Congestive heart failure

Introduction:

Definition and overview

Congestive heart failure, or heart failure, is a long-term condition in which your heart can't pump blood well enough to meet your body's needs. Your heart is still working. But because it can't handle the amount of blood it should, blood builds up in other parts of your body. Most of the time, it collects in your lungs, legs and feet.

Historical Context:

To date, an Egyptian man named Nebiri, also known as Chief of Stables, is the oldest-known case of heart failure. Thanks to a German pathologist's examination of 3,500-year-old mummified remains, it's believed Nebiri died of pulmonary edema caused by heart failure.

Epidemiology:

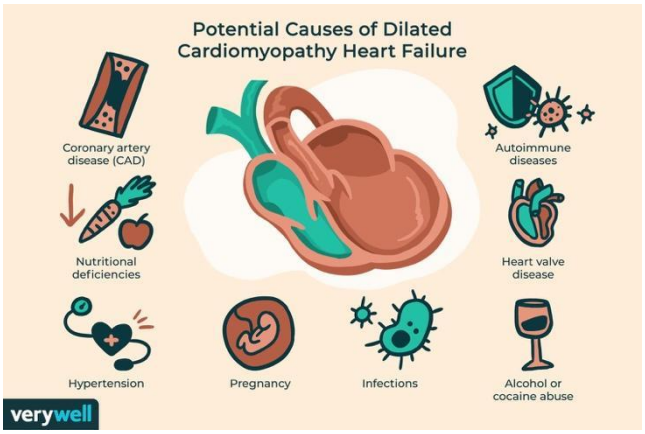
HF risk factors include advancing age, sex, inherited cardiomyopathies, hypertension, diabetes mellitus and obesity .Data from Europe and North America indicate a decline in the age-specific incidence of HF, with a notable shift towards HF with preserved ejection fraction among women, highlighting the evolving epidemiology of HF.

Age-adjusted mortality in young adults (aged 15–44 years) increased from 2.36 in 1999 to 3.16 in 2019, a greater rise than in older adults (aged ≥75 years).

Etiology:

Causes and risk factors:

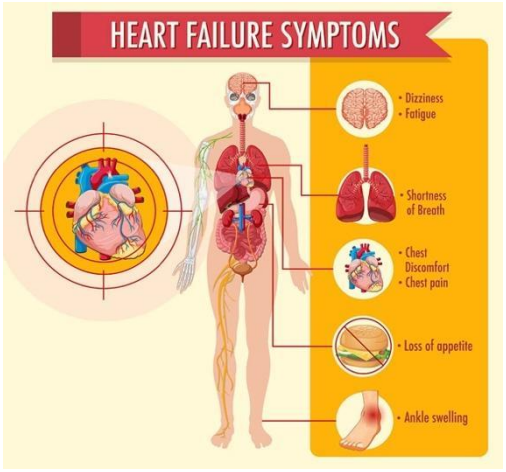
Coronary artery disease and/or heart attack, Cardiomyopathy (genetic or viral), Heart issues present at birth (congenital heart disease), Diabetes, High blood pressure (hypertension), Arrhythmia, Kidney disease, A body mass index (BMI) higher than 30, Tobacco and recreational drug use, Alcohol use and Medications such as cancer drugs (chemotherapy).



Clinical Features:

Signs and Symptoms:

There are many symptoms for heart failure such as : Shortness of breath, Waking up short of breath at night, Chest pain, Heart palpitations, Fatigue when you're active, Swelling in your ankles, legs and abdomen, Weight gain, Need to urinate while resting at night, A dry, hacking cough, A full (bloated) or hard stomach or Loss of appetite or upset stomach (nausea).



Disease Stages and Progression:

Heart failure is a chronic condition that gets worse with time. There are four heart failure stages (Stages A, B, C and D). They range from having a high risk of developing heart failure to having advanced heart failure.

Complications:

The most common complications of heart failure are :Hypotension, Kidney failure or Infections from frequent hospital visits that involve central IVs.

Diagnosis:

Diagnostic Criteria:

Your healthcare provider will ask you about your symptoms and medical history. They may ask you about:
Other health conditions you have, A family history of heart disease or sudden death, Your use of tobacco products, Any history of chemotherapy and/or radiation or The medications you take.

