

Heart failure

→ Heart failure is a condition in which heart is unable to pump blood at a rate adequate for the requirements of body tissues.

Types

I Acute heart failure

- seen following A/C myocardial infarction, rupture of heart valve
- sudden ↓ in CO → severe hypotension
- edema is not a feature.

II Left sided failure

LVF → congestion occurs in pulmonary circulation.

↓
Dyspnea ≠ orthopnea.
(due to pulmonary edema.)

III High output failure

→ Heart pumps abnormally large quantities of blood to deliver adequate oxygen to tissues.

- severe anemia
- Beriberi
- hyperthyroidism
- AV fistula

IV Forward failure

Due to inability of ventricle to pump blood causing inadequate cardiac output

Chronic heart failure

- seen in chronic valvular disease
- BP may be maintained
- edema in dependent part is a feature.

Right sided failure

RVF → congestion occurs in systemic circulation

↓
↑ JVP, hepatomegaly, ascites, edema in dependent parts

Low output failure

→ due to failure of the heart to pump blood due to decreased myocardial contractility

Backward failure

↓ CO → ↑ EDPV → ↑ venous pressure

↓
Pressure & volume in atrium and venous compartment behind the failed ventricle ↑

↓
Pulmonary and systemic congestion

IV Systolic failure

- Occurs due to systolic ventricular dysfunction
- seen in Ischemic heart disease.
- Systolic Failure uses blood supply to tissues

Diastolic failure

- Occurs due to failure of Relaxation of ventricle
- seen in restrictive cardiomyopathy - as in amyloidosis where heart muscle is infiltrated by amyloid proteins
- inability to relax → EOV ↓

Application of Law of Laplace in heart failure

→ Explains the disadvantages faced by a dilated heart

$$P = 2T/R$$

- when radius of cardiac chamber is increased, a greater tension must be developed in myocardium to produce a given pressure
- consequently, a dilated heart must do more work than a non dilated heart.

Clinical features

a) Dyspnea → Due to failure of left ventricle to pump

blood effectively ⇒ produces tissue hypoxia

→ in early stages - dyspnea only on exertion

→ in advanced ^{even} at rest.

b) orthopnea → Dyspnea in Recumbent position

Causes → Redistribution of blood from abdomen and lower extremities into chest → causes an ↑ in pulmonary hydrostatic pressure

→ 2) diaphragm pushed towards lungs → causes reduction in VC.

c) Paroxysmal Nocturnal dyspnea.

episodes of dyspnea

* cough of sudden onset of in night awakening patient from sleep

- Occurs partly due to deposition. Depression of respiratory centers during sleep and partly due to accumulation of excess fluid in lungs in recumbent posture in sleep.

