

Atherosclerotic Heart Disease:
Coronary Vessels, EKG Localization of STEMI and
Complications/Derivatives for USMLE Step One



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They will never ask you to name a vessel

← Name this vessel





They will never ask you to name a vessel

They will ask you the manifestations
of that blocked vessel.

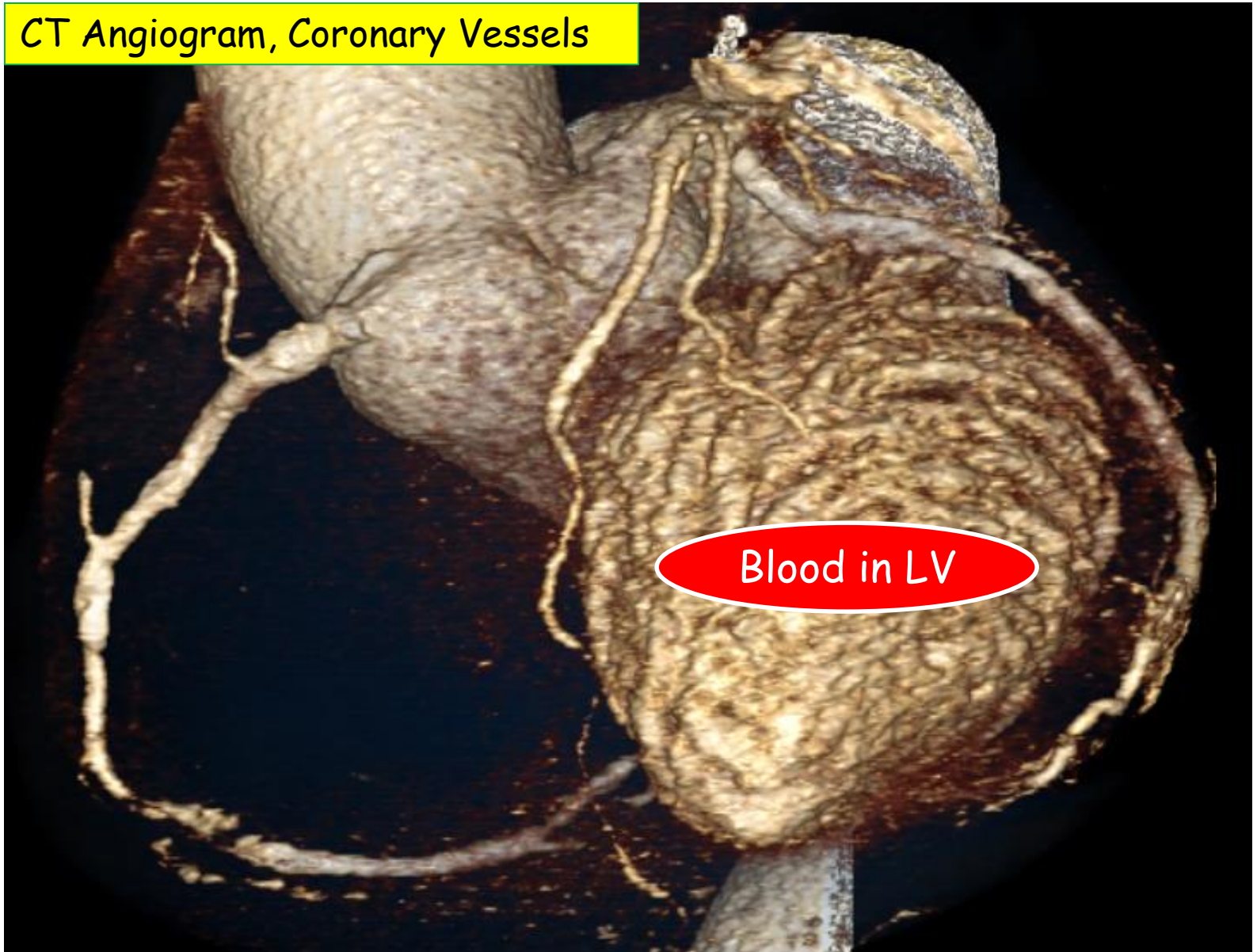
They will ask you the manifestations
of that blocked vessel.

