



Thinking out of box

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The Pericardium





an inverted cone-shaped sack surrounding the heart and lying on top of the diaphragm .


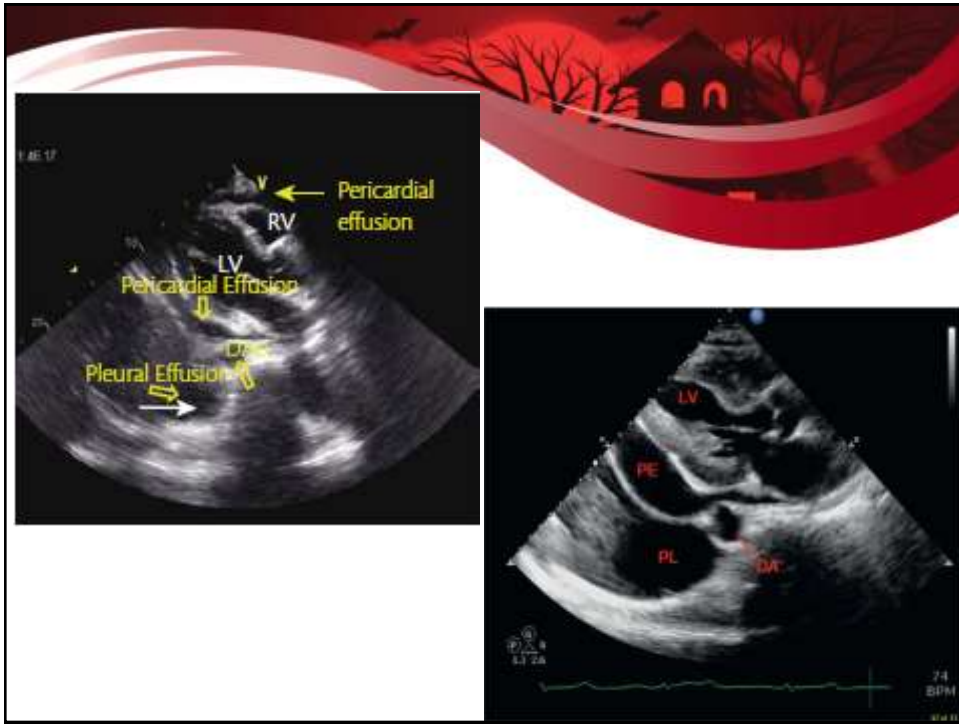
The inner portion, or visceral pericardium, is a single layer of mesothelial cells covering the epicardium.

The outer layer is composed of a dense outer fibrous tissue with an inner layer of mesothelial cells known as the parietal pericardium.

The fibrous pericardium is attached to
Inferiorly : the central tendinous portion of the diaphragm Superiorly: with the sheath covering the great vessels. Anteriorly : it attaches to the posterior surface of the sternum. Posteriorly: it is attached to the thoracic vertebral column, esophagus, bronchi, and aorta.



