

Heart failure

by

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Defintion:

- A clinical syndrome which is characterized by inability of heart to maintain sufficient output to tissue in spite of maximum effort.

Compensatory mechanisms of H.F.

1.tachycardia:valuable but within limits

2.Hypertrophy

3.Coronary reserve

4.Stunning & hybernating myocardium

*Stroke volume=end diastolic volume – end systolic volume

Normally stroke volume=70 ml

*COP=S.V. x H.R.

e.g. $70 \times 70 = 4900 \sim 5\text{liters}$

Etiology

1. Ischemic heart disease(35-40%)
2. cardiomyopathy(30-34%)
 - .dilated cardiomyopathy(CDM)
 - .hypertrophic
 - .HOCM
 - .arrhythmogenic Rt ventricular dysplasia
3. HTN (15-20%)
4. Valvular diseases : AR , MR
5. myocarditis
6. Postmyocarditis
7. Drugs : amphetamines

Classification of H.F.

a. Low COP	VS	high cop
b. Acute	VS	chronic
c. Rt. Side	VS	Lt. side
D. Systolic	VS	diastolic
e. For ward	VS	back ward

N.B.

Most of cardiac diseases begin with diastolic HF & end with systolic HF except 3 diseases which begin diastolic & stay diastolic which are:

1. Constrictive pericarditis
2. Restrictive cardiomyopathy
3. HOCM

Low COP

- C\P:
- Fatigability
- Recurrent chest infection
- Tachycardia
- Dizziness up to fainting attacks

high COP

- Causes:
- Heart disease with anaemia or pregnancy
- Hyperthyroidism
- Bei Beri

Rt. Side HF

*Causing systemic congestion:

- .Rt. Hypochondrial pain(hepatomegally)
- . L.L. oedema
- . Congested neck veins
- .ascites
- . Pleural effusion
- .anasarca

Lt. side HF

- Causing pulmonary congestion:
- Dyspnea
- PND
- Pulmonary oedema

C\P of H.F.

SYMPTOMS

- Exertional dyspnea
- Orthopnea
- Paroxysmal nocturnal dydonea
- fatigue

SIGNS

- Cardiomegally
- Gallop rhythm (3rd & 4TH)
- Tachycardia
- Hypotension
- Bibasal crackles
- Pleural effusion
- Ankle oedema
- Ascites
- Tender hepatomegally

NEW YORK HEART ASSOCIATION(NYHA):

Grade 1:

- no breathlessness

Grade 2:

- breathlessness on extraordinary
e.g: 3rd floor or 200m

Grade 3:

- breathlessness on mild ordinary
exertion e.g: : 2nd floor or 200m

Grade 4:

- : breathlessness at rest including
orthopnea , PND & cardiac
asthma

framing-ham classification of dyspnea(more advanced)

- A. no structural nor symptoms
- B. structural without symptoms(e.g: mild MS)
- C. structural & symptoms
- D. refractory symptoms(needs I.V. drugs)

Investigations of H.F.

1. Blood tests: CBC ,liver biochemistry , urea , electrolytes & cardiac enzymes in acute H.F.
2. Chest x-ray :look for
 - . Cardiomegally
 - . pulmonary congestion with upper lobe diversion
 - . Fluid in fissure
 - . Kerley B line & pulmonary oedema

3.E.C.G.(there is nothing specific) For ischemia , HTN or arrhythmia

4.Echocardiography(specific in HF)

→ cause of HF (AS , MS , DCM)

→ ejection fraction & severity

- Normal ejection fraction = 55 – 75
- Ejection fraction = $\frac{\text{end systolic volume} - \text{end diastolic volume}}{\text{end diastolic volume}}$



5. stress doputamine test:

→it differentiates between stunned & hybernating myocardium

6. cardiac enzymes :

→diagnostic

→therapeutic

7. isotope study :