Well, they won't actually say
manifestations of a blocked vessel.

They'll say chest pain and ST segment
(elevation/depression) in leads...

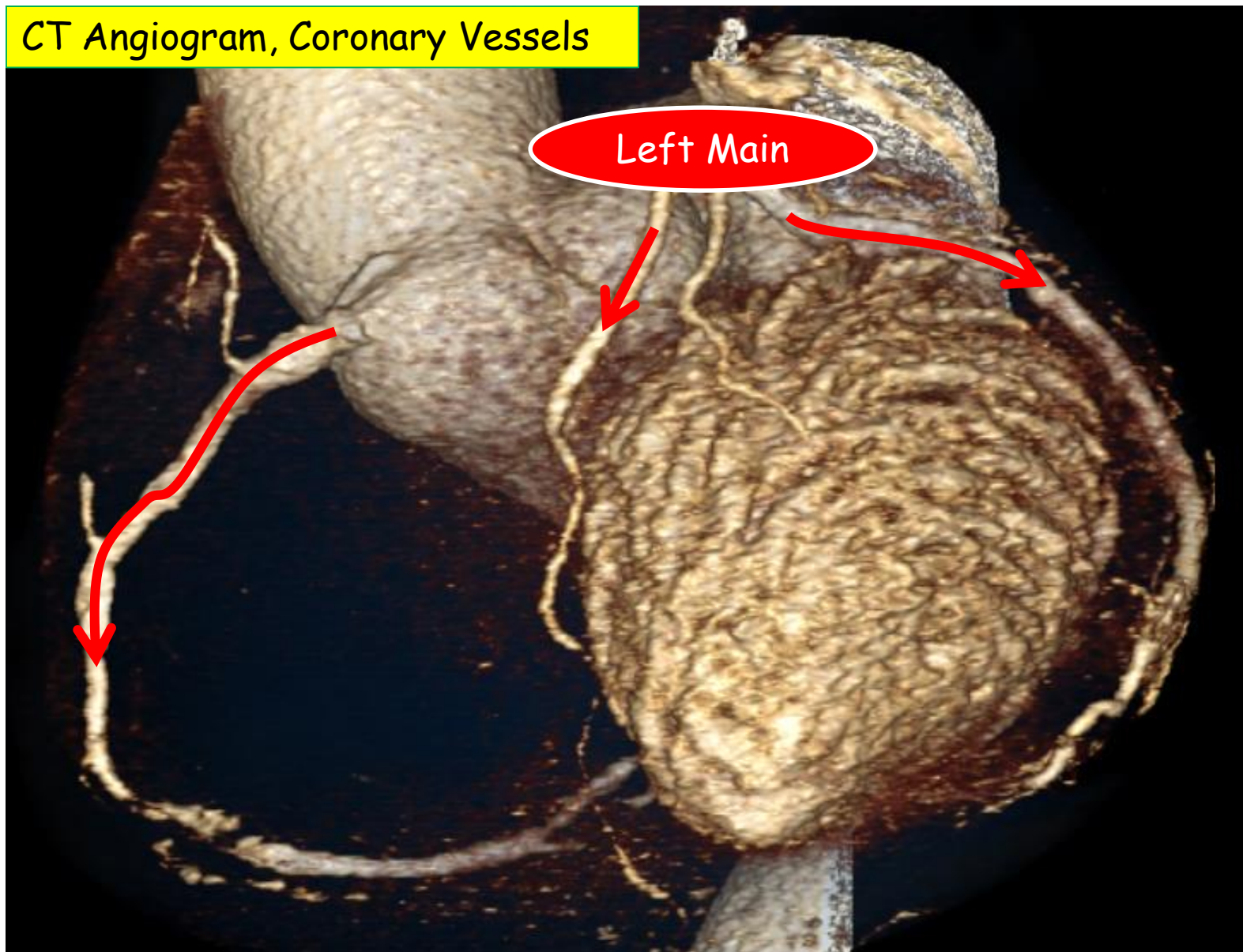


CT Angiogram, Coronary Vessels