Pericardial versus Pleural effusion



Quantification



EACVI

Semi-quantification

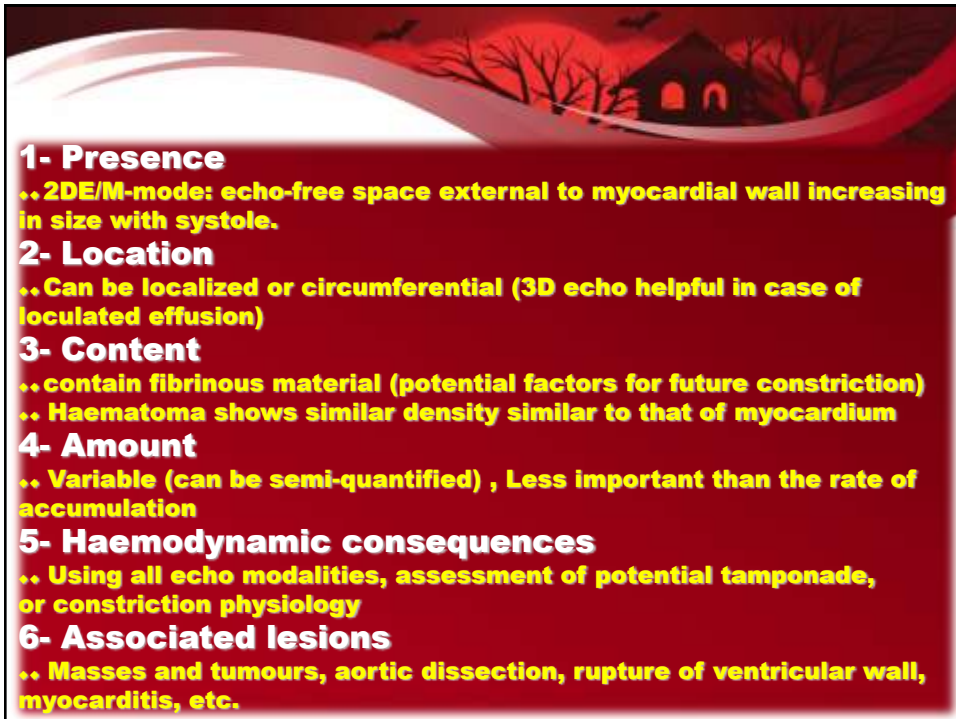
- ◆ Small: < 0.5 cm (< 100 mL);
- ◆ Moderate: ≤ 1 cm (100/500 mL);
- ◆ Large: > 1 cm (> 500 mL)

ASE: Echocardiographic Quantification of Pericardial Effusion

Trivial Echolucent space < 10 mm Seen only in systole
Small Echolucent space < 10 mm Seen in systole and diastole
Moderate Echolucent space 10-20 mm
Large Echolucent space > 20 mm



Echocardiographic findings in pericardial effusion



1- Presence
 ..2DE/M-mode: echo-free space external to myocardial wall increasing in size with systole.

2- Location
 ..Can be localized or circumferential (3D echo helpful in case of loculated effusion)

3- Content
 ..contain fibrinous material (potential factors for future constriction)
 .. Haematoma shows similar density similar to that of myocardium

4- Amount
 .. Variable (can be semi-quantified) , Less important than the rate of accumulation

5- Haemodynamic consequences
 .. Using all echo modalities, assessment of potential tamponade, or constriction physiology

6- Associated lesions
 .. Masses and tumours, aortic dissection, rupture of ventricular wall, myocarditis, etc.



Pericardial tamponade
Definition

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Cardiac tamponade

Definition

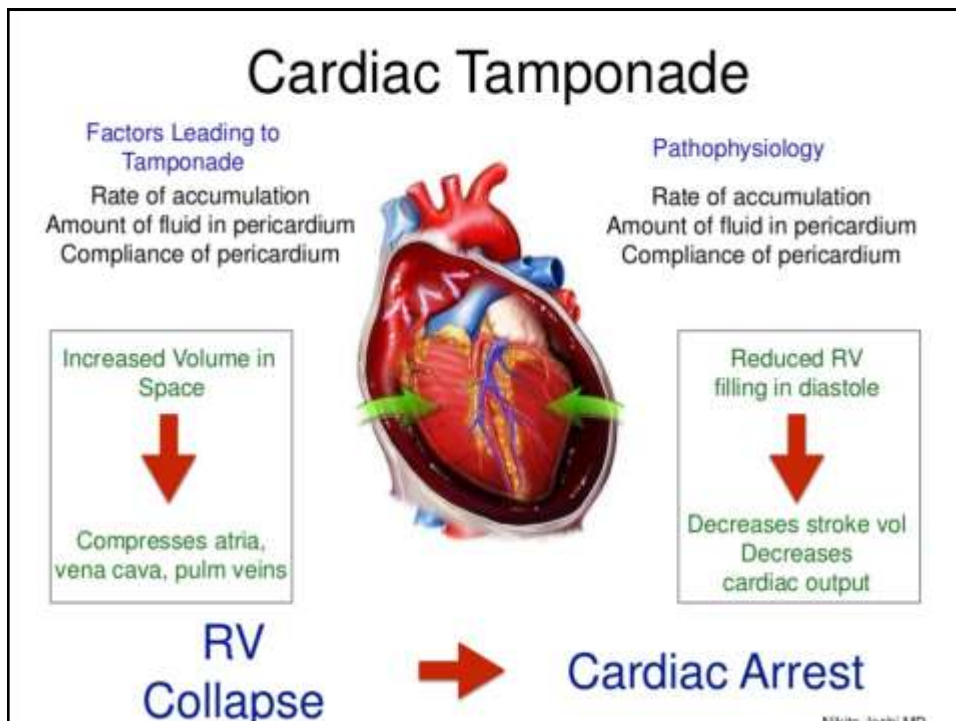
- ♦♦ Life-threatening clinical condition related to elevated intrapericardial pressure above normal filling pressure of the heart
- ♦♦ A pulsus paradoxus may be present (> 10 mmHg decrease of systolic blood pressure with inspiration)