Diagnostic Tests and Procedures:

Many tests can be done to diagnose heart failure such as :
Blood tests, Cardiac catheterization, Chest X-ray, Echocardiogram, Heart MRI (magnetic resonance imaging), Cardiac computed tomography (CT), Electrocardiogram (EKG or ECG),Multigated Acquisition Scan (MUGA scan), Stress test and Genetic testing.

Differential diagnosis:

Diseases that may present with clinical features of volume overload or dyspnea are in the differential for HF. These include acute renal failure, acute respiratory distress syndrome, cirrhosis, pulmonary fibrosis, nephrotic syndrome, and pulmonary embolism.

Pathophysiology:

Mechanisms of Disease Development:

In the initial stages of CHF, several compensatory mechanisms attempt to maintain cardiac output and meet the systemic demands. The chronic activation of the sympathetic nervous system results in reduced beta-receptor responsiveness and adrenaline stores. This results in changes in myocyte regeneration, myocardial hypertrophy, and myocardial hypercontractility. The increased sympathetic drive also results in the activation of the renin-angiotensin-aldosterone system (RAAS) system, systemic vasoconstriction, and sodium retention.

Treatment

Medical and Surgical Treatments:

Your treatment will depend on the type of heart failure you have and, in part, what caused it. Medications and lifestyle changes are part of every heart failure treatment plan. Your healthcare provider will talk to you about the best treatment plan for you.

Surgical procedures. In more severe cases, surgery is required to open or bypass blocked arteries, or to replace heart valves. Some congestive heart failure patients are candidates for a type of pacemaker called biventricular pacing therapy

Pharmacological Therapies:

There are different lines of treatment but the most commonly used drugs are: Vasodilators expand blood vessels, ease blood flow, and reduce blood pressure, Diuretics correct fluid retention, Aldosterone inhibitors help with fluid retention and improve chances of living longer, ACE inhibitors or ARB drugs improve heart function and life expectancy, Digitalis glycosides strengthen the heart's contractions, Anticoagulants or antiplatelets such as aspirin help prevent blood clots, Beta-blockers improve heart function and chances of living longer or Tranquilizers reduce anxiety.

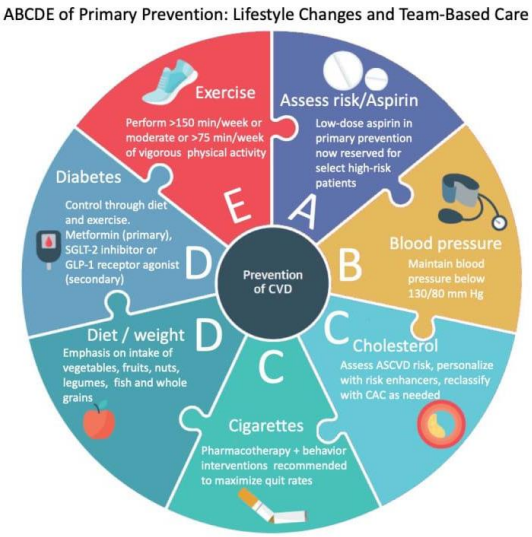
Lifestyle and Dietary Modifications:

These are the same changes as those for preventing heart failure. In addition, you may be advised to avoid salt (because of fluid retention) and caffeine (because of heartbeat irregularities). Your doctor will advise how much fluid and what kinds to drink, as sometimes fluid intake should be limited.

Rehabilitation and Supportive Care:

Comprehensive care includes internal health services, nutritive support, and social services to help navigate the cerebral and social complications of living with CHF.

Prevention and Control:



Although you can't change some risk factors like age, family history or race, you can change your lifestyle to give yourself the best chance of preventing heart failure. Things you can do include:
Staying at a weight that's healthy for you, Eating foods that are good for your heart,Exercising regularly, Managing your stress, Stopping the use of tobacco products, Not drinking alcohol, Not using recreational drugs and Taking care of other medical conditions you have that can increase your risk.

Prognosis:

Disease outcomes and survival rates:

With new treatments, individualities living with CHF can achieve near-normal life expectancy. Without treatment, CHF can be fatal.