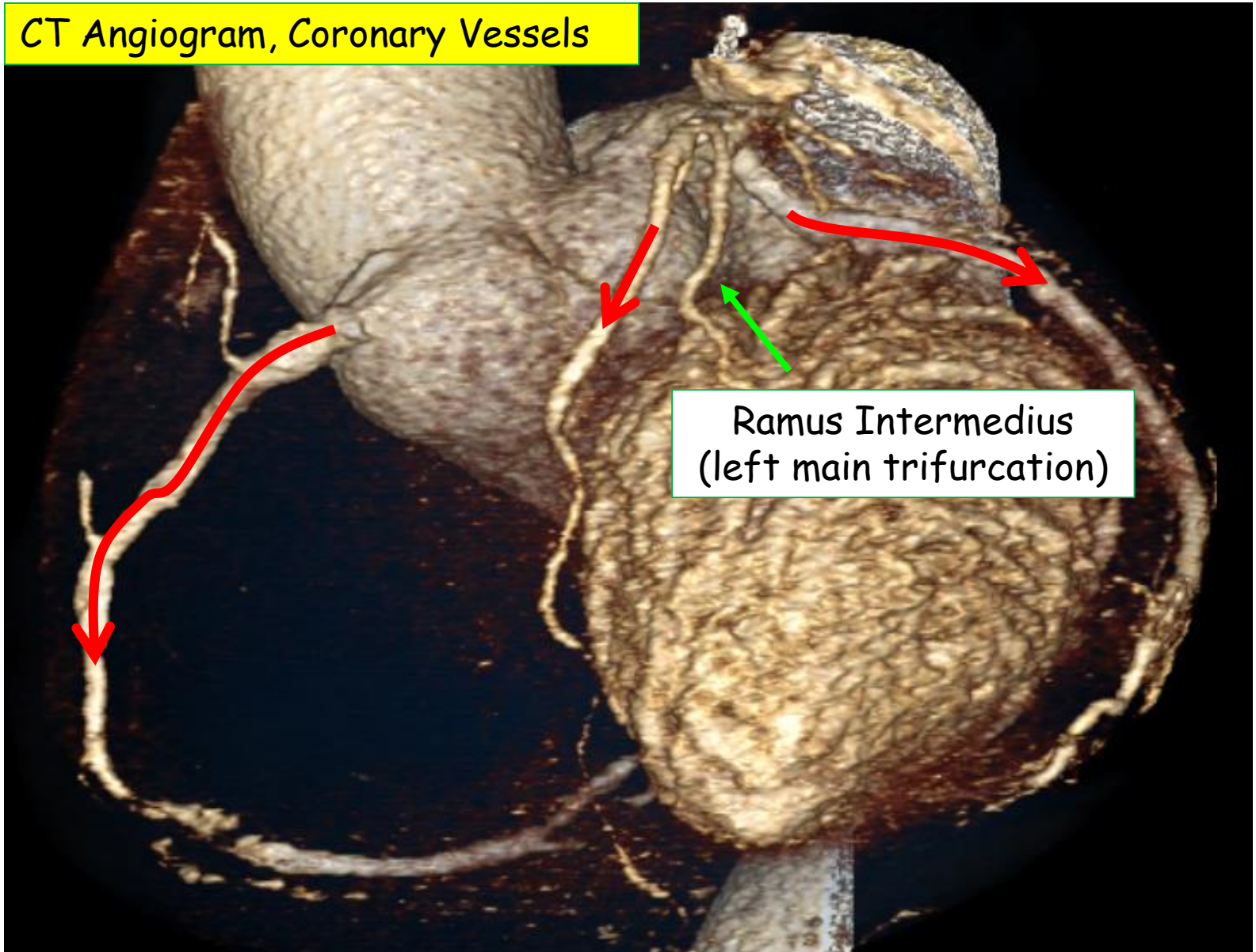


Blood in LV

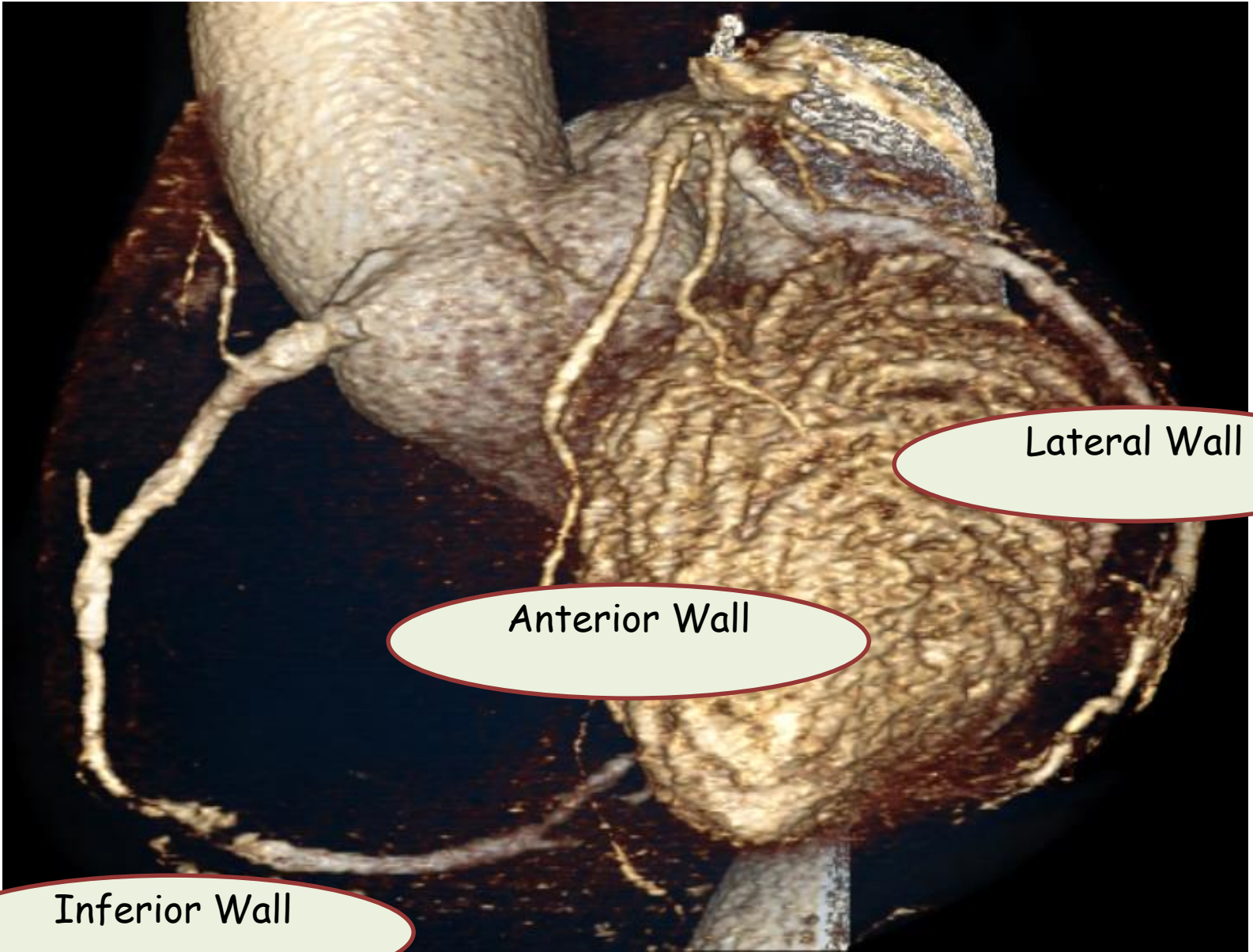
CT Angiogram, Coronary Vessels



