

CONGESTIVE HEART FAILURE

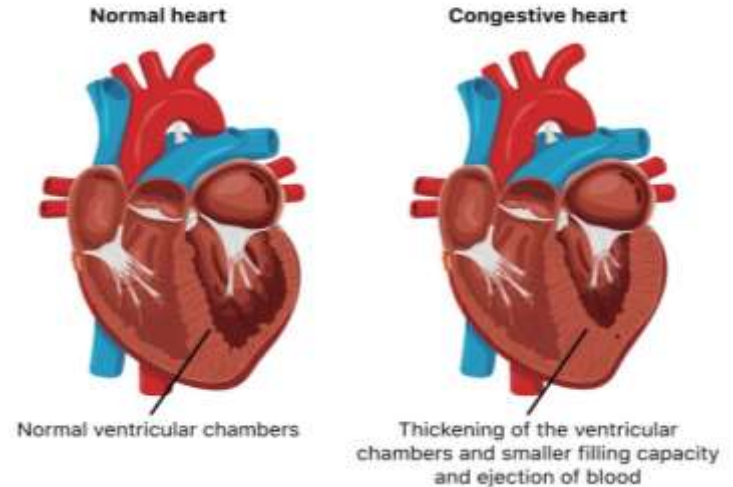


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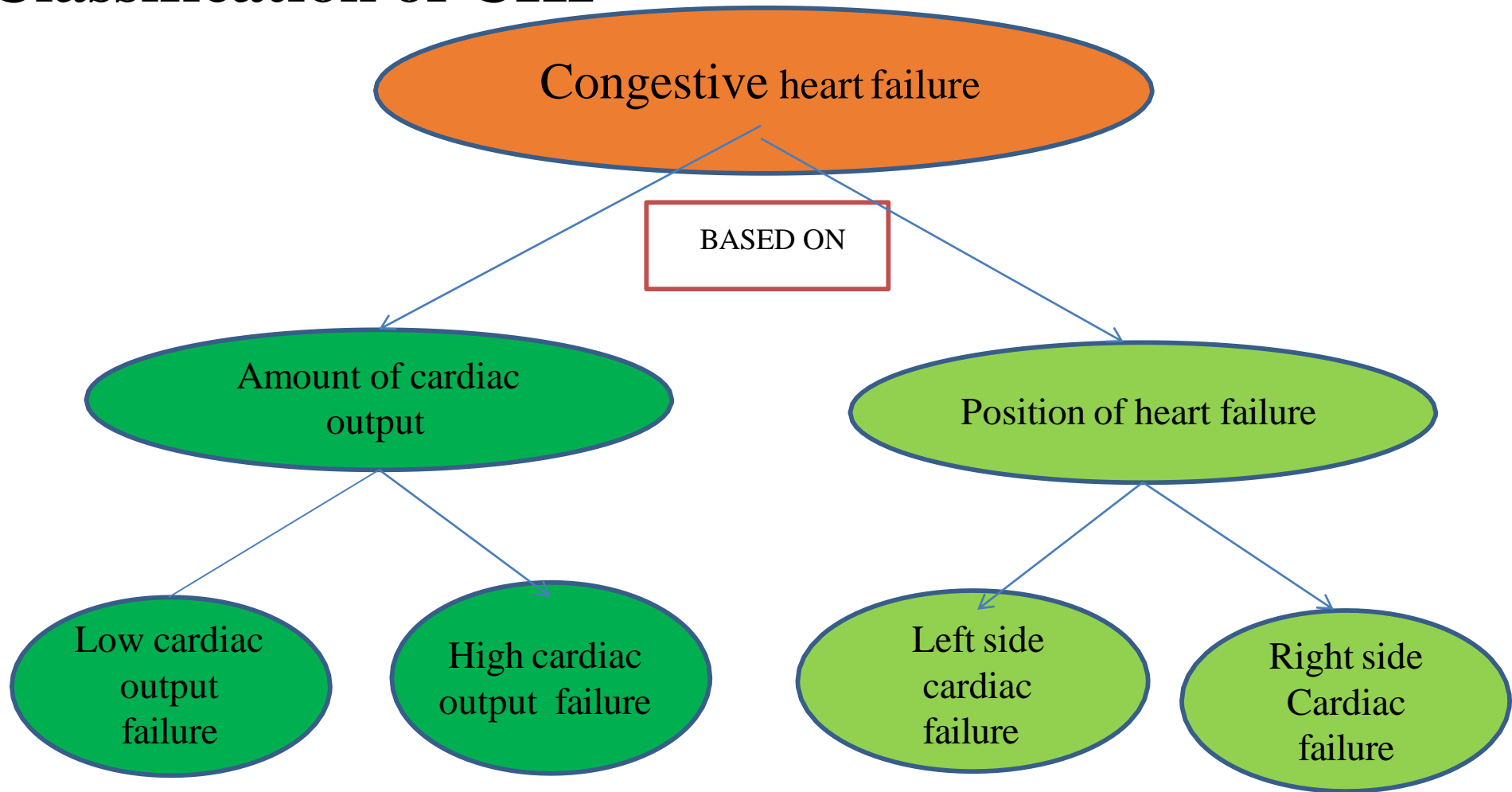
Heart failure is defined as the pathophysiologic state in which impaired cardiac function is unable to maintain an adequate circulation for the metabolic needs of the tissues of the body. It may be *acute* or *chronic*.

