PERICARDITIS

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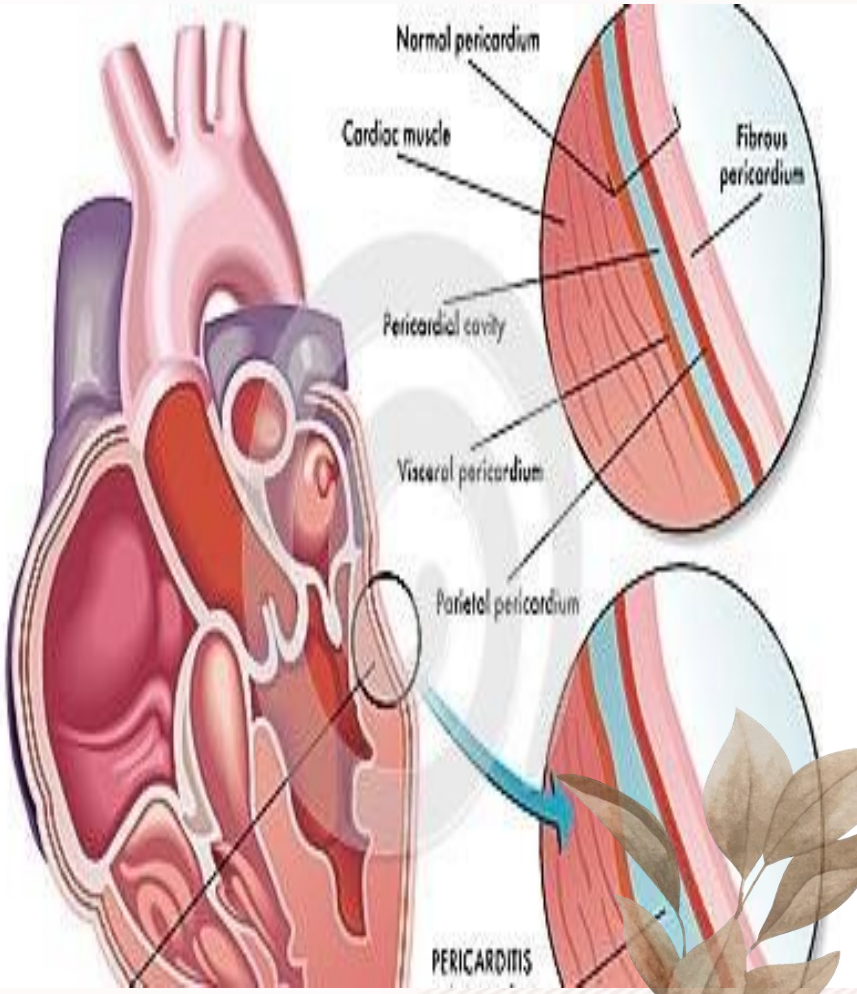
pericardium

The pericardium is a thin sac that surrounds your heart. It protects and lubricates your heart and keeps it in place within your chest.



The pericardium has two layers:

Fibrous pericardium is the outer layer that holds your heart in place in the chest cavity and protects from infections.

Serous pericardium is the inner layer. It's further divided into two more layers: the visceral and parietal layers. The serous pericardium helps to lubricate your heart.