CT Angiogram, Coronary Vessels



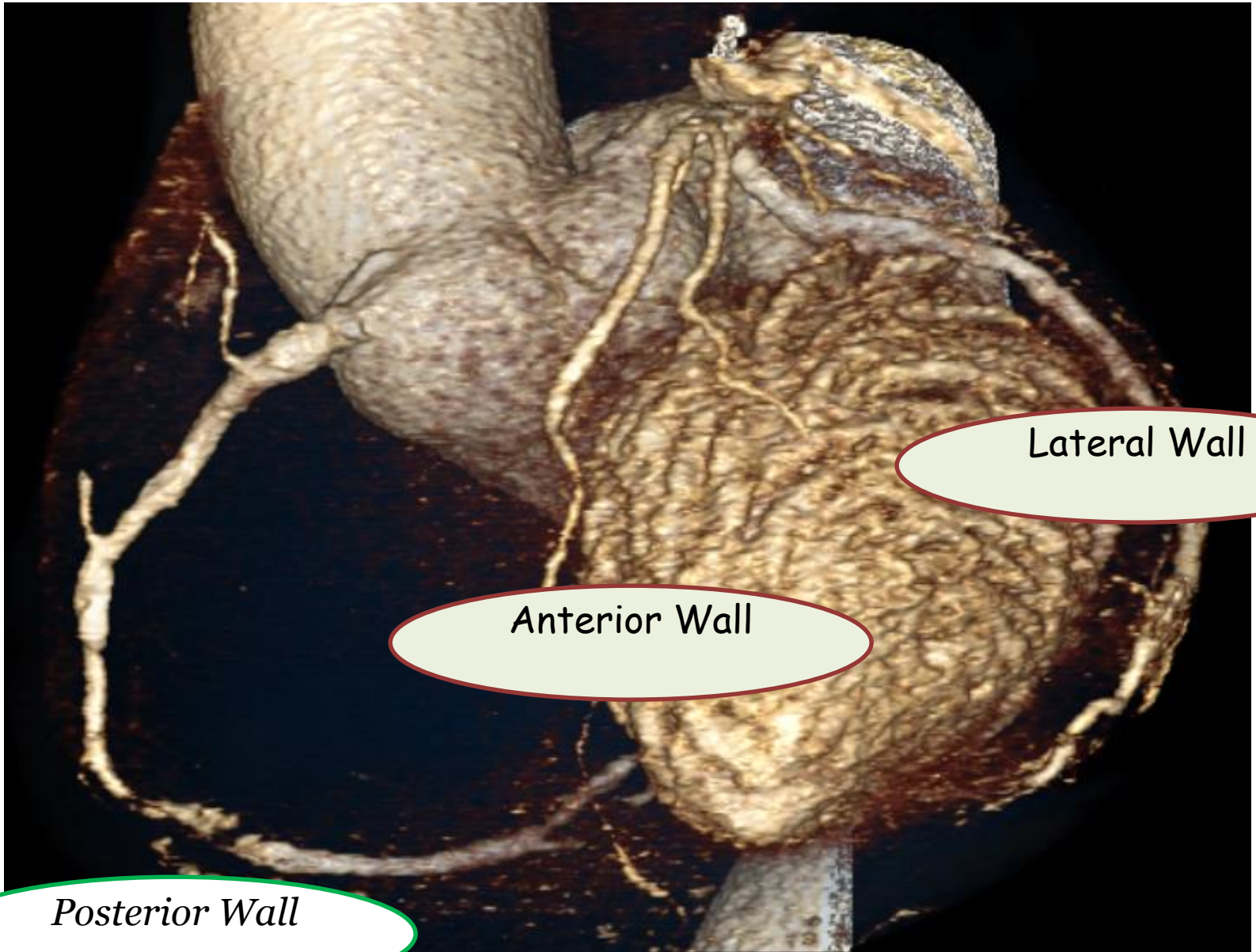
Ramus Intermedius
(left main trifurcation)