Acute Tamponade

Rapid accumulation of as little as 150 mL of fluid/blood can cause profound tamponade physiology

Subacute Tamponade

When pericardial effusion develops gradually, the pericardium stretches and can allow for the accumulation of large amounts of pericardial fluid (>1000 mL) without any significant increase in intrapericardial pressure.





Causes of Pericardial Effusion

- Inflammatory
- Infectious
- Autoimmune
- Neoplastic
- Endocrine/metabolic
- Myxedema
- Uremia
- Trauma/iatrogenic/surgery
- Radiation treatment
- Volume overload states
- Congestive heart failure
- Cirrhosis
- Myocardial infarction
- Idiopathic



Pericardial Effusion Mimics

Pleural effusion
Epicardial fat
Left ventricular pseudoaneurysm
Pericardial cyst

Beck's triad (cardiac tamponade) 3 D's:

- D**istant heart sounds
- D**istended jugular veins
- D**ecreased arterial pressure

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Clinical Findings

Hypotension
Elevated jugular
venous pressure
Pulsus paradoxus
Tachycardia/
tachypnea
Diminished heart
sounds

Echocardiographic Findings

Pericardial effusion
Chamber collapse

Inferior vena cava plethora
Hepatic venous flow pattern change

Exaggerated respiratory-related changes in
right and left ventricular size and Doppler
inflow velocities
Swinging heart

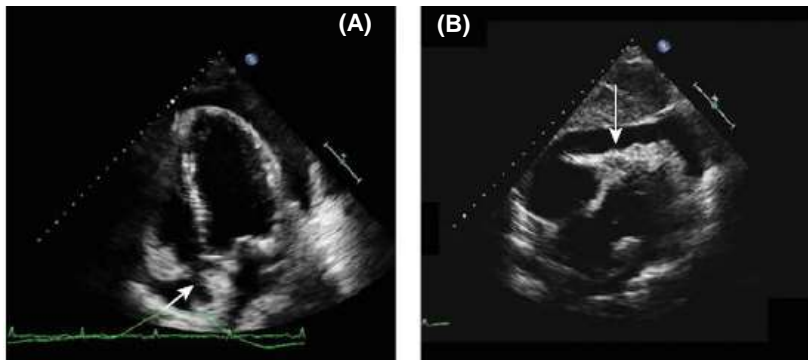
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Parameters to evaluate

1. Right atrial collapse
2. Right ventricular diastolic collapse .
3. Swinging heart
4. Compression of the left atrium or left ventricle
5. Reciprocal changes in ventricular volumes and septum motion toward left ventricle with inspiration and toward right ventricle during expiration.
6. Dilatation of the inferior vena cava and blunted respiratory changes
7. Mitral and tricuspid Doppler velocity profiles with respiratory variation exceeding 30%