In between these two layers is the fluid-filled pericardial cavity

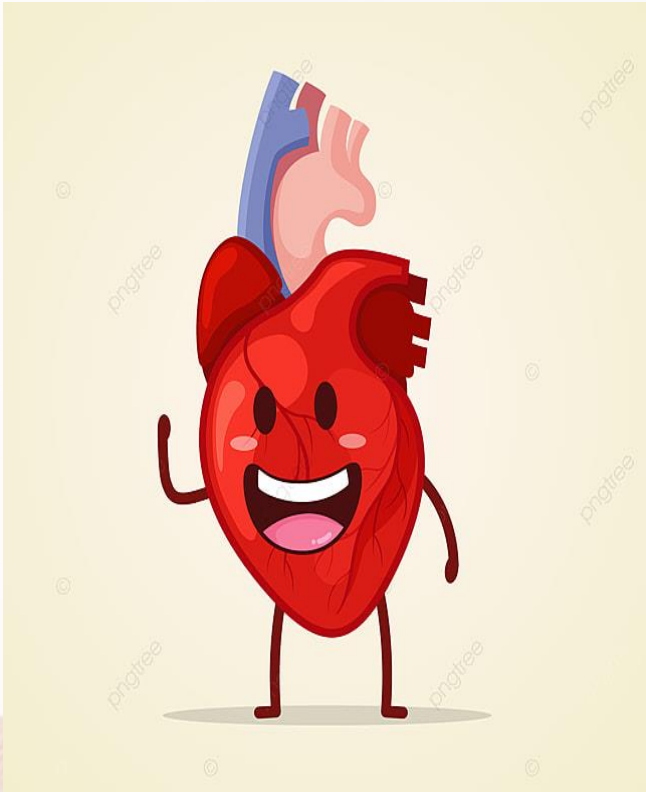
• Pericardial Diseases

1. Acute Pericarditis
2. Constrictive Pericarditis
3. Pericardial Effusion
4. Cardiac Tamponade

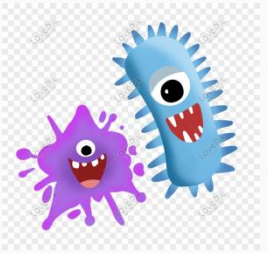
Acute Pericarditis

Acute Pericarditis

- Definition Acute pericarditis: inflammation of the pericardium that either occurs as an isolated process or with concurrent myocarditis (myopericarditis).



Etiology



- Idiopathic
- Infectious

o Most commonly viral (e.g., coxsackie B virus)

o Bacterial (e.g., Staphylococcus spp., Streptococcus spp., or M. tuberculosis)

&Fungi + toxoplasmosis

- Myocardial infarction

o Postinfarction fibrinous pericarditis: within 1–3 days as an immediate reaction

o Dressler syndrome: weeks to months after an acute myocardial infarction

- Postoperative (postpericardiotomy syndrome)
- Uremia : e.g., due to acute or chronic renal failure
- Radiation

o Exudative pericarditis: develops acutely during or after radiation therapy

o Constrictive pericarditis: develops several years after radiation therapy

- Neoplasms :(e.g., Hodgkin lymphoma)
- Autoimmune connective tissue diseases (e.g., rheumatoid arthritis, systemi lupus)
- Trauma

Clinical Manifestation

1- Chest pain : (most common finding)

- Acute, sharp retrosternal pain
- Typically aggravated by coughing, swallowing, or deep inspiration
- Improves on sitting and leaning forward
- Can radiate to the neck and shoulder

2- Low-grade intermittent fever, tachypnea, dyspnea, nonproductive cough.

Note: Pain is not always present, depending on the cause (usually absent in rheumatoid pericarditis)

On Physical Examination

- Pericardial Friction Rub: high-pitched scratching on auscultation

- Best heard over the left sternal border during expiration while the patient is sitting up and leaning forward
- occurs in atrial and ventricular systole, as well as early diastole
- Present in 85% of patients
- Not always present, but it is very specific for pericarditis

- If There Is Pericardial Effusion

- Faint heart sounds
- Ewart sign : A clinical finding of dullness at the base of the left lung, with increased vocal fremitus and bronchial breathing. Secondary to compression of the lung parenchyma by a large pericardial effusion.

Diagnosis

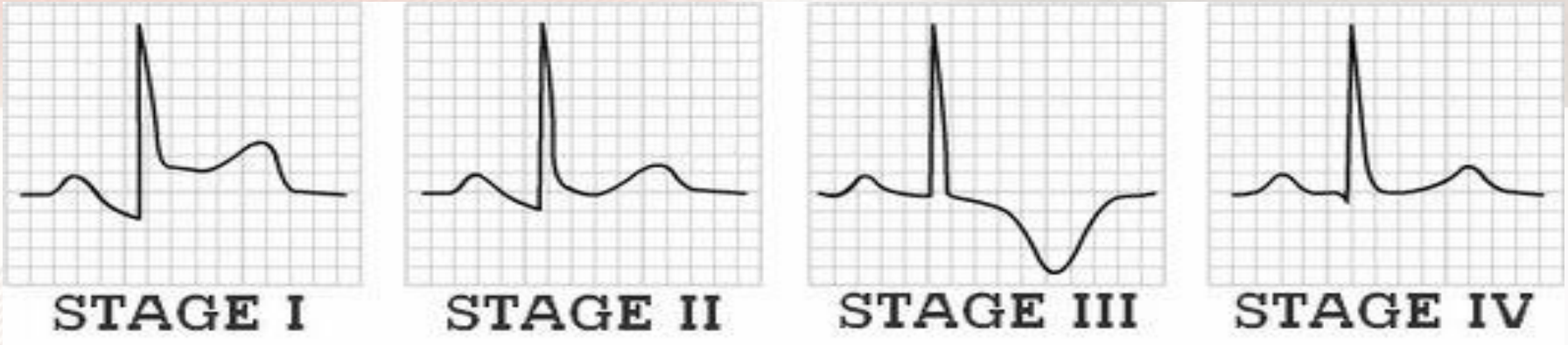
- Diagnosis Diagnostic criteria for acute pericarditis:

