



# CXR #11

WAMSS SGR 2022



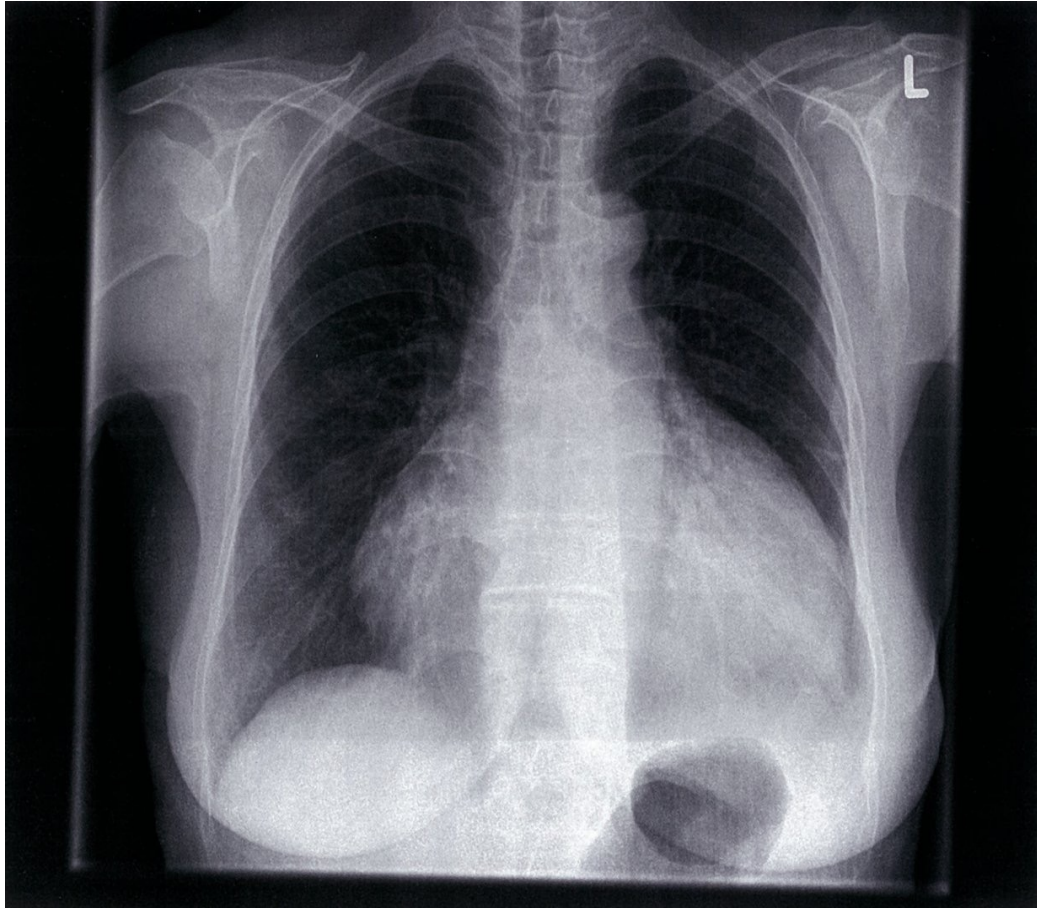
# Trigger

You are an intern working in the emergency department. Eliana, a 63F presents with progressively worsening shortness of breath since a myocardial infarction 1 week prior. She has been using 3 pillows to sleep and has experienced mild, retrosternal chest pain.

Eliana is an orphan and does not know of any family history. Eliana has a history of hypertension and has a 80 pack year smoking history.

A PA CXR was performed on admission.

