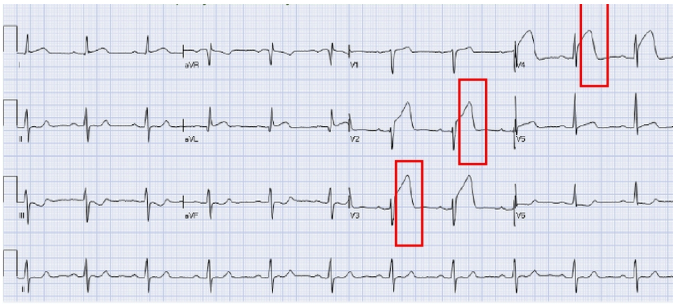
L2 (Common Clinical Cardiology Scenarios)

- Case 1: A 65-year-old gentleman presents to the Emergency Department with crushing retrosternal chest pain lasting 2 hours. He has a history of diabetes mellitus, hypertension, and dyslipidemia. His medications include insulin, metformin, enalapril, and atorvastatin. On examination, the patient appears apprehensive, diaphoretic, and in severe distress, describing a sense of impending doom. His blood pressure is 90/50 mmHg, and his heart rate is 110 beats per minute. Cardiovascular examination reveals normal heart sounds (S1 and S2) with no audible murmurs. An ECG is performed and shows ST-segment elevation in V2, V3, and V4.

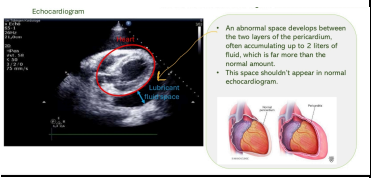


Symptoms and signs	Diagnostic tool	Diagnosis	Management	Some notes
Crushing retrosternal chest pain, history of diabetes mellitus, hypertension, and dyslipidemia, diaphoretic, apprehension, hypotension (BP 90/50), tachycardia (HR 110), and the ECG shows ST elevation.	ECG and cardiac biomarker (Troponin).	STEMI (ST Elevation Myocardial Infarction)	1. Percutaneous Coronary Intervention (PCI): stent and adjunctive therapies including antiplatelets, anticoagulants. - PCI is a minimally invasive procedure used to open blocked or narrowed coronary arteries to restore blood flow to the heart. 2. Thrombolytics.	1. STEMI is transmural myocardial ischemia and subsequent myocardial injury or necrosis. 2. It is a life-threatening condition with high mortality. 3. Risk factors include: hypertension, hyperlipidemia, smoking, and diabetes which are very common in our Jordanian population. 4. The pathogenic mechanism typically involves plaque rupture and thrombus formation within the coronary artery.

😊 PCI:

- The red arrow indicates where the blood is stopped due to thrombus. Once the coronary artery is recanalized by PCI, the blood flow will be restored. You can notice that the vessels reach to the base, so this is the left anterior descending artery which was presented with anterior lead ST from V2 to V4.

- Case 2: A 20-year-old college student, previously healthy, presents with **sudden-onset** sharp retrosternal chest pain. The pain worsens with inspiration and lying supine but improves when leaning forward. The patient reports a recent upper respiratory tract infection two weeks ago. On examination, his vital signs are stable (BP 120/80 mmHg, HR 90 beats per minute). Cardiovascular examination reveals a squeaking sound best heard at the left parasternal area, consistent with a pericardial friction rub. An ECG shows diffuse ST-segment elevation with PR-segment depression.