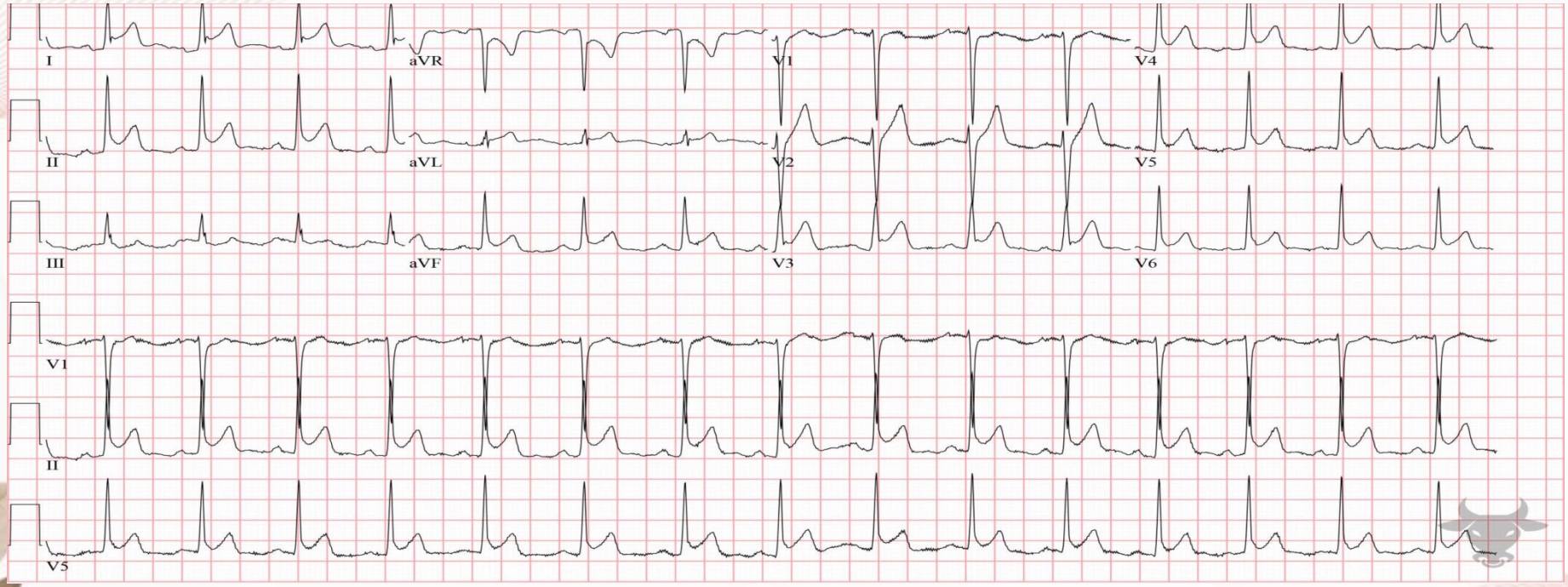
At least two of the following four criteria must be present for a diagnosis of acute pericarditis

1. Characteristic chest pain
2. Pericardial friction rub
3. Typical ECG changes
4. New or worsening pericardial effusion

ECG features of pericarditis

stage1	diffuse ST elevations, ST depression in aVR and V1, PR segment depression
stage2	ST segment normalizes in ~ 1 week
stage3	inverted T waves
stage4	ECG returns to normal baseline (as prior to onset of pericarditis) after weeks to months





- Diffuse concave ST elevation (in I, II, aVF, V3–V6) with reciprocal ST depression in aVR and V1

To aid your diagnosis:

- Echocardiography: pericardial effusion may be present, often normal

- Cardiac MRI Indications: Consider if diagnosis is uncertain Findings

o Thickened pericardium , pericardial enhancement, pericardial effusion

o May show associated myocarditis

- CT scan with IV contrast :Consider if the diagnosis is uncertain.