→technetium 99m

→thallium 201



8. Biochemical (BNP)

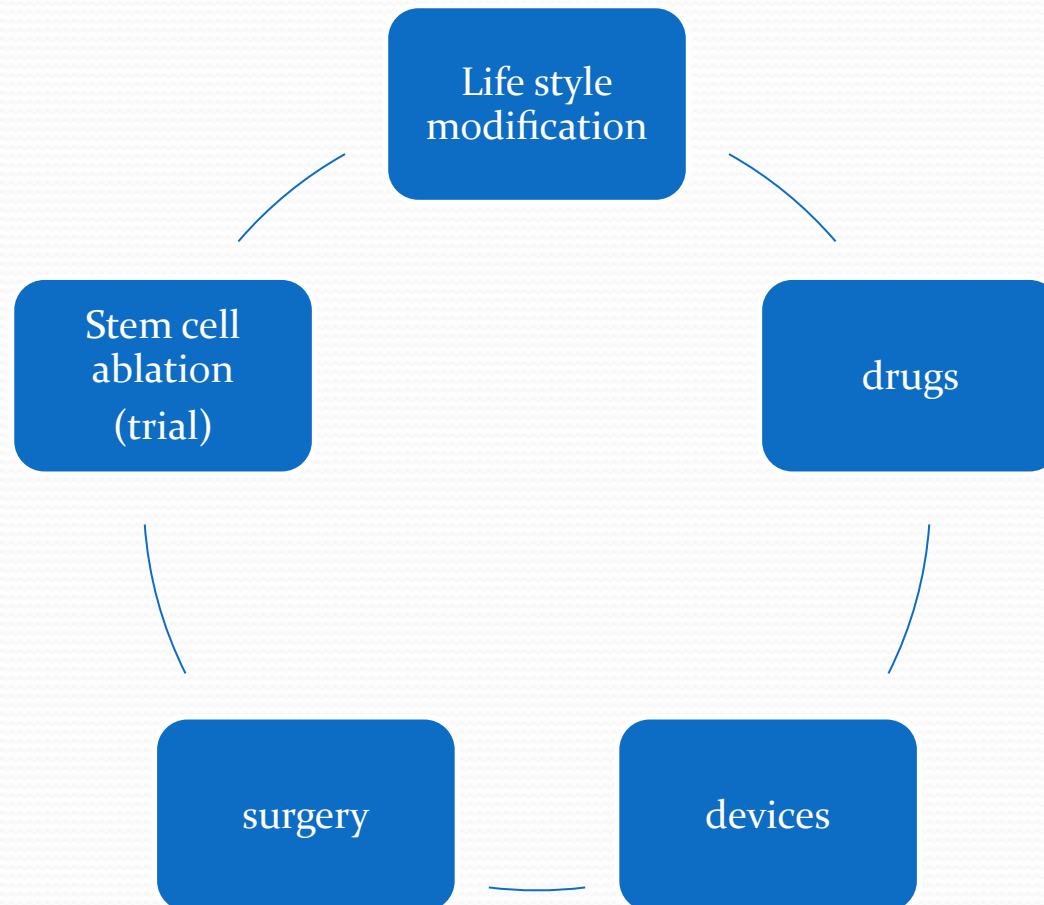
9. others:

→cardiac MRI

→cardiac biopsy

→holter (ambulatory 24-hours ECG monitoring)

TTT of HF



Life style modification

1. Obesity control → maintain desired weight & body mass index
2. D.M. & H.T.N. control
3. Dietary modification
 - large meals should be avoided
 - salt restriction (2-3 gm daily)

N.B. a recent study has shown that omega-3 polysaturated fatty acids reduce mortality & admission to hospital



5. Stoppage of smoking

6. Physical activity , exercise training & rehabilitation
which should be → dynamic , regular & stepwise

Drugs

Optimal pharmacological ttt is

angiotensin converting enzyme inhibitors(ace)

Beta blockers

diuretics

ACEi

- Captopril 6.25 mg x 3daily \ 25-50 mg x 3daily
- Enalapril 2.5 mg daily \ 10 mg x 2 daily
- Ramipril 1.25 – 2.5 mg daily \ 2.5-5mg x 2 daily

B.B.s

-
- (it have been shown to improve functional status & ↓ cardiovascular morbidity & mortality in pts with HF)

- Bisoprolol 1.25mg daily \ 10mg daily
- Carvedilol 3.125 mg daily \ 50mg daily
- Nebivolol 1.25mg daily \ 10mg daily
- Metoprolol 25-100 mg daily

*mechanism of action of B.B. :

- ✓ -ve entropic effect
- ✓ They block renin secretion , so reducing the heart rate & COP
- ✓ New receptor formation (resensitization)

Precautions of B.B. in HF

- < 20 ejection fraction
- Pt should be dry (not oedematous)
- 1st dose in hospital
- Gradually ↑↑ of the dose
- Follow up by echo every 2 wks

Diuretics

- Furosemide 20-40mg daily \max 250-500mg daily
- Aldosterone antagonists
 - spironolactone 12.5 -25 mg daily \ max 50-200 mg daily

N.B. : benefits of spironolactone

- ❖ k⁺ sparing
- ❖ Diuretic
- ❖ Antiproliferative
- ❖ Potentiate the action of furosemide
- ❖ Prevent A.F.

Digoxin 0.125-25mg daily (reduce the dose in elderly or if renal impairment)

- Indications of digoxin

- ☐ In HF & AF

- ☐ Contraindication of B.B.s(↓↓ejection fraction)

Others(Vasodilators)

Isosorbide dinitarte 20-40 mg daily

Hydralazine 37.-75 mg x3 daily

Prognosis (death)

- 85 % → arrhythmia
- 10 % → thromboembolism
- 5% → from HF itself

Devices

- 1) Implantable cardioverter defibrillator (ICD)
 - It recognizes ventricular tachycardia or fibrillation & automatically delivers shock to the heart to cause cardioversion to sinus rhythm
 - It is indicated in all survival pts who have experienced an episode of life-threatening ventricular tachyarrhythmia except:
 - a) 1st hours of MI
 - b) Hypo or hyperkalaemia (reversible cause)
- 2) Cardiac resynchronization therapy (CRT) all cardiac fibers work at the same time
- 3) Cardiac resynchronization therapy device (CRTD) combined of previous 2 devices

Surgical intervention

- According to the cause:

- Valvular replacement

- Heart transplantation

- *indications:

- Failure of previous 3 options

- Life expectancy <10 years



lationStem cell ab

Still under trial...



Thank you

A black and white photograph showing a hand-drawn message. The words "Thank you" are written in a fluid, cursive script using a black marker. The marker is visible in the upper right corner, with its tip just finishing the letter 'u'. The background is a plain, light-colored surface.