

Heart failure

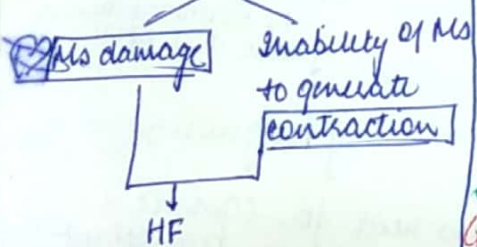
- complex clinical syndrome results from fw impairment } vent filling & ejection of blood
 which lft SOB, fatigue, sign of fw failure, edema & rales.

Classification

(HFwEF)
with reduced EF
 (<40%)

- 1) CAD - MI, ischemia
- 2) Overload { Obs valv ds - HTN
- 3) Overload { regurg valv ds - L-R shunt - Extracardiac shunt
- 4) lung ds { cor pulmonale - pulm vase dlo
- 5) DCMP { Familial (AD) - Infiltrative
- 6) Drug { Metabolic - renal
- 7) Chagas
- 8) dlo rate, rhythm

Pathogenesis HFwEF



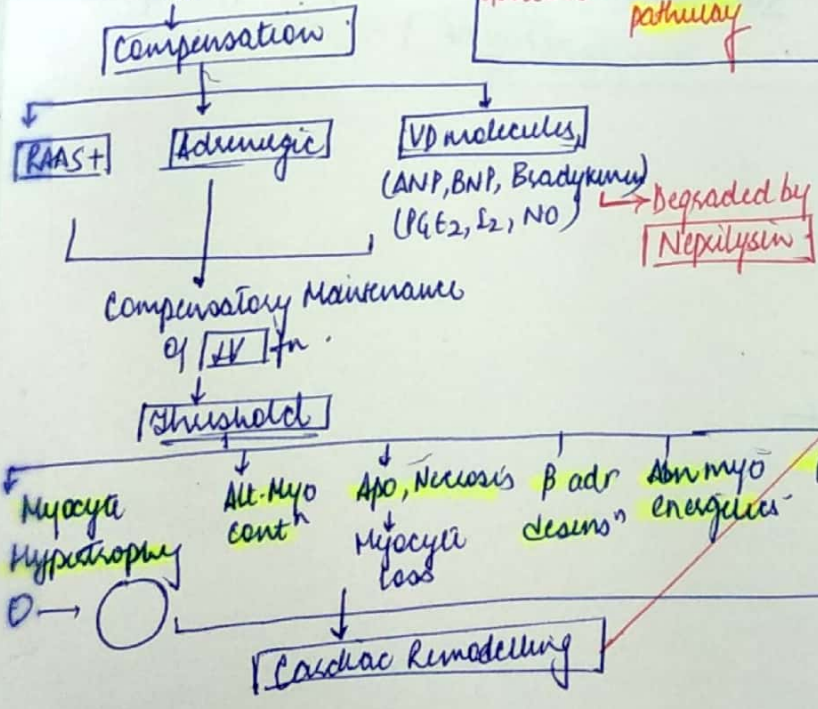
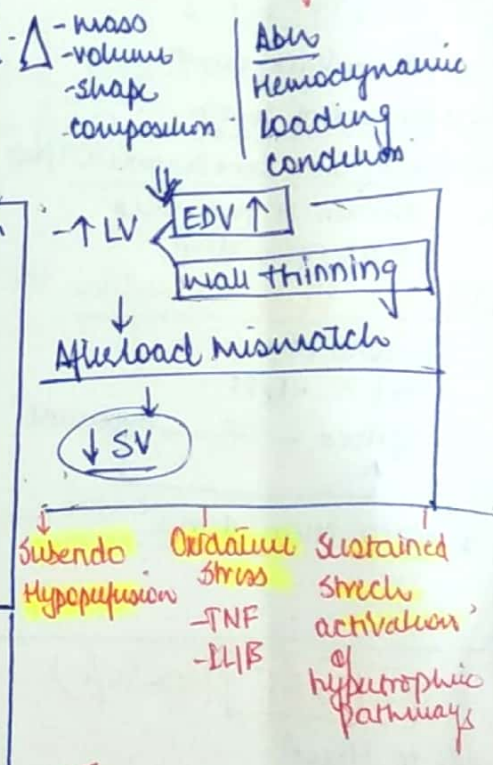
Preserved EF - 40-50%

- 1) Pathological Hypertrophy { HCM/HOCM - HTN
- 2) Aging
- 3) Endomyocardial dlo
- 4) RCM
- 5) Fibrosis