- Lab Findings :

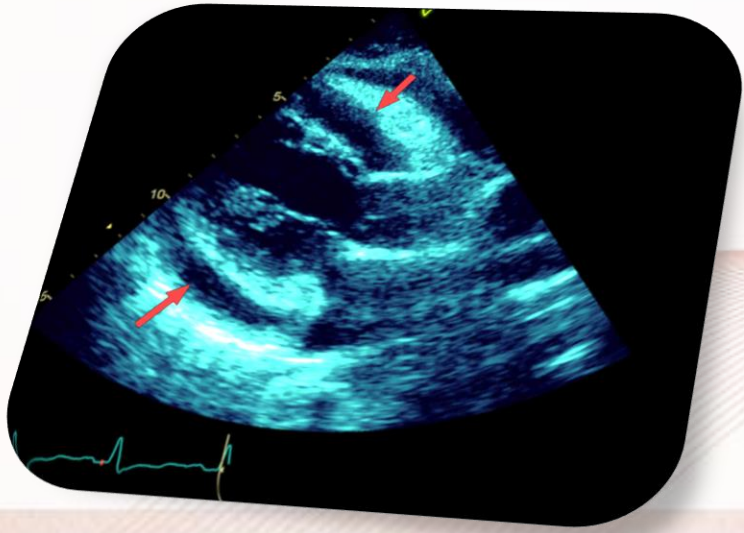
-CBC :leukocytosis

- ↑ Troponin I (could be minimally elevated)

-↑ ESR

- ↑ CRP

- ↑ Creatinine kinase (if associated myocarditis)



Treatment

- The mainstays of therapy include anti-inflammatories to control pain and prevent a recurrence, and treatment of the underlying cause
- Pharmacotherapy NSAID (high dose)
  - Aspirin
  - Ibuprofen
  - Indomethacin

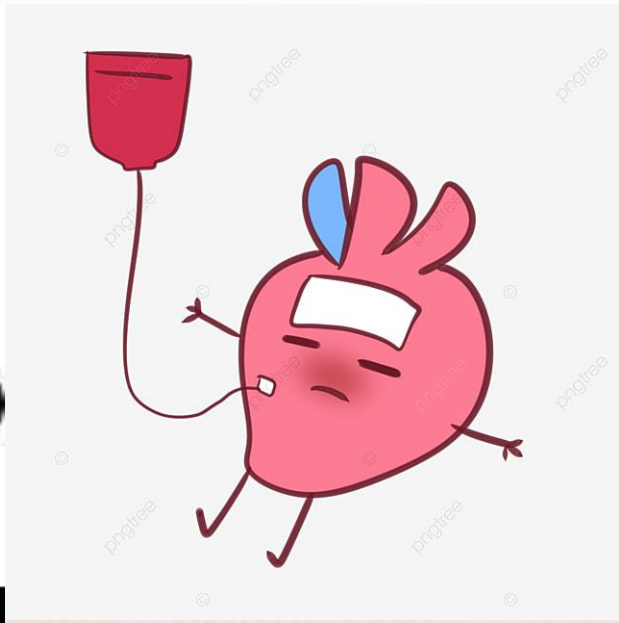
- Consider colchicine in combination with NSAIDs or as a monotherapy.
- Only consider prednisone in severe cases or in pericarditis caused by uremia, connective tissue disease or if NSAIDs are contraindicated .

- Supportive Therapy
  - Treat any known underlying causes.
  - Antibiotics for bacterial causes
  - Tuberculosis therapy
  - Immunosuppressants in autoimmune disease
  - Dialysis (in the case of uremia)
  - Restrict physical activity in patients with acute pericarditis

Most cases are self-limited and resolve in 2 to 6 weeks.

Constrictive Pericarditis

- Constrictive pericarditis is characterized by compromised cardiac function caused by a thickened, rigid, and fibrous pericardium.

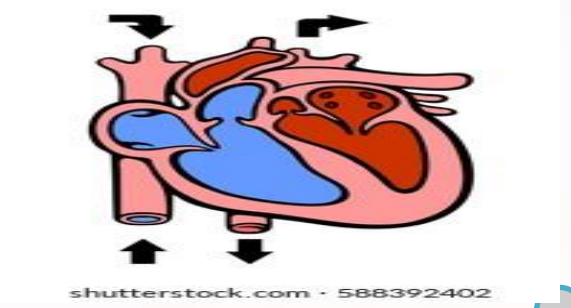


Etiology

- In most patients, the cause is never identified and is idiopathic or related to a previous viral infection.
- Other causes include:
  - recurrent pericarditis
  - uremia
  - radiation therapy
  - Tuberculosis
  - chronic pericardial effusion
  - tumor invasion
  - connective tissue disorders
  - surgery involving the pericardium.

