

Chapter– 2.4 Congestive Heart Failure

Topic: Congestive Heart Failure

2.1

Introduction

Congestive heart failure (CHF), also known as heart failure, occurs when the heart is unable to pump blood effectively, leading to inadequate perfusion of organs and tissues.

Etiopathogenesis: Congestive heart failure can result from various underlying conditions that impair the heart's ability to pump blood efficiently or fill properly. Common etiologies and risk factors include:

- Coronary artery disease (CAD)
- Hypertension
- Cardiomyopathies (e.g., dilated cardiomyopathy, hypertrophic cardiomyopathy)
- Valvular heart disease (e.g., mitral regurgitation, aortic stenosis)
- Myocardial infarction (heart attack)
- Arrhythmias (e.g., atrial fibrillation)
- Congenital heart defects
- Diabetes mellitus
- Chronic kidney disease

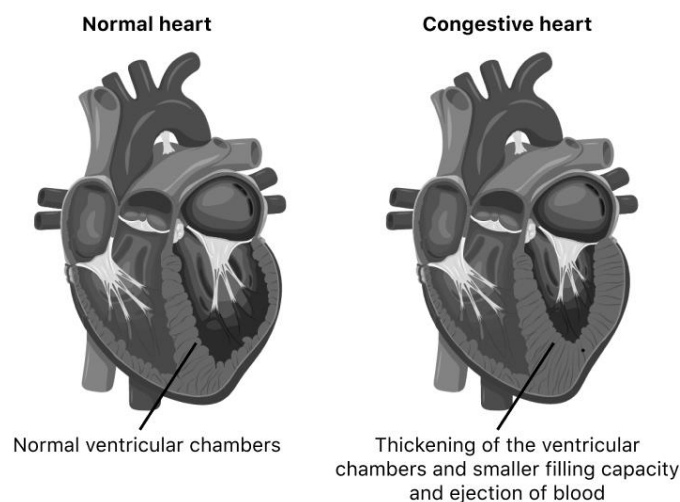


Fig 2.5 Normal vs Congestive Heart

2.2

Types

Congestive heart failure can be categorized based on the ejection fraction (EF) of the heart:

1. Heart failure with reduced ejection fraction (HFrEF): EF < 40%
2. Heart failure with preserved ejection fraction (HFpEF): EF ≥ 50%
3. Heart failure with mid-range ejection fraction (HFmrEF): EF 40-49%

2.3

Symptoms

Common symptoms of congestive heart failure include:

- Shortness of breath (dyspnea), especially during physical exertion
- Rapid or irregular heartbeat (palpitations)
- Fatigue and weakness
- Persistent cough or wheezing
- Swelling (edema) in the legs, ankles, feet, or abdomen
- Reduced exercise tolerance
- Weight gain due to fluid retention
- Frequent urination, especially at night (nocturia)

2.4

Diagnostic Test

Diagnosis of congestive heart failure include:

- History and physical examination
- Echocardiography (including assessment of EF)
- Chest X-ray
- Electrocardiography (ECG)
- B-type natriuretic peptide (BNP) or N-terminal pro-BNP (NT-proBNP) levels
- Cardiac catheterization (if indicated)

The management of congestive heart failure involves:

A. Pharmacological Management: Common medications used in the management of CHF include:

- 1. Angiotensin-Converting Enzyme (ACE) Inhibitors: e.g.** Enalapril, Lisinopril, Ramipril; block the conversion of angiotensin I to angiotensin II, leading to vasodilation, reduced aldosterone secretion, decreased sodium and water retention.
- 2. Angiotensin II Receptor Blockers (ARBs): e.g.** Losartan, Valsartan, Candesartan; block the binding of angiotensin II to its receptors, leading to vasodilation and reduced aldosterone secretion.
- 3. Beta-Blockers: e.g.** Carvedilol, Metoprolol succinate, Bisoprolol; block the effects of catecholamines on beta-adrenergic receptors, leading to reduced heart rate, decreased myocardial contractility, and improved left ventricular function.
- 4. Diuretics: e.g.** Furosemide, Bumetanide, Hydrochlorothiazide; increase urine production and reduce fluid overload by promoting the excretion of sodium and water. They are used to alleviate symptoms of congestion and reduce edema and pulmonary congestion in CHF patients.
- 5. Aldosterone Antagonists: e.g.** Spironolactone, Eplerenone; block the effects of aldosterone on mineralocorticoid receptors, leading to potassium retention and sodium and water excretion. They reduce fluid retention, and decrease mortality in patients with advanced CHF.
- 6. Hydralazine and Isosorbide Dinitrate: e.g.** BiDil (combination of hydralazine and isosorbide dinitrate); direct vasodilator that reduces afterload, while isosorbide dinitrate is a nitrate that dilates veins, reducing preload.
- 7. Sacubitril/Valsartan: e.g.** Entresto (combination of sacubitril and valsartan); Sacubitril inhibits neprilysin, an enzyme that increased levels of natriuretic peptides, which promote vasodilation and natriuresis. Valsartan is an ARB. This combination is used in patients with CHF with reduced ejection fraction to reduce mortality and hospitalizations.

B. Non-Pharmacological Management: Non-pharmacological interventions play a crucial role in the management of congestive heart failure and may include:

- Dietary modifications (e.g., sodium restriction)
- Fluid restriction
- Regular physical activity (as tolerated)
- Smoking cessation
- Weight management
- Stress reduction
- Vaccinations (e.g., influenza, pneumococcal)

2.6**Complications**

Complications of congestive heart failure may include:

- Pulmonary edema
- Cardiogenic shock
- Arrhythmias (e.g., atrial fibrillation, ventricular tachycardia)
- Renal dysfunction (e.g., acute kidney injury)
- Hepatic congestion
- Thromboembolic events (e.g., stroke, deep vein thrombosis)
- End-organ damage (e.g., liver cirrhosis)