The term congestive heart failure (CHF) is used for the chronic form of heart failure in which the patient has evidence of congestion of peripheral circulation and of lungs. CHF is the end-result of various forms of serious heart diseases.

Normal vs. Congestive Heart



Classification of CHF



Based on amount of cardiac output

Low-cardiac output failure

- It is most common congestive heart failure.
- The metabolic demands of the body organs are normal within limits but the heart fails to pump sufficient amount of oxygenated blood to the organs of the body.
- The primary cause of LCOF is the **ventricular systolic dysfunction and ventricular diastolic dysfunction.**

❖ *Ventricular systolic dysfunction*

- Myocardial infarction weakens the muscles of ventricles and makes them inefficient to pump the required volume of blood.
- Thus results in low cardiac output and low ejection fraction.

❖ *Ventricular diastolic dysfunction*

- Hypertrophy is responsible for the stiffening of heart muscle
- The stiffened muscle of the ventricles fails to relax during diastolic and thus cannot collect sufficient amount of blood.
- This ultimately results in low cardiac output.

High cardiac output failure

- It occurs very rarely.
- Hyperthyroidism , anaemia & arteriovenous shunt, enhances the metabolic demands of the body for myocardial oxygen ,which cannot be met even by the increased pumping action of the heart.

| Low cardiac output failure | High cardiac output failure |
|---|---|
| Most frequent | Very rarely |
| Metabolic demands of the body organs for oxygen are normal and within limits | Metabolic demands of the body for oxygen is very high |
| Myocardial fraction is prominent factor leading to the failure of systolic & diastolic function of the ventricles, ultimately results in low cardiac output failure | Hyperthyroidism, anaemia, arteriovenous shunt causes high cardiac output failure. |

Based on the position of heart failure

- The failure of either right side or left side of the heart to pump the blood leads to the failure of the other side and ultimately results in the failure of the both sides of the heart.

❖ *Left side cardiac failure*

- The failure of the left ventricle to pump the entire blood present in it during systole results in retention of some amount of blood after every systole
- Thus blood is accumulated in the left ventricle after few systole of the heart.
- The left ventricle fails to accept the blood from auricles and lungs thus the uncollected blood due to back-up pressure remains in the lungs resulting in pulmonary oedema.

Right side cardiac failure

- The failure of right ventricle to pump the entire blood present in it during systole results in retention of some amount of blood after every systole.
- Thus blood is accumulated in right ventricle after few systoles.
- The left ventricle fails to accept the blood from peripheral organs and ultimately results in generalized systemic oedema or peripheral oedema.

Left side cardiac failure

Is the result of **right side cardiac failure**

Inefficient pumping action of left ventricle is responsible for the accumulation of blood in the ventricles

Left ventricle fails to accept/collect the blood from **lungs due to back pressure**

Pulmonary congestion/oedema is the final result

Right side cardiac failure

Is the result of **left side cardiac failure**

Inefficient pumping action of right ventricle is responsible for the accumulation of blood in right ventricle

Right ventricle fails to accept/collect the blood from **peripheral organs.**

Peripheral generalized oedema is the final result

BACKWARD AND FORWARD HEART FAILURE

The mechanism of clinical manifestations resulting from heart failure can be explained on the basis of mutually interdependent backward and forward failure.

Backward heart failure

According to this concept, either of the ventricles fails to eject blood normally, resulting in rise of end-diastolic volume in the ventricle and increase in volume and pressure in the atrium which is transmitted *backward* producing elevated pressure in the veins.

Forward heart failure

According to this hypothesis, clinical manifestations result directly from failure of the heart to pump blood causing diminished flow of blood to the tissues, especially diminished renal perfusion and activation of renin angiotensin- aldosterone system.

ETIOLOGY

Heart failure may be caused by one of the following factors, either singly or in combination:

INTRINSIC PUMP FAILURE

The most common and most important cause of heart failure is weakening of the ventricular muscle due to disease so that the heart fails to act as an efficient pump. The various diseases which may culminate in pump failure by this mechanisms are as under:

- i) Ischaemic heart disease
- ii) Myocarditis
- iii) Cardiomyopathies
- iv) Metabolic disorders e.g. beriberi
- v) Disorders of the rhythm e.g. atrial fibrillation and flutter

INCREASED WORKLOAD ON THE HEART.

Increased mechanical load on the heart results in increased myocardial demand resulting in myocardial failure.

Increased load on the heart may be in the form of pressure load or volume load.

i) Increased pressure load may occur in the following states:

- a) Systemic and pulmonary arterial hypertension.
- b) Valvular disease e.g. mitral stenosis, aortic stenosis, pulmonary stenosis.
- c) Chronic lung diseases.

ii) Increased volume load occurs when a ventricle is required to eject more than normal volume of the blood resulting in cardiac failure. This is seen in the following conditions:

- a) Valvular insufficiency
- b) Severe anaemia
- c) Thyrotoxicosis
- d) Arteriovenous shunts
- e) Hypoxia due to lung diseases.

IMPAIRED FILLING OF CARDIAC CHAMBERS.

Decreased cardiac output and cardiac failure may result from extra-cardiac causes or defect in filling of the heart:

- a) Cardiac tamponade e.g. haemopericardium, hydropericardium
- b) Constrictive pericarditis.