Pathophysiology

- A fibrotic, rigid pericardium restricts the diastolic filling of the heart.
- Ventricular filling is unimpeded during early diastole because intracardiac volume has not yet reached the limit defined by the stiff pericardium.
- When intracardiac volume reaches the limit set by the noncompliant pericardium, ventricular filling is halted abruptly.



If a patient has clinical signs of cirrhosis (ascites, hepatomegaly) and distended neck veins, perform tests to rule out constrictive pericarditis.

Diastolic Dysfunction in Constrictive Pericarditis

- Early diastole: Rapid filling
- Late diastole: Halted filling

Clinical Features

Patients appear very ill

- Symptoms of fluid overload
  - Jugular vein distention, ↑ jugular venous pressure
  - Prominent x descents and y descents in jugular venous pressure
  - Kussmaul sign
  - Hepatic vein congestion
  - Peripheral edema , ascites
- Symptoms of reduced cardiac output
  - Fatigue, dyspnea on exertion
  - Tachycardia
  - Pericardial knock: sudden cessation of ventricular filling during early diastole that is heard best at the left sternal border
  - Pulsus paradoxus: decreased blood pressure amplitude by at least 10 mm Hg during deep inspiration

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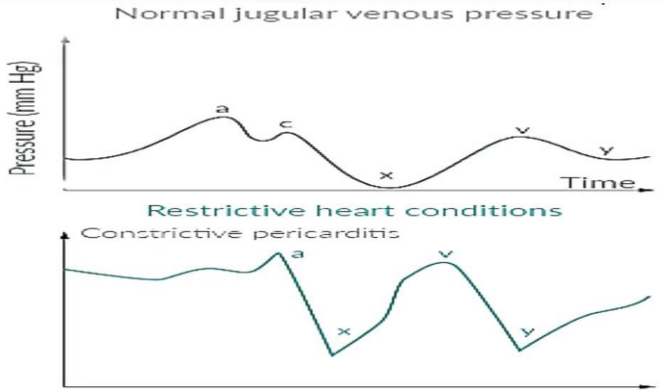


Diagnosis

- Echocardiography :

➢ ↑ Pericardial thickness

➢ Abnormal ventricular filling with sudden halt during early diastole

- CT and cardiac MRI :