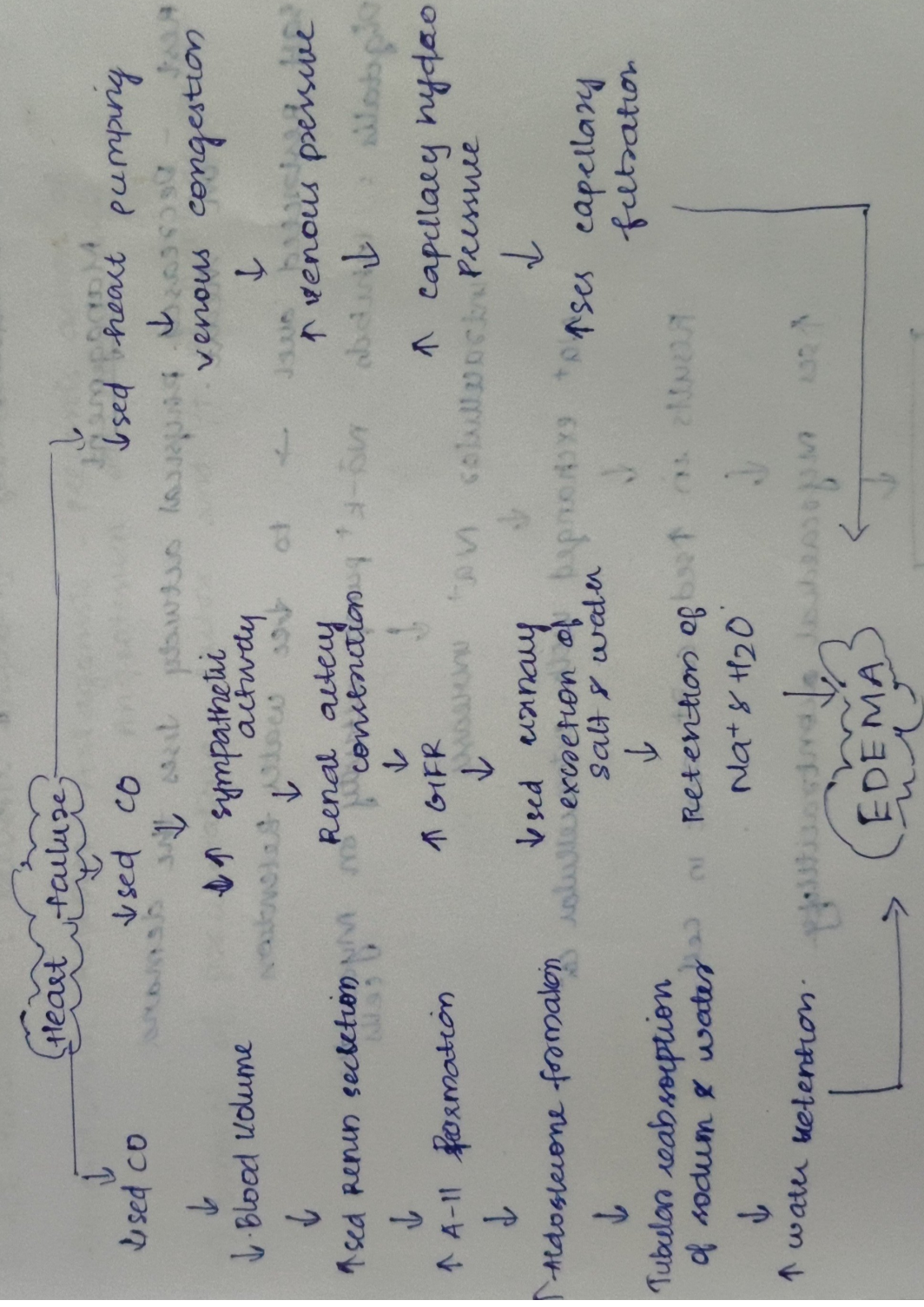
d) Fatigue and exercise intolerance

Fatigue → Due to ↓ CO → cause tissue hypoxia
 exercise intolerance → due to ↓ perfusion of skeletal muscles → ↓ O₂ supply to meet the demands

e) edema in dependent parts

Active / pedal edema - in ambulatory patients

facial edema - in bedridden patients



f) Hypoxia

g) Hepatomegaly

→ Due to hepatic congestion

→ Tender hepatomegaly is an important feature of RHF

g) Raised JVP

→ ↑ RAP → ↑ JVP

→ Reliable sign of CHF

h) Ascites

→ Accumulation of excess free fluid in peritoneal cavity

Cavity

→ Occurs in ~~advanced~~ advanced stages of heart failure

Management

1) Rest - Decreased physical activity uses the demand on heart.

2) Salt restricted diet → to decrease water retention

3) Digitalis : Inhibits $\text{Na}^+ \text{K}^+$ pump activity on Myocardial cells

↓
Increases intracellular Na^+ increases

↓
 Na^+ exchanged with extracellular Ca^{2+}

↓

Results in ↑ used Ca^{2+} conc in cell

↓

↑ uses myocardial contractility

↓

↑ $\text{P}_{\text{res CO}}$

4) Diuresis - Promote water excretion

↓ ΔCF volume

↓ VR to heart

↓
les load on the head

5) vasodilators : decrease peripheral resistance
(after load)

$\downarrow$ coarser.

6) ACE inhibitors : Prevent Angio-II formation

Angiotensin Receptor Antagonists - prevents action of Angiotensin on blood vessels

e) Removal of precipitating factors and $\frac{1}{4}$ of primary cause -