Lateral Wall

Anterior Wall

Inferior Wall



Lateral Wall

Anterior Wall

Posterior Wall



RCA

LCX

LAD

Lateral Wall
by LCX

Anterior Wall
by LAD

Inferior Wall
by RCA

RCA

LCX

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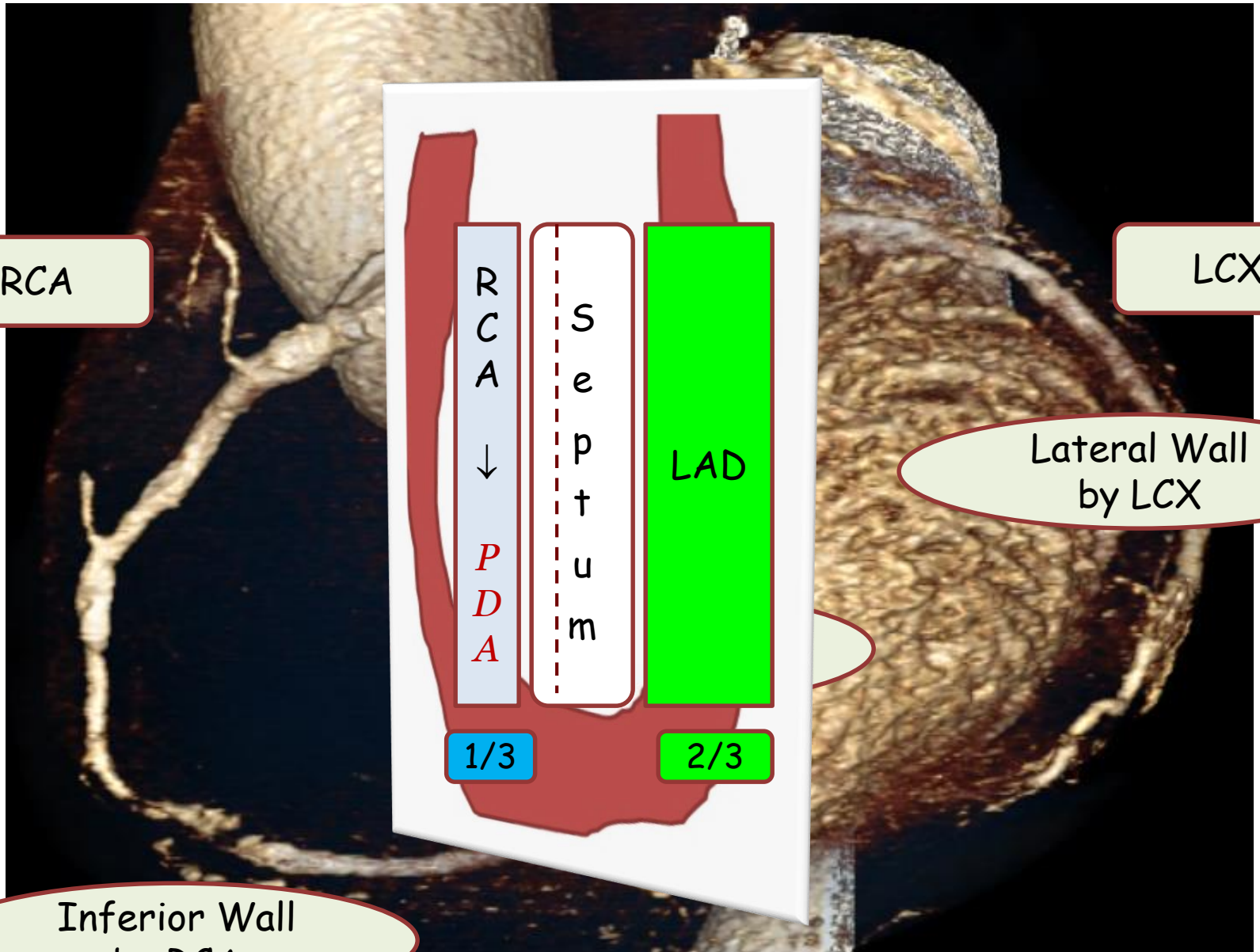
LAD