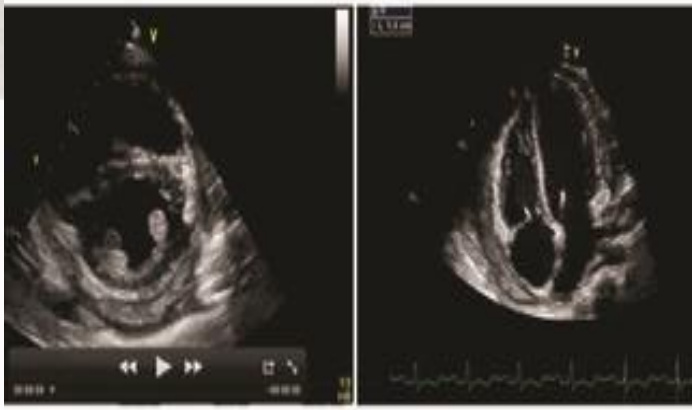
➢ Pericardial thickening > 2 mm

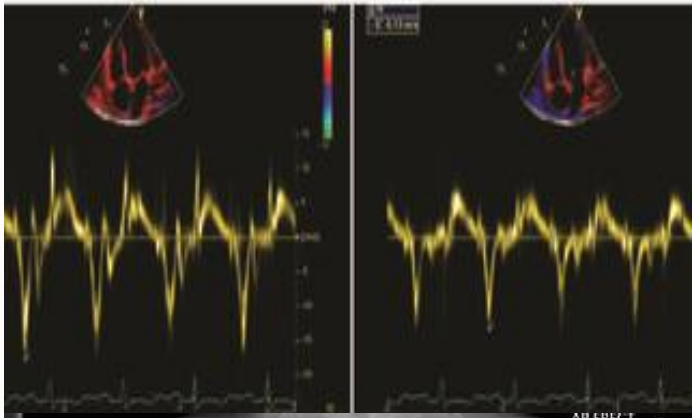
➢ Calcifications

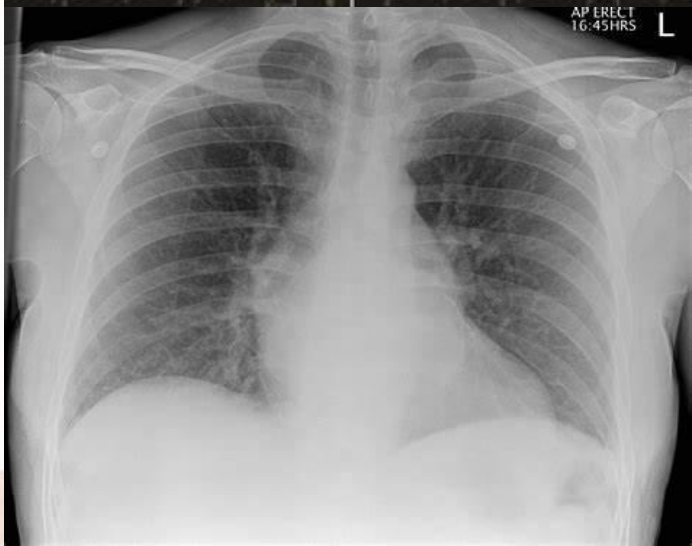
- Chest x-ray (PA and lateral views):

➢ Heart size: normal or slightly increased

➢ Pericardial calcifications







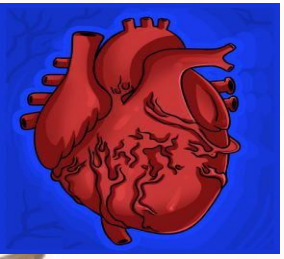
- Cardiac catheterization Indications: if noninvasive methods have failed to provide a definitive diagnosis Findings :

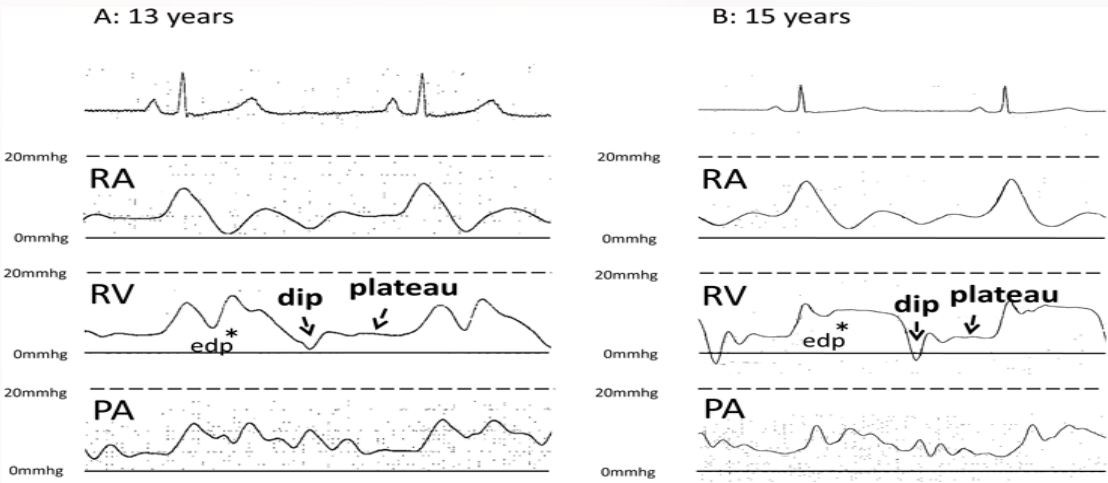
➢ Similar pressures in the left and right atria and right ventricle at the end of diastole

➢ Square root sign

o Also known as dip-and-plateau waveform

o Sudden dip in the right and left ventricular pressure in early diastole followed by a plateau during the last stage of diastole