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Right atrial collapse during systole (A). Right ventricular diastolic collapse (B). Dilatation of the inferior vena cava and blunted respiratory changes

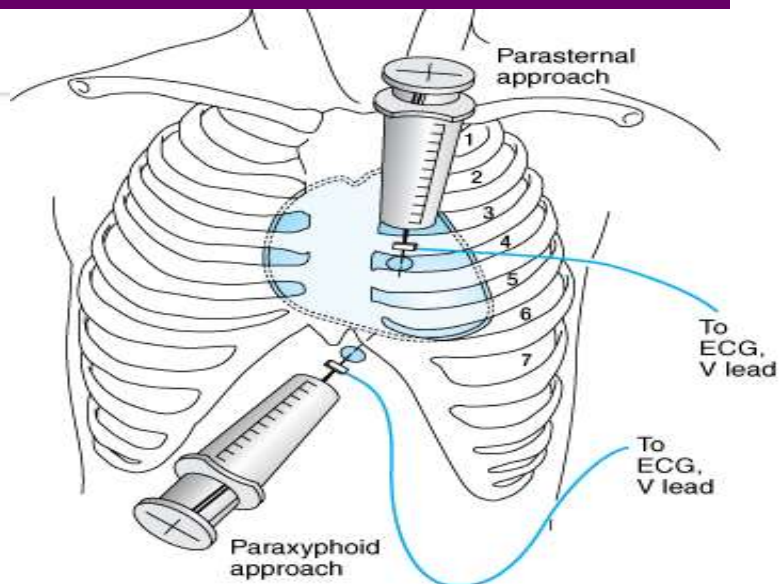


Relative contraindication of pericardiocentesis

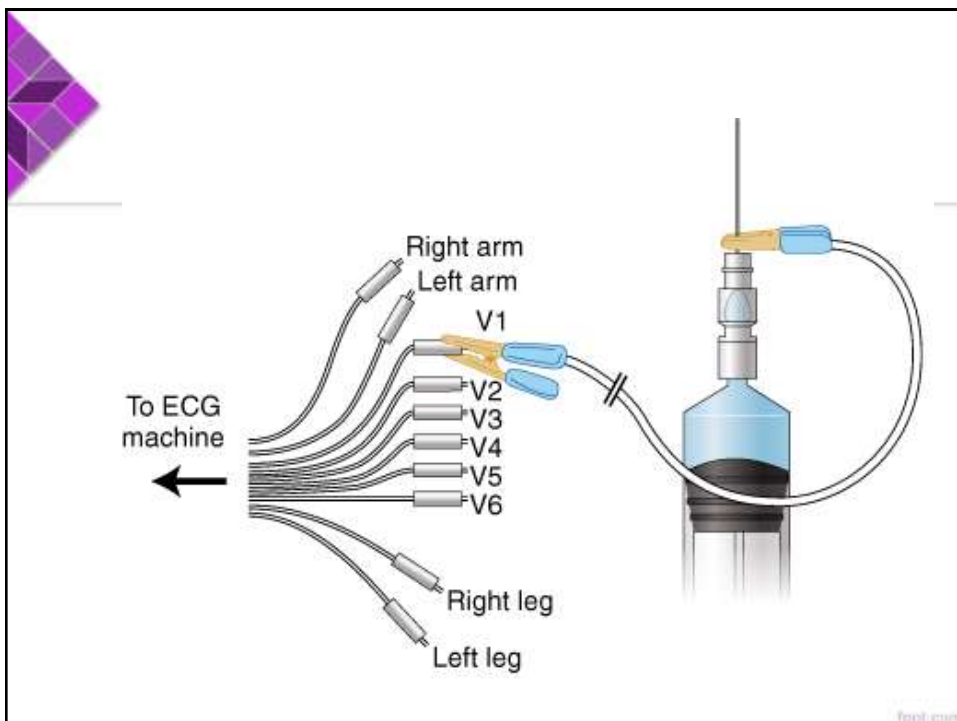
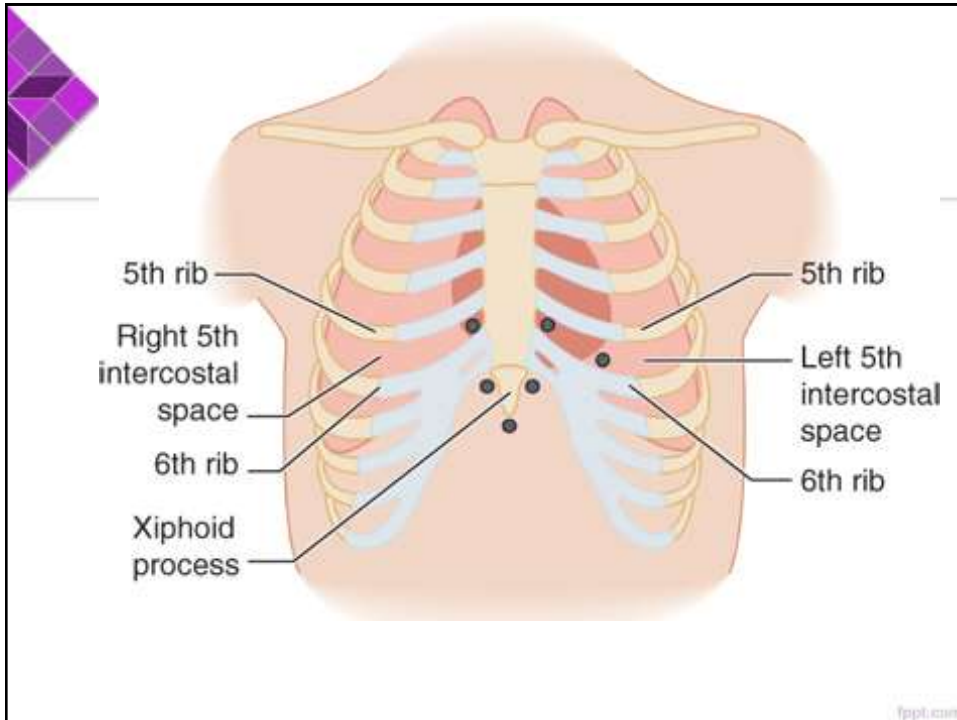
- **Coagulopathy (INR > 1.8, PTT > 2× normal and/or platelet count < 50,000/mL)**
- **Traumatic hemopericardium**
- **Subacute cardiac free wall rupture**
- **Small or posteriorly located effusions**
- **Purulent, grossly infected pericardial effusion**
- **Type A aortic dissection**

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Pericardiocentesis



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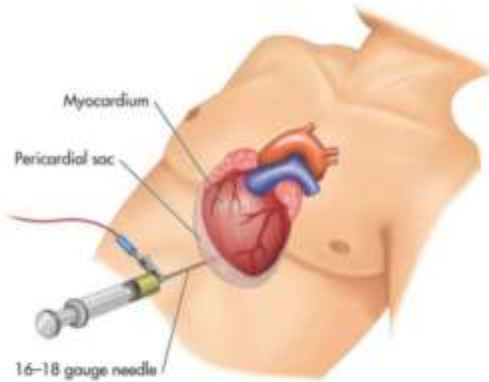
Pericardiocentesis