High output states

- 1) Thyrotoxicosis
- 2) Beri Beri Anemia
- 3) Sys AV shunting
- 4) Chl Anemia

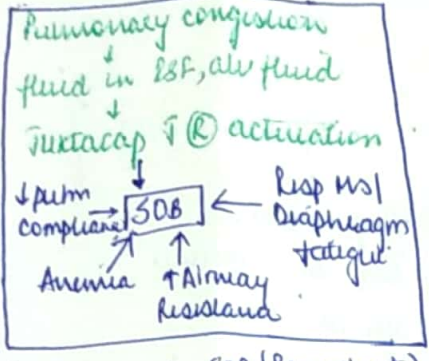
Cardiac (LV) Remodelling



HF & EF

S/S

- 1) Fatigue
- 2) Shortness of breath



3) Orthopnoea - SOB (recumbent)

Redistribution of fluid from splanchnic @ & to central @
 4) \uparrow TPCWP

SOB on lying down

4) Nocturnal cough

5) Paroxysmal Noct Dyspnoea (PND)

- awoken pt from sleep
- 1-3h after sleep

6) Cheyne Stokes Respiration

- periodic/cyclic
- 40% \geq HF & EF
- Apnoea \rightarrow Hb \rightarrow Hyperventⁿ

7) Acute pulm edema

Clinical features

PLE

- 1) \uparrow JVP, Abdominal Tuglar Refla.
- 2) lung crackles, rales, crpitations
- 3) Pleural effusion - BIL, when UL(R)
- 4) S3 gallop, S4 \checkmark
- 5) Murmur \rightarrow MR, TR \rightarrow **Advanced HF**
- 6) Liver - enlarged, tender, jaundice, ascites
 (hep congestion due sev. TR)
- 7) edema - peripherab, anasarca, serosal
- 8) Marked wt loss
- 9) Cachexia

4x

- 1) Lab - CBE/LFT/PTT (electrolytes) Uremic Analysis -
 - H₂O DM/Dyslipidemia/thyroid d/o (RBS) (lipid) (TSH/T3/T4)
- 2) Ecg - LVH, prior MI, poor L wave progression
- 3) CKR - cardiomegaly, pulm vasc Δ , pulm edema
- 4) 2D Echo - most useful
 - LV-size/fri/valvular/RVMA
- 5) Cardiac MRI - Gold std LV $\left\{ \begin{array}{l} \text{mass} \\ \text{volume} \end{array} \right.$
 - Dx & clinical decisi
 also \uparrow in ARNI
- 6) Biomarkers $\left\{ \begin{array}{l} \text{BNP} \\ \text{NT-ProBNP} \\ \text{ST2 soluble} \\ \text{Galectin 3} \end{array} \right.$ prognosis
- 7) Cardiac exercise test - Assess need for cardiac transplant
 - **Adv HF**

HFpEF (40-50%)

\sim CF to HFpEF

Lx

- 1) EF
- 2) LV volume index $> 40 \text{ ml/m}^2$
- 3) LV mass index $\left\{ \begin{array}{l} \text{M} > 149 \text{ g/m}^2 \\ \text{F} > 122 \text{ g/m}^2 \end{array} \right.$
- 4) Diastolic dysfn
- 5) Cardiac MRI

Treatment of HF

HFrEF < 40%

- 1) **ACEI** - Lisino | Enali | Captop | Trando | Ramipril (2.5-5mg)
- 2) **ARBs** - Losartan (50-150 OD) | Valsartan (40-160 BD) | Candesartan (4-32 OD)
- 3) **Aldosterone Antagonist** - Spironolactone (12.5-50 OD) | Eplerenone (25-50 OD)
- 4) **Beta Blockers** - Metoprolol succinate (12.5-200 OD) | Carvedilol (3-12.5-50 BD) | Bisoprolol (0.25-10mg BD)
- 5) **AV Vasodilators** - Hydralazine | ISDN → (37.5/20 - 75/40 OD)
- 6) **ARNI** - (100 - 200 BD)

- Pt. & long term **ACEI** / **ARB** → have prev. level of **AT-II** → **Neurohormonal Escape phenomenon**

- **start 2 drugs** → **ACEI + β I** OR **ACEI + ARBs** OR **ARB + β I**
(When β I insufficient) (When ACEI insufficient)

- **NYHA 2+4** → **Add Aldosterone Antagonist**

- **4 Drug combination should be AVOIDED**

7) **Direct Renin I** → **Aliskiren** - No major benefit - \downarrow HR

8) **IVABRADINE** → **If current \ominus in SA node** $\left\{ \begin{array}{l} \text{No Negative Inotropic effect} \\ \text{Benefits to pt} \rightarrow \text{on ACEI + } \beta\text{I + AA but } \text{HR} > 70 \\ \text{Unable to tolerate } \beta\text{I} \end{array} \right.$