**Task:** Interpret the CXR and provide a differential.





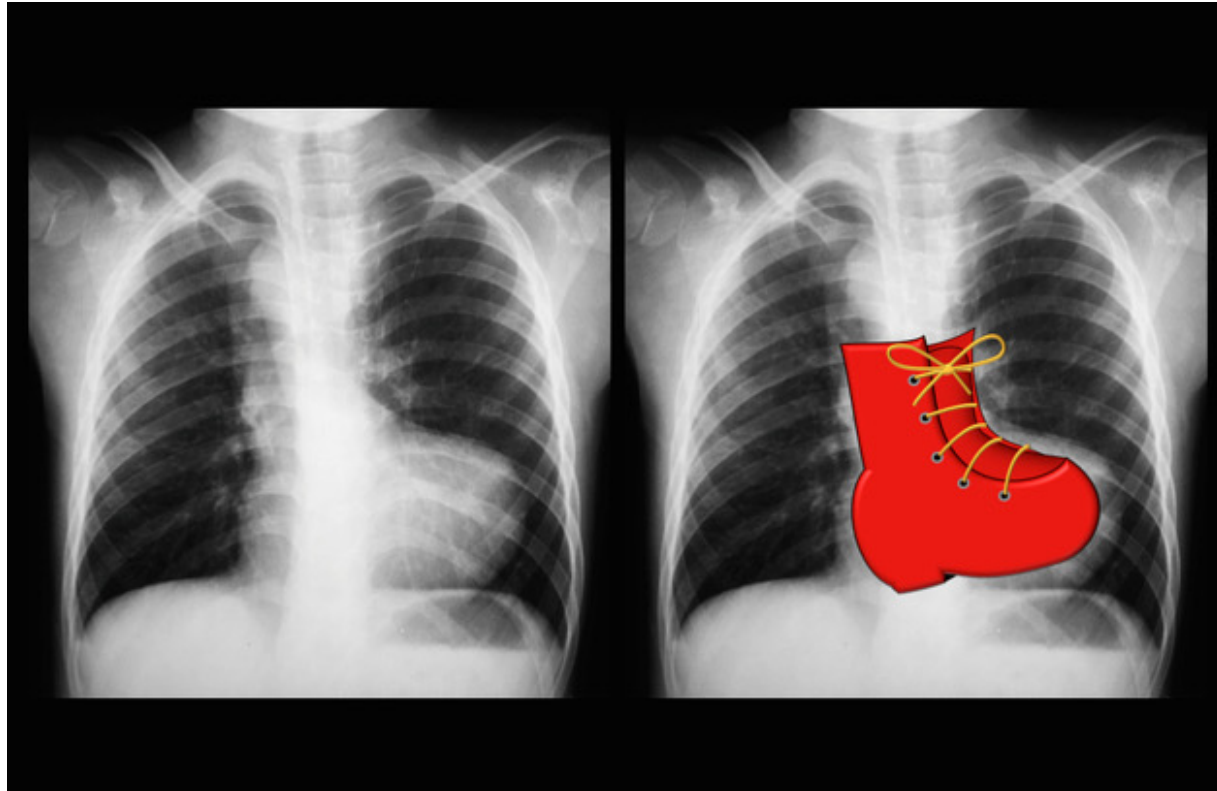
<b>Details and demographic</b>	PA CXR of a 63F 1 week post MI
<b>RIPE/Quality</b>	Rotation : No rotational artifact
	Inspiration: Adequate inspiratory effort with 6 anterior ribs showing.
	Projection: AP
	Exposure: Adequate exposure, vertebrae visible behind heart
<b>Airways and lung fields</b>	Trachea is equidistant between two clavicles, not indicative of any tracheal deviation. Clear lung fields
<b>Bones and soft tissue</b>	No obvious fractures or soft tissue abnormalities
<b>Cardo-mediastinum</b>	Mediastinum appears to be midline Cardiothoracic ratio of 0.75 (a normal measurement is 0.42 to 0.50) Enlarged cardiac silhouette (water bottle sign). This indicates a large pericardial effusion.
<b>Diaphragm</b>	Left costophrenic angle is not visible due to enlarged cardiac silhouette
<b>Everything else</b>	No free gas under the diaphragm, no subcutaneous emphysema is noted.
<b>Interpretation</b>	<p>In summary, this is a PA CXR of a 63F 1 week post MI. An enlarged cardiac silhouette, water bottle sign is present which indicates a large pericardial effusion. My working differential is <b>pericardial effusion</b> secondary to MI.</p> <p>A common cause of an enlarged cardiac silhouette is cardiomegaly, which is an appropriate differential. In particular, a 'boot shaped heart' is classically associated with Tetralogy of Fallot (cardiomegaly with an upturned cardiac apex). Pericardial effusion is the more likely differential given the clinical picture presented.</p>

# Water bottle sign



<https://radiopaedia.org/articles/water-bottle-sign-heart>

# Boot shaped heart



<https://radiopaedia.org/articles/boot-shaped-heart-2>



# Follow-up Questions

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1. What 2 factors determine whether a pericardial effusion progresses to cardiac tamponade?
2. Outline the clinical presentation of cardiac tamponade
3. What are the classic ECG findings of cardiac tamponade?





