible foods is prescribed. Pharmacotherapy for heart failure allows improvement of the patient’s condition and quality of life.

The following drug groups are prescribed in this pathology:

- **Cardiac glycosides** (digoxin, strophanthin, etc.) — increase myocardial contractility, enhance cardiac pumping function and diuresis, and improve tolerance to physical exertion.
- **Vasodilators and ACE inhibitors** (enalapril, captopril, lisinopril, perindopril, ramipril) — reduce vascular tone, dilate veins and arteries, thereby decreasing vascular resistance during cardiac contractions.
- **Nitrates** (nitroglycerin and its long-acting formulations) — improve ventricular filling, enhance cardiac output, and dilate coronary arteries.
- **Diuretics** (furosemide, spironolactone) — reduce fluid retention in the body.

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- **β -adrenoceptor blockers** (carvedilol) — slow heart rate, improve ventricular filling, and enhance cardiac output.
 - **Anticoagulants** (acetylsalicylic acid, warfarin) — prevent thrombus formation in blood vessels.
 - **Agents improving myocardial metabolism** (B-group vitamins, ascorbic acid, inosine, potassium preparations).

Heart Failure is a complex, multifactorial condition that often develops as a complication of Ischemic Heart Disease, Arterial Hypertension, Cardiomyopathy, and valvular pathologies.

Analysis of studies indicates the following key points:

1. **Early diagnosis and monitoring are crucial** – the use of clinical signs and biomarkers (BNP, NT-proBNP) for early detection improves patient quality of life and reduces mortality risk.
2. **Comprehensive therapeutic approach** – pharmacological therapy (ACE inhibitors, beta-blockers, SGLT2 inhibitors), device therapy (ICD, CRT), and lifestyle modifications significantly improve outcomes.
3. **Preventive measures** – play a fundamental role in addressing the root causes of heart failure.

The following drug classes are commonly prescribed in the management of heart failure:

- **Cardiac glycosides** (e.g., digoxin, strophanthin) — enhance myocardial contractility, improve cardiac pumping efficiency and diuresis, and increase tolerance to physical exertion.
- **Vasodilators and ACE inhibitors** (e.g., enalapril, captopril, lisinopril, perindopril, ramipril) — reduce vascular tone, dilate veins and arteries, and decrease vascular resistance during cardiac contractions.
- **Nitrates** (e.g., nitroglycerin and its long-acting formulations) — facilitate ventricular filling, improve cardiac output, and dilate coronary arteries.
- **Diuretics** (e.g., furosemide, spironolactone) — reduce fluid retention and relieve symptoms of congestion.
- **β -Adrenoceptor blockers** (e.g., carvedilol) — slow heart rate, improve ventricular filling, and enhance cardiac output.
- **Anticoagulants** (e.g., acetylsalicylic acid, warfarin) — prevent thrombus formation within blood vessels.
- **Metabolic modulators** (e.g., B-group vitamins, ascorbic acid, inosine, potassium supplements) — support myocardial metabolism.

Heart failure is a complex, multifactorial condition that frequently develops as a complication of ischemic heart disease, arterial hypertension, cardiomyopathy, and valvular pathologies.

Key insights from clinical studies include:

1. **Early diagnosis and monitoring** are essential — utilizing clinical signs and biomarkers (BNP, NT-proBNP) for early detection improves patient quality of life and reduces mortality risk.

2. **Comprehensive therapeutic strategies** — combining pharmacological treatment (ACE inhibitors, beta-blockers, SGLT2 inhibitors), device therapy (ICD, CRT), and lifestyle modifications significantly improves patient outcomes.

3. **Preventive measures** — play a critical role in addressing the underlying causes of heart failure and reducing disease progression.

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