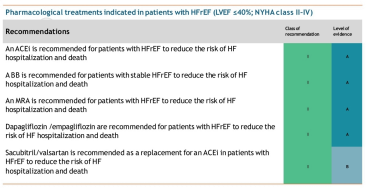
Symptoms and signs	Diagnostic tool	Diagnosis	Management	Some notes	Feared complication
1. Sudden sharp chest pain exacerbated by inspiration, coughing and supine position and improves when leaning forward and sitting up. [>95% of patients with acute pericarditis are present with chest pain]. 2. Squeaking sound with friction rub, no risk factors, and the ECG shows diffuse ST elevation.	ECG	Pericarditis	- First-line: Combination therapy: NSAIDs (Naproxen, ibuprofen) and colchicine (which is a drug to gout but it has anti-inflammatory effects). - Second-line: steroids if NSAIDs are contraindicated.	Typical presentation of Pericarditis (major criteria for diagnosing): **1. Sharp and pleuritic chest pain** improved by sitting up and leaning forward. **2. Pericardial friction rub:** superficial scratchy or squeaking sound best heard over the left sternal border. **3. ECG changes**: widespread ST elevation and PR depression. **4. Pericardial effusion** (we can see it in echocardiogram).	Pericardial effusion lead to other complication called **tamponade** which clinically diagnoses by Beck's triad: Muffled heart sounds, hypotension and elevated JVP (jugular venous pressure). Muffled means softened, unclear. 

- The pericardium is a fibroelastic sac made up of visceral and parietal layers separated by a space (the pericardial cavity). In healthy individuals, the pericardial cavity contains 15-50 mL of an ultrafiltrate of plasma.

- The heart is connected through the pericardium with different structures by ligaments:

1. Posterior of the heart: vertebropericardial ligament.
2. Bottom of the heart: phrenicopericardial ligament.
3. Anterior: superior and inferior sternopericardial ligament.

- Case 3: A 60-year-old woman presents with progressive shortness of breath over three weeks, associated with orthopnea and paroxysmal nocturnal dyspnea (PND). She has a history of diabetes mellitus, hypertension, and coronary artery disease, with previous coronary artery bypass graft surgery. On examination, her blood pressure is 100/60 mmHg, and her heart rate is 95 beats per minute. Cardiovascular examination reveals an S3 heart sound and raised jugular venous pressure (JVP). Pulmonary examination reveals lung crackles, and there is pitting edema in the lower extremities.

Symptoms and signs	Diagnostic tool	Diagnosis	Management
1. Dyspnea, orthopnea, PND. 2. lung crackles [the sound of fluid that build up inside alveoli, which is the cause of shortness of breath due to impair gases exchange]. 3. pitting edema [patients have volume overload]. 4. S3 sound, JVP elevation, history of CAD-CABG, DM, HTN. - S3 sound is a diastolic sound (low-pitched), it's an early filling sound. It is normal in youngsters but above the age of 35/40 becomes pathological. While S4 sound always is pathological.	1. Chest X-Ray (CXR): we will see fluffy infiltrates, indicating pulmonary edema. 😵Sometimes we get confused is this x-ray is pneumonia or heart failure so to confirm we ask for "brain natriuretic peptide" test. 2. BNP levels: - High BNP indicates patients are with heart failure with very high sensitivity. - Negative BNP indicates this is Not heart failure with very high specificity. So, A high BNP level strongly suggests heart failure, with excellent sensitivity, while low BNP level effectively rules out heart failure, demonstrating high specificity.	Congestive Heart Failure (CHF)	Management is based on four types: 1. Class 1: ACEI or ARBs or ARNIs (Angiotensin Receptor-Neprilysin Inhibitors). 2. Class 2: Beta Blockers. 3. Class 3: Spironolactone (aldosterone antagonist). 4. Class 4: Sodium-glucose co-transporter 2 (SGLT2) inhibitors [Diabetic medications] like Dapagliflozin / empagliflozin. - Sacubitril/valsartan are recommended as a replacement for an ACE inhibitor in HFrEF to reduce hospitalization and death. HFrEF Management  Pharmacological treatments indicated in patients with HFrEF (LVEF ≤40%; NYHA class II–IV) Recommendations | Class of recommendation | Level of evidence An ACEI is recommended for patients with HFrEF to reduce the risk of HF hospitalization and death | I | A A BB is recommended for patients with stable HFrEF to reduce the risk of HF hospitalization and death | I | A An MRA is recommended for patients with HFrEF to reduce the risk of HF hospitalization and death | I | A Dapagliflozin /empagliflozin are recommended for patients with HFrEF to reduce the risk of HF hospitalization and death | I | A Sacubitril/valsartan is recommended as a replacement for an ACEI in patients with HFrEF to reduce the risk of HF hospitalization and death | I | B