## Question 1

- Volume of fluid (the larger the effusion improves likelihood of cardiac tamponade)
- Acute vs Chronic onset (a rapid but small effusion can lead to cardiac tamponade)



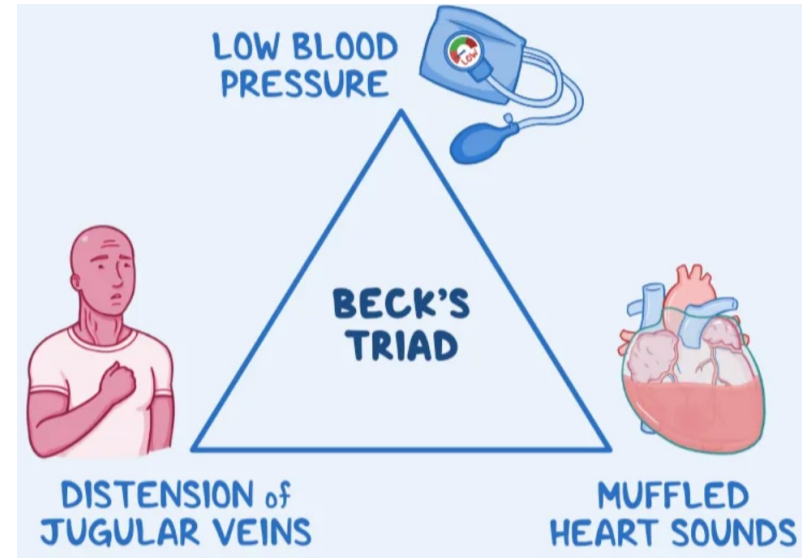
## Question 1

- For chronic pericardial effusion, ~1500 mL can cause cardiac tamponade, but with acute pericardial effusion, only ~150 mL is needed.
- Acutely, the pericardium is stiff/non-compliant, so rapid developing pericardial effusions will rapidly increase intrapericardial pressure
- Over time the pericardium can stretch and increase compliance to accommodate a larger volume of fluid. Once maximum distension is reached, additional fluid will rapidly increase intrapericardial pressure

<https://pubs.rsna.org/doi/full/10.1148/rg.276065002>

## Question 2

- Clinical features of pericardial effusion
- Classic triad of symptoms: Beck Triad
  - Hypotension
  - Muffled heart sounds
  - Elevated JVP
- Other signs/symptoms
  - Tachycardia
  - Pulsus paradoxus
  - Pallor
  - Signs of heart failure
  - Signs of obstructive shock