Subxiphoid Approach

Needle inserted btwn the
xiphoid process and L
costal margin
30° to 45° angle

Aim for L mid-clavicle

Directs needle toward
Anterior wall of R
ventricle



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Pericardiocentesis

Parasternal Approach

Needle is inserted
perpendicular to skin,
L 5th intercostal
space

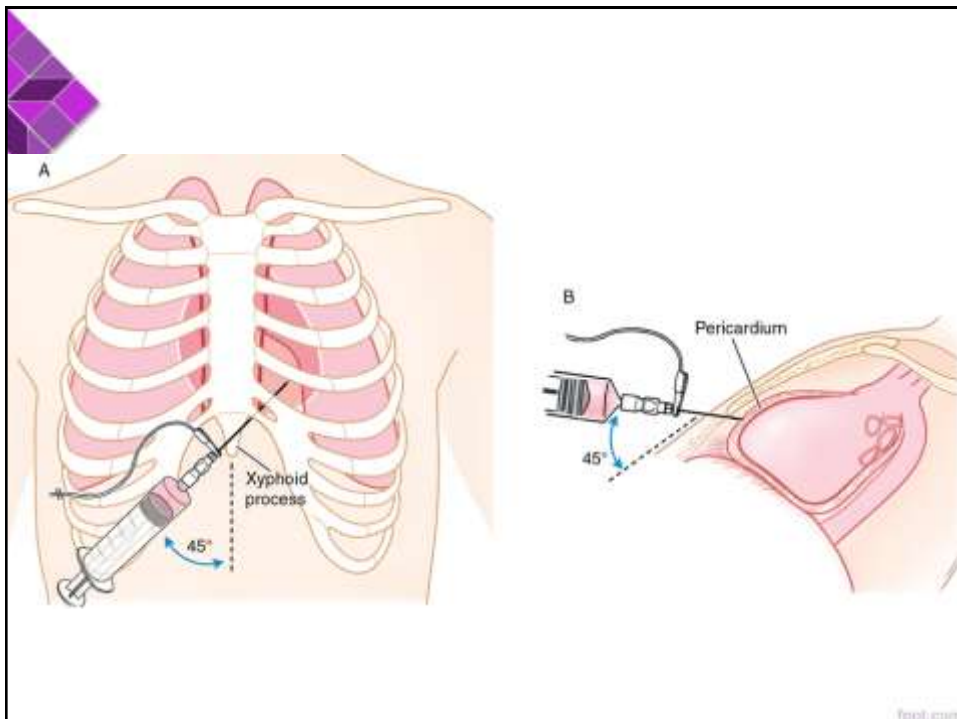
Penetration
immediately
lateral to sternum