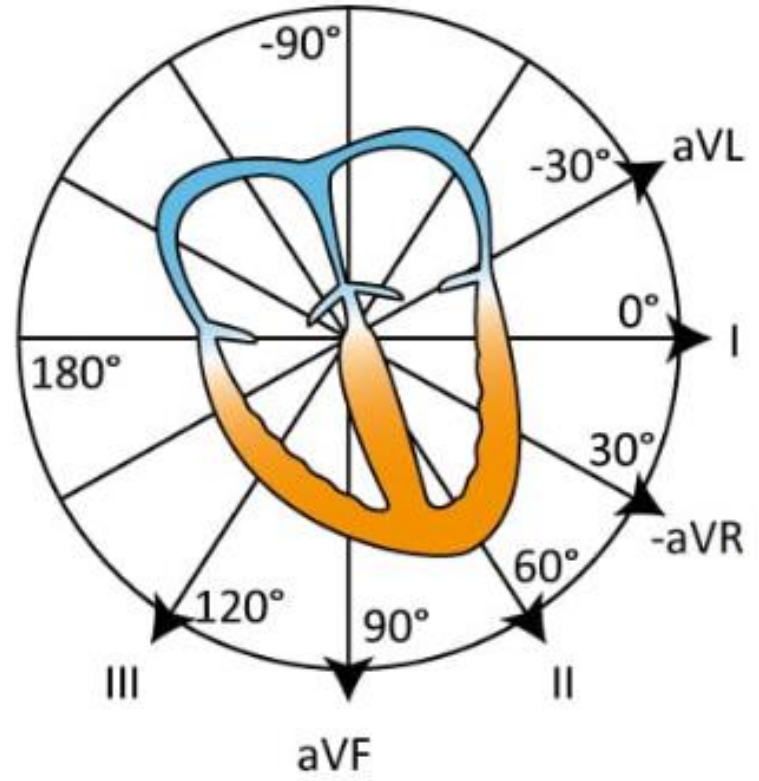
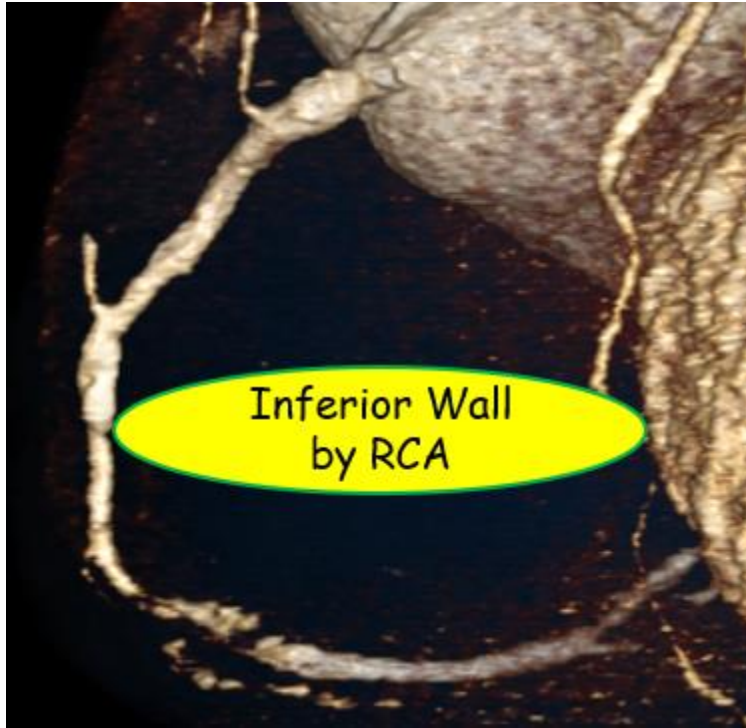
Lateral Wall
by LCX