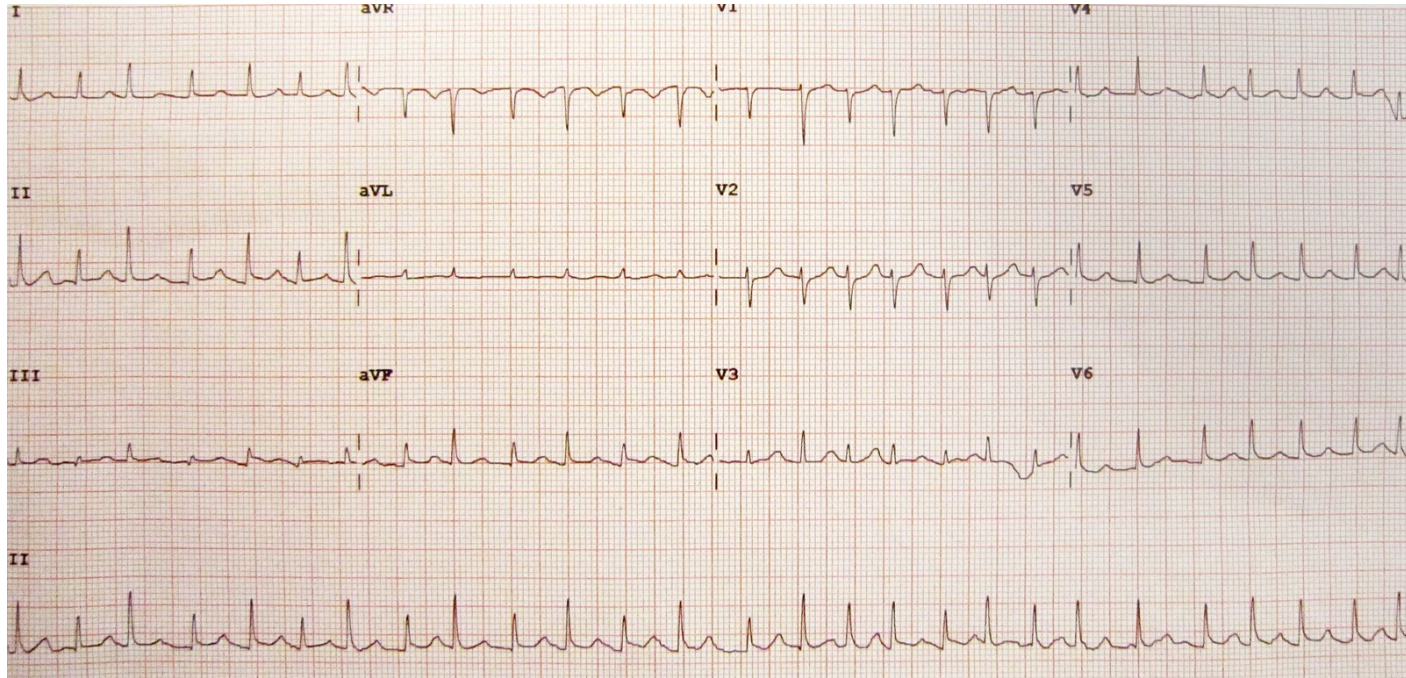




## Question 3

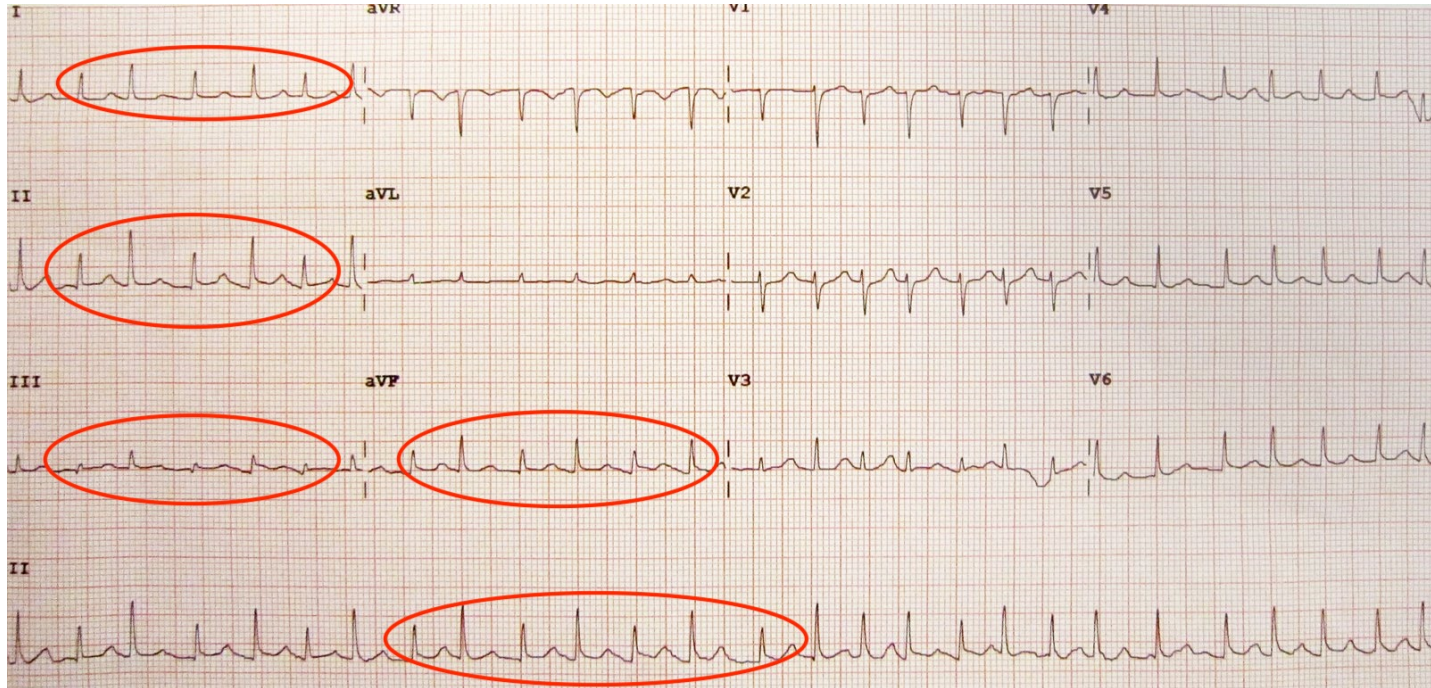
- Sinus tachycardia (most common)
  - Compensatory mechanism to help maintain cardiac output
- Low voltage QRS complexes
  - Pericardial fluid surrounding heart reduces conductivity through the leads
- Electrical alternans
  - Consecutive QRS complexes alternate in height
  - Due to the swinging motion of heart when surrounded by pericardial fluid
- Try spot these signs on the following ECG!

# Question 3



<https://www.amboss.com/us/knowledge/pericardial-effusion-and-cardiac-tamponade>

# Question 3



Rare ~ 150 bpm, Most obvious electrical alternans and low QRS complex voltage circled



# Thank you!

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