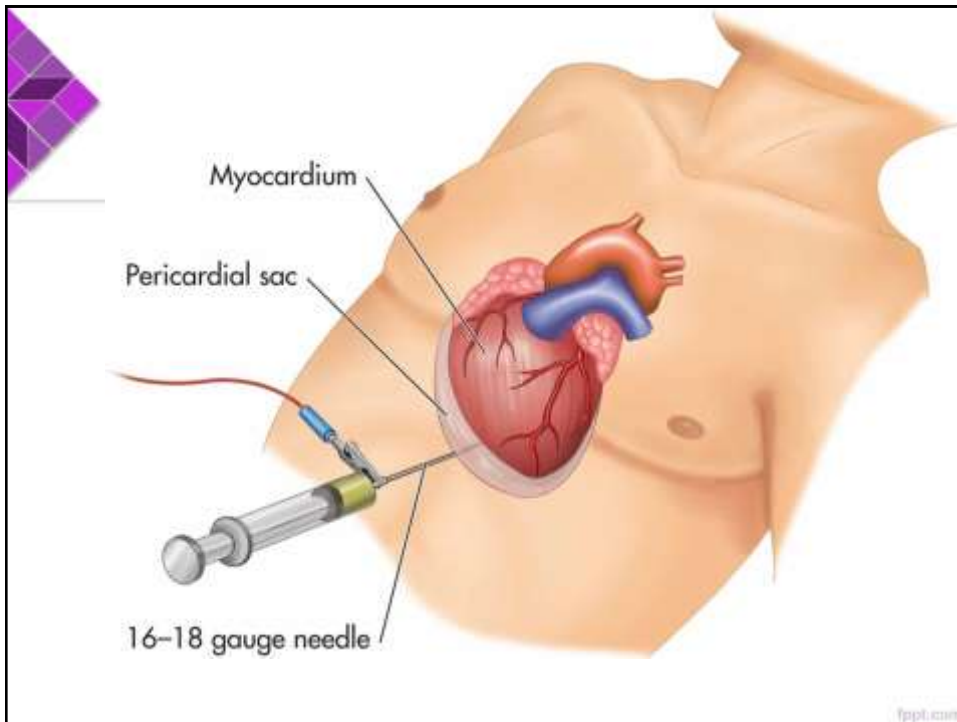


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Subxiphoid approach

- long 18-22 G needle attached to syringe
- insertion: between xiphisterum and left costal margin
- direct towards the left shoulder at 40 degree angle to skin
- continual aspiration as needle approaches RV
- once pericardial fluid aspirated, can insert cannula into pericardial space
- attach a 3 way tap and remove fluid with improvement in haemodynamics





COMPLICATIONS

- myocardial perforation
- bleeding
- pneumothorax
- arrhythmia
- acute pulmonary edema (due to rapid drainage of pericardial fluid leading to excessive LV preload)
- acute ventricular dilatation



Thinking out of box



Case presentation

- History:


- 27 years old Male, History of SLE.
- History of myx. & on eltroxin treatment
- Presented with SOB.
- Congested Neck Veins

- ECG :

- low voltage

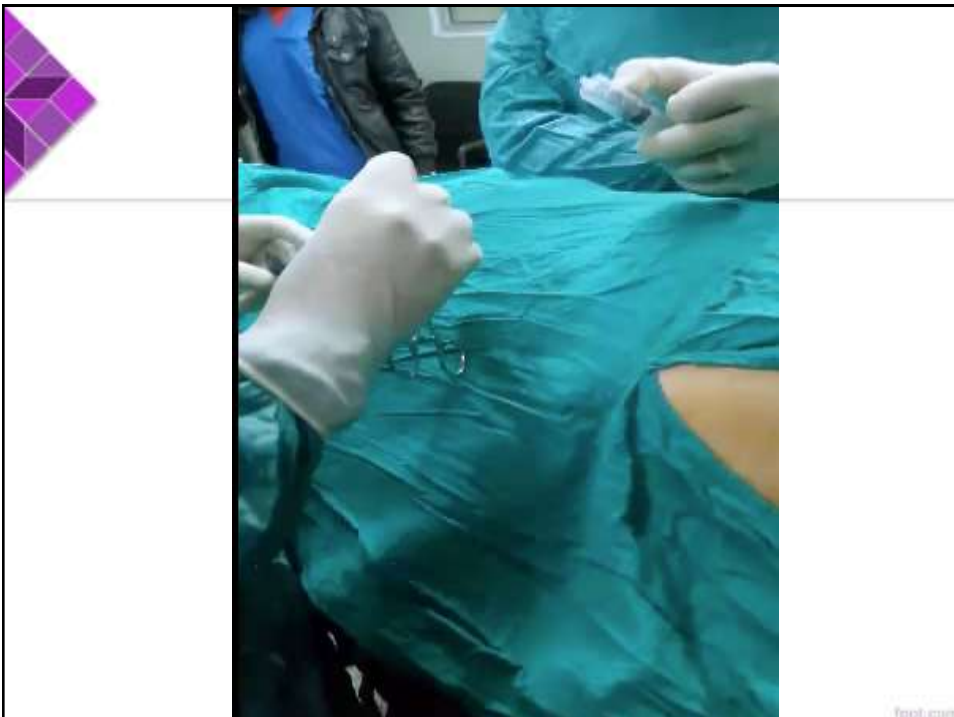
- X-ray:

- flask shaped heart.



- Echo:
 - Massive pericardial effusion.
 - Tamponading
 - Mainly posterolateral

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Take Home Message

- Echo guided pericardial effusion tapping could be carried out even in posterolateral type with low risk of complications.

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Thank You !