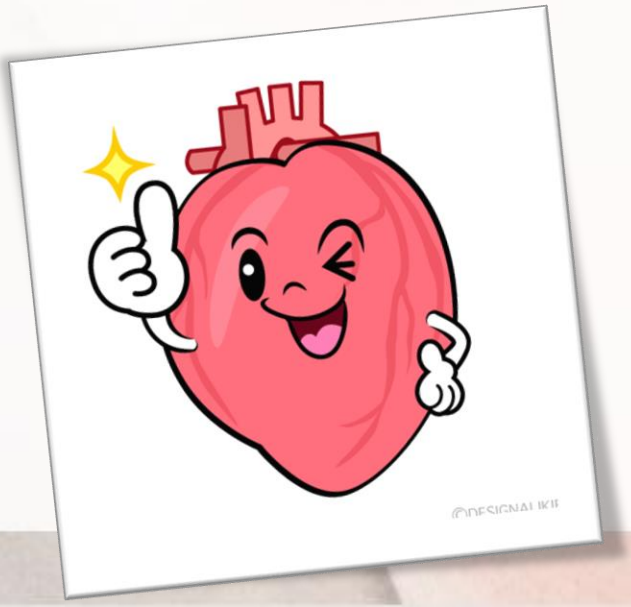
- ECG :

➢ No conclusive findings: generalized flat/inverted T waves, low QRS voltage

➢ Atrial fibrillation can occur in severe disease

Treatment

- 1. Treat the underlying condition
- 2. Diuretics may be extremely helpful in treating fluid overload symptoms
- 3. Surgical pericardiectomy



Pericardial effusion
And
Cardiac tamponade

Definition

Pericardial effusion: an accumulation of fluid in the pericardial space between the parietal and visceral pericardium. May be acute or chronic.

- Cardiac tamponade: a pathophysiological process whereby elevated intrapericardial pressure from a pericardial effusion causes compression of the heart (especially the right ventricle)

Etiology

1• Hemopericardium: accumulation of blood in pericardial space

- Cardiac wall rupture (e.g., complication of myocardial infarction)
- Chest trauma (traumatic cardiac tamponade)
- Aortic dissection
- Cardiac surgery (e.g. heart valve surgery, coronary bypass surgery)

Etiology

2• Serous pericardial effusion

- idiopathic
- Acute pericarditis (especially viral, but also fungal, tuberculous or bacterial)
- Malignancy
- Postpericardiotomy syndrome
- Uremia
- Right heart failure

Pathophysiology

Cardiac tamponade: pericardial fluid collection (e.g., bloody or serous) -> increase pressure in the pericardial space -> compression of the heart (especially of the right ventricle due to its thinner wall) -> interventricular septum shift toward the left ventricle chamber -> decrease systemic venous return (preload) -> decrease ventricular diastolic filling -> decrease stroke volume (and venous congestion) -> decrease cardiac output and diastolic pressures in all 4 chambers