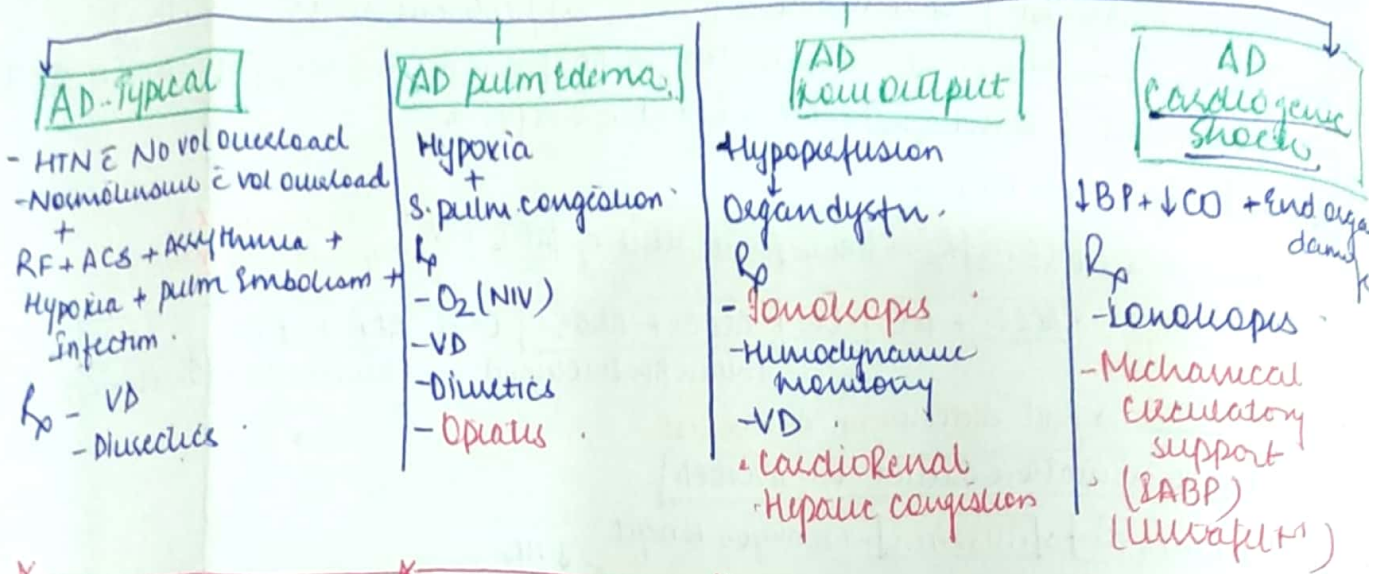
9) **DIGOXIN** - **MOA** - mild Inotropic
- Sympathetic \ominus
- Attenuation of carotid sinus Baroreceptor

↓
Only if pt. is profoundly symptomatic even after optimal therapy

- 10) **Oral Diuretics** → **Loop** → **Furosemide**
- 11) **No role of statin** in non Ischemic HF
- 12) Current guideline → Support use of **Aspirin** in Ischemic HF
- 13) **PUFA** → Long chain PUFA Beneficial

Acute Decompensated HF **ADHF**

- Heterogeneous clinical syndrome of
- High short term & long term (20%) Mortality
 - High short term (5%) Mortality
- ↓ cardiac performance
Renal dysfunction
Altered vascular compliance



ADHF - Intravenous

1. DIURETICS (1st choice - vol overload, congestion)

- Furosemide - 20-240 mg/d - severe congestion **Infusion**
- Torsemide - 10-100 mg/d → Oral ✓
- Bumetanide - 0.5-5 mg/d - Oral ✓
- Metolololol, Chlorthalidone (2.5-10mg)
- Acetazolamide
- Spirolactone (S. Hypokalemia)

2. IONOTROPES

- Dobutamine - 2-20 ug/kg/min
- Milrinone - 0.375-0.75 ug/kg/min
- Levosimendan - 0.1 ug/kg/min (ionotrope + PDE3I)
- Omecamtiv Mecarbil → ↑ contractility w/o ↑ O₂ demand

3. VASODILATORS (rapid dyspnoea relief (dit pulm congestion))

- NTG - 10-20 ug/min → 200 ug/min (↑ 10 ug/min every 3-5 min)
- Nesiritide - 2 ug/kg → 0.1 ug/kg/min (arterial line)
- Nitroglycerin - 0.3 ug/kg/min → 5 ug/kg/min
- Senelaxin - less efficient
- Urokinase - 15 mg/kg/min (if SBP > 116 mm x 48h)

4. Neurohormonal Antagonist

- ROLO-phyllin → Adenosine (A₁) antagonist
- Tolvaptan → Vasopressin Antagonist