Team 435

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Objectives:

➢ Definition, types and classes of heart failure.
➢ Etiological factors and risk factors of heart failure.
➢ Clinical presentation.
➢ Investigations.
➢ Management.

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❖ What is heart failure ?

➤ It is defined as the inability of the heart to pump enough blood to meet body tissues demand.

❖ Types and causes of heart failure

Types	EF < 45% (systolic dysfunction) (dilation)	EF ≥ 45% (diastolic dysfunction)
Definition	Impaired **contractility**.	Impaired **ventricular filling**[1] (inability of the heart to relax)
Causes	**Ischemic heart** disease[2] (like MI) **HTN** causing hypertrophic cardiomyopathy.(HTN is the most common cause of CHF) **Valvular heart disease** (AS, MS, AR) - Myocarditis[3] - Less common causes: Alcohol abuse, radiation, thyroid disease.	**HTN** causing hypertrophic cardiomyopathy.(HTN is the most common cause of CHF) - Restrictive cardiomyopathy (amyloidosis, hemochromatosis, sarcoidosis) **Valvular diseases** (aortic stenosis (AS), mitral stenosis, and aortic regurgitation)

❖ High output heart failure:

➤ It's basically an increased demand from body on the heart to pump more blood.

➤ Usually caused by: chronic anemia, hyperthyroidism, paget disease, pregnancy, AV fistula and mitral regurgitation.

➤ Note that these conditions rarely cause heart failure by themselves, but they can result quickly in heart failure if they develop in the presence of an underlying heart disease.

❖ NYHA Classification:

Class I	No symptoms and no limitation in ordinary physical activity, (e.g. shortness of breath when walking, climbing stairs.. etc). Symptoms only occur with vigorous activities, such as playing a sport.
Class II	Mild symptoms (mild shortness of breath) and slight limitation during ordinary activity. Symptoms occur with prolonged or moderate exertion (e.g. climbing a flight of stairs or carrying heavy packages)
Class III	Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances. Comfortable only at rest
Class IV	Severe limitations. Experiences symptoms even while at **rest**. Mostly bed bound patients.

[1] either impaired relaxation or increased stiffness of ventricle or both.
[2] infarcted cardiac muscle does not pump blood.
[3] postviral.

❖ Clinical presentation:

Mostly you have both right and left heart failure but in some cases you have isolated side

Type	Left sided heart failure (blood flow back to the lungs)	Right sided heart failure(blood flow back to IVC & SVC)
Symptoms	- Dyspnea - Orthopnea - Paroxysmal nocturnal dyspnea - Nocturnal cough (non-productive) - Confusion and memory impairment - Diaphoresis and cool extremities. (class IV)	- Dyspnea - Orthopnea - Paroxysmal nocturnal dyspnea - Nocturnal cough (non-productive) - Nocturia - Weight gain
Signs	**Displaced point of maximal impulse.** **Pathologic S3 and S4 gallop.** **Crackles at lung bases.** - Dullness on percussion and decreased tactile fremitus at lung bases.	**Peripheral pitting edema.** **Jugular venous distention.** **Hepatomegaly, hepatojugular reflux.** - Ascites. - Right ventricular heave.

❖ Investigations:

Chest x-ray	You may find: cardiomegaly or pleural effusion.
ECG	Helpful in detecting ischemic heart disease and chamber enlargement.
Echocardiogram	**The most important diagnostic test.** - The only reliable way to differentiate **between** systolic and diastolic dysfunction. **Transthoracic** is the **initial choice.** **Transesophageal** is the **most accurate one.**
BNP	- More than 150 pg/ml indicates decompensated heart failure. - Less than 300 of N-terminal pro-BNP virtually **excludes** heart failure.
MUGA scan	- Radionuclide ventriculography using technetium-99 also called multigated acquisition scan. - Helpful in chemotherapy patients on maximum doses to exclude cardiomyopathy.
Cardiac catheterization	- Invasive test but provides valuable quantitative information such as valve diameters and septal defects. - Can also be used in **CAD** to exclude it as a cause of HF.
Cardiac enzymes	- Troponin T (stays up to 2 weeks) - CK-MB (only 3 days)
Stress testing	- Differentiates between cardiac and pulmonary etiology of dyspnea. - Assesses the dynamic response of heart rate, rhythm and BP.

❖ Management:

Lifestyle modification	• Fluid (1.5-2 L daily) and sodium (less than 4 g/day) restriction • Weight loss • Smoking cessation • Exercise • Weight monitoring (for fluid accumulation).
Diuretics	• Most effective symptomatic relief. • Loop diuretics (furosemide). • Thiazide diuretics.
Aldosterone antagonist	• Spironolactone has proven its benefits in patients with class III and IV of heart failure. • It causes hyperkalemia and gynecomastia. • Eplerenone is the alternative (does not cause gynecomastia).
ACE inhibitor	• Initial treatment of HF should be ACE inhibitors and diuretics. • Need to monitor BP, potassium, BUN and creatinine. • May cause dry cough
ARBs	• Should be used if the patient cannot tolerate ACE inhibitors.
Beta blockers	• Metoprolol, bisoprolol and carvedilol. • It slows the progression of heart failure by decreasing the consumption of oxygen. • It has antiarrhythmic and anti-ischemic effect.
Digitalis	• A positive inotropic agent. • It controls symptoms of dyspnea and decreases the frequency of hospitalization but it does not lower mortality rate.
Hydralazine and isosorbide dinitrate.	• Can be used in patients who cannot tolerate ACE inhibitors or ARBs. • It improves mortality in African American patients.

★ There's evidence for medications highlighted in black that they can improve mortality but others provide only symptomatic relief.

★ Most common cause of death in HF patients is arrhythmias and sudden death so studies have shown that ICD (implantable cardioverter defibrillator) can decrease mortality rates by helping to prevent sudden cardiac death.
   ○ Indications for ICD are: at least 40 days post-MI, EF less than 35% and class II or III symptoms despite optimal medical treatment.