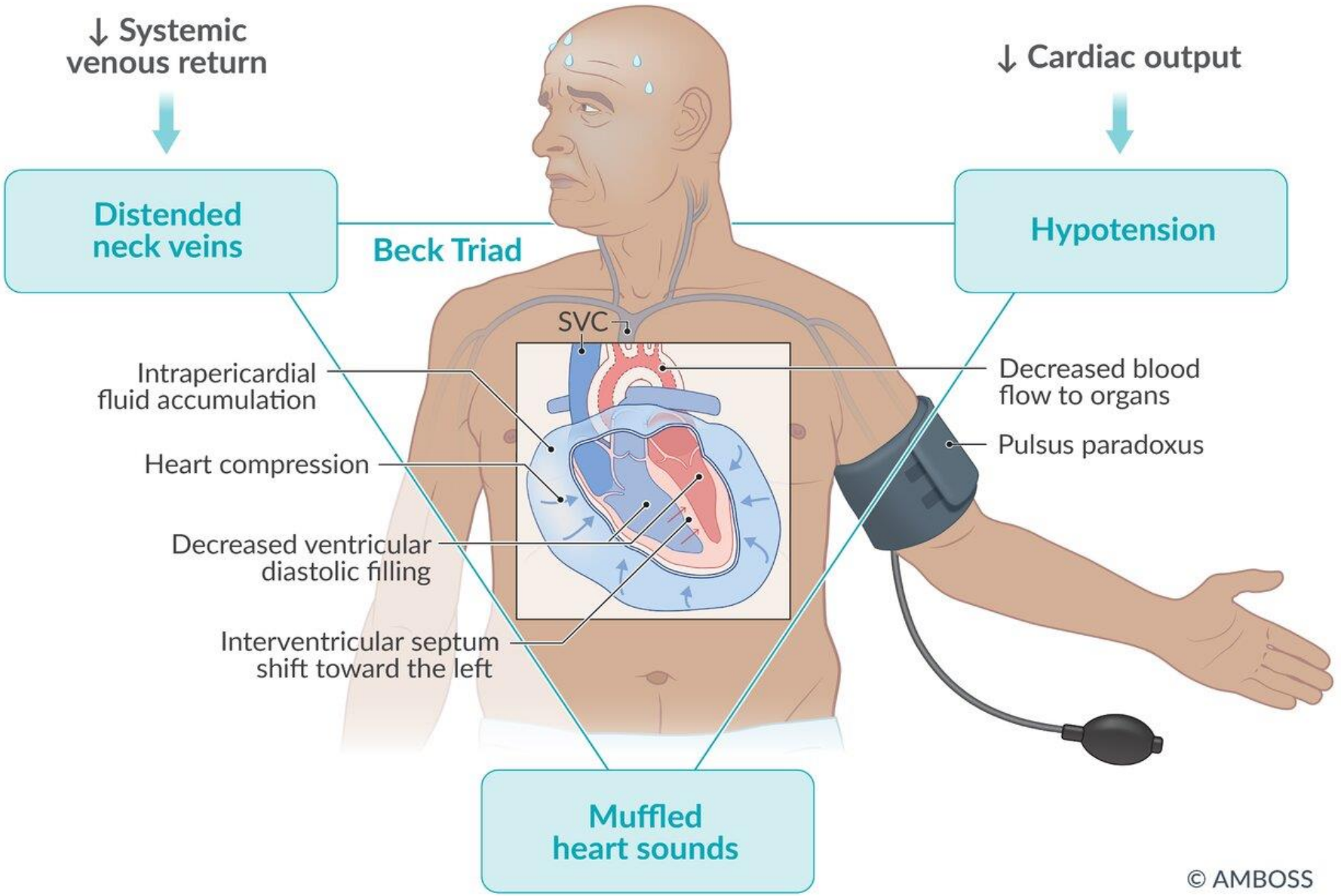
Clinical Features of pericardial effusion

- Initially asymptomatic in most cases
- Shortness of breath, especially when lying down (orthopnea)
- Retrosternal chest pain .
- Can cause compressive symptoms
  - Hoarseness
  - Nausea
  - Dysphagia
  - Hiccups
- Apical impulse is difficult to locate or nonpalpable.
- Ewart sign: dullness to percussion at the base of the left lung with increased vocal fremitus and bronchial breathing due the compression of lung parenchyma by the pericardial effusion

Clinical Features of cardiac tamponade

- Beck triad
  - Hypotension
  - Muffled heart sounds
  - Distended neck veins
- Tachycardia, pulsus paradoxus
- Pallor, cold sweats
- Left ventricular failure
- Symptoms of right heart failure
- Obstructive shock, cardiac arrest (presenting as pulseless electrical activity)

Cardiac tamponade



Diagnosis

1.Clinical Evaluation: A thorough history and physical examination are crucial, focusing on signs of hypotension, muffled heart sounds, and JVD.

2.Imaging Studies:
1.Echocardiography:The most important tool for diagnosis, showing pericardial effusion and signs of tamponade physiology (diastolic collapse of cardiac chambers).

2.Chest X-ray: May show cardiac enlargement

3.CT or MRI: Useful for detailed assessment, particularly in complicated cases or suspected malignancy.

3.Electrocardiogram (ECG)

Treatment

• Small pericardial effusion: Conservative management focusing on treating the underlying cause is usually sufficient

• Large pericardial effusion causing symptoms : Consider pericardial fluid drainage, manage acute heart failure, treat pericarditis, Provide supportive care, e.g., pain management .

Pericardial fluid drainage

• Therapeutic pericardiocentesis

A procedure used to drain pericardial fluid, usually guided by ultrasound. A large needle is introduced via a subxiphoid, parasternal area. Pericardial fluid is drained by simple needle aspiration or placement of a pericardial drain

The management of cardiac tamponade involves:

1. Initial Assessment: Recognize key signs like hypotension, jugular venous distension, muffled heart sounds, and pulsus paradoxus. Begin monitoring and provide oxygen .

2. Emergency Treatment: Perform pericardiocentesis to remove fluid from the pericardial sac, ideally under ultrasound guidance. Provide IV fluids if hypotensive .

3. Advanced Management: Consider surgical pericardial window if tamponade recurs or if pericardiocentesis is insufficient

Thank You