Factors Influencing Prognosis:

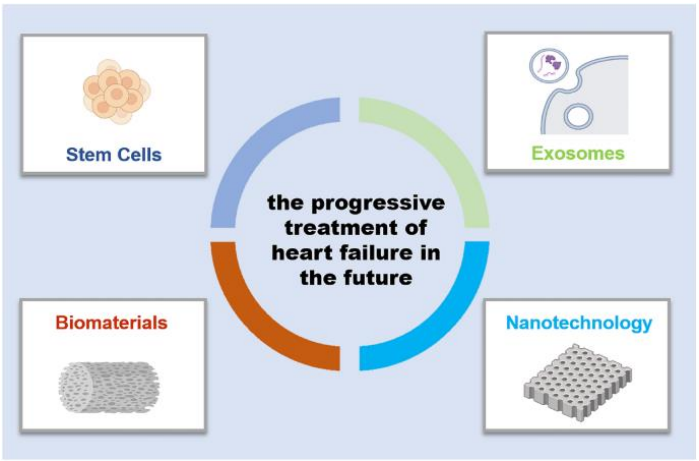
Prognostic factors include the stage at opinion, presence of comorbidities, and overall health and life.

Current research and future directions:

Numerous studies have clarified various pathophysiological aspects of HFpEF that contribute to the discovery of new therapeutic targets.

(a) metabolic therapy

(b) micro-RNA.



Case studies

Example cases:

Patient Profile:

- **Name**: John Doe
- **Age**: 68 years
- **Gender**: Male
- **Medical History**: Hypertension for 15 years, hyperlipidemia, type 2 diabetes mellitus, previous myocardial infarction (5 years ago).
- **Medications**: Lisinopril, Metformin, Atorvastatin, Aspirin.

Presenting Complaint: John presents to the emergency department with worsening shortness of breath, swelling in his ankles, fatigue, and a chronic cough that produces pink, frothy sputum. His symptoms have progressively worsened over the last two weeks.

Physical Examination:

- **Vital Signs**: Blood pressure 150/90 mmHg, heart rate 98 bpm, respiratory rate 22 breaths/min, oxygen saturation 90% on room air.
- **General**: Obese male in moderate distress, sitting upright to breathe.
- **Cardiovascular Exam**: Elevated jugular venous pressure, S3 heart sound present, a regular rhythm with no murmurs.
- **Respiratory Exam**: Bilateral crackles noted at lower lung fields, dullness to percussion at lung bases.
- **Extremities**: Mild bilateral pitting edema at the ankles.

Diagnostic Tests:

- **ECG**: Shows left ventricular hypertrophy and a previous inferior wall ST elevation myocardial infarction.
- **Chest X-ray**: Displays cardiomegaly and bilateral pleural effusions.
- **Echocardiogram**: Reveals ejection fraction (EF) of 35%, indicating systolic dysfunction.
- **Laboratory Tests**: Elevated BNP (B-type natriuretic peptide) levels consistent with heart failure; renal function slightly impaired.

Diagnosis: John is diagnosed with congestive heart failure (CHF), specifically heart failure with reduced ejection fraction (HFrEF).

Management Plan:

Acute Management: .1

- Supplemental oxygen to maintain oxygen saturation above 92%.
- Diuretics (e.g., Furosemide) initiated to manage fluid overload.
- Monitoring of electrolyte levels and renal function due to diuretic use.
- Continue home medications (considered for continuation or adjustment based on renal function).

Long-term Management: .2

- Initiation of guideline-directed medical therapy (GDMT):
- ACE inhibitor (Lisinopril) to manage hypertension and prevent further remodeling.
- Beta-blocker (e.g., Carvedilol) to improve heart function and reduce mortality risk.
- Mineralocorticoid receptor antagonists (e.g., Spironolactone) if potassium levels allow.
- Dietary modifications (low sodium diet) and fluid restriction counseling.
- Education about daily weight monitoring, signs of fluid overload, and medication adherence.

Follow-up: .3

- Schedule follow-up appointments in 1-2 weeks to reassess symptoms, adjust medications, and monitor renal function and electrolytes.
- Cardiology referral for further evaluation and management options, including potential eligibility for advanced heart failure therapy (e.g., implantable devices or transplantation).