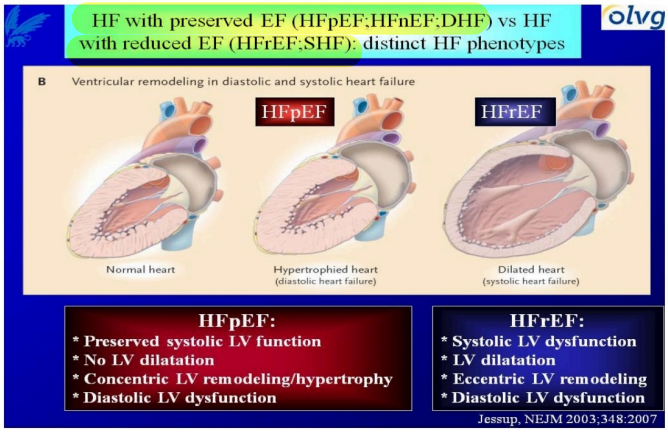
- **PND** happens when someone sleeps with no problems but wakes up around 3-4 am with difficulty in breathing. While **orthopnea** happens when someone cannot breath normally (shortness in breath) when he sleep on his back (spinal position). Orthopnea is worse (bcz. any lining in supine position makes the short of breath) since it indicates high central venous pressure once man sleep on his back while PND it takes several hours for the central venous pressure to be high. Both are indicators of heart failure.

- Heart failure (HF) is a clinical syndrome in which patients have typical symptoms and signs resulting from an abnormality of cardiac structure or function which impairs the ability of the ventricle to fill with or eject blood.

- Symptoms: breathlessness, orthopnea, paroxysmal nocturnal dyspnea, ankle swelling, fatigue, and reduced exercise tolerance.

- Signs: elevated jugular venous pressure, hepatojugular reflux, third heart sound [gallop rhythm], S4 sound, edema & scrotal edema in male cardiac murmur, and displaced apex beat.

Sub-types (Echocardiogram)



- This image shows the normal heart with normal thickness, chamber lumen, and Lt. atrium.

- In HFpEF, the heart wall is thickened, the chamber lumen is compromised, and Lt. atrium is dilated.

- In HFrEF, lumen is severely dilated, and Lt. atrium is dilated, too.

Classification of Heart Failure

- This helps us to know how bad patient situation is

Functional Classification (New York Heart Association [NYHA])

Class	Severity of symptoms and limitation of physical activity
I	**No limitation** of physical activity Ordinary physical activity does not cause symptoms of HF (breathlessness, fatigue, or palpitations)
II	**Slight limitation** of physical activity Comfortable at rest, but **ordinary physical activity results in symptoms of HF**
III	**Marked** sever **limitation** of physical activity Comfortable at rest, but **less than ordinary physical activity causes symptoms of HF***
IV	**Unable** to carry on any physical activity without discomfort/symptoms of HF, or symptoms of HF at rest may be present

Here patient has minimal exertion
(يعني بيتعب لما يتحرك من الغرفة للمطبخ)

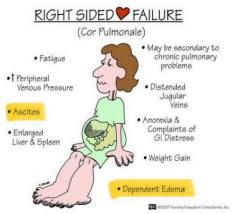
At rest

- Keep in mind HF is the most cause of hospital administration after the age of 65

Heart Failure Staging

Stages of HF	Development and progression of HF	Corresponding NYHA Class
A	At **high risk** for HF but **without structural heart disease or symptoms** of HF	None
B	**Structural** heart disease but **without signs or symptoms** of HF	I
C	**Structural** heart disease **with prior or current symptoms** of HF	I II III
D	**Refractory HF** requiring specialized interventions	IV

Symptoms



- Mostly in Lt. side HF ▶ pulmonary edema & highlighted above
- in Rt. Side HF ▶ ⬆ JVP & other highlighted above
- isolated from are rarely seen usually are combined which we call " congestive heart failure"
- When we can see right sided only? If the left ventricle is normal, but the patient have pulmonary disease (like severe cystic fibrosis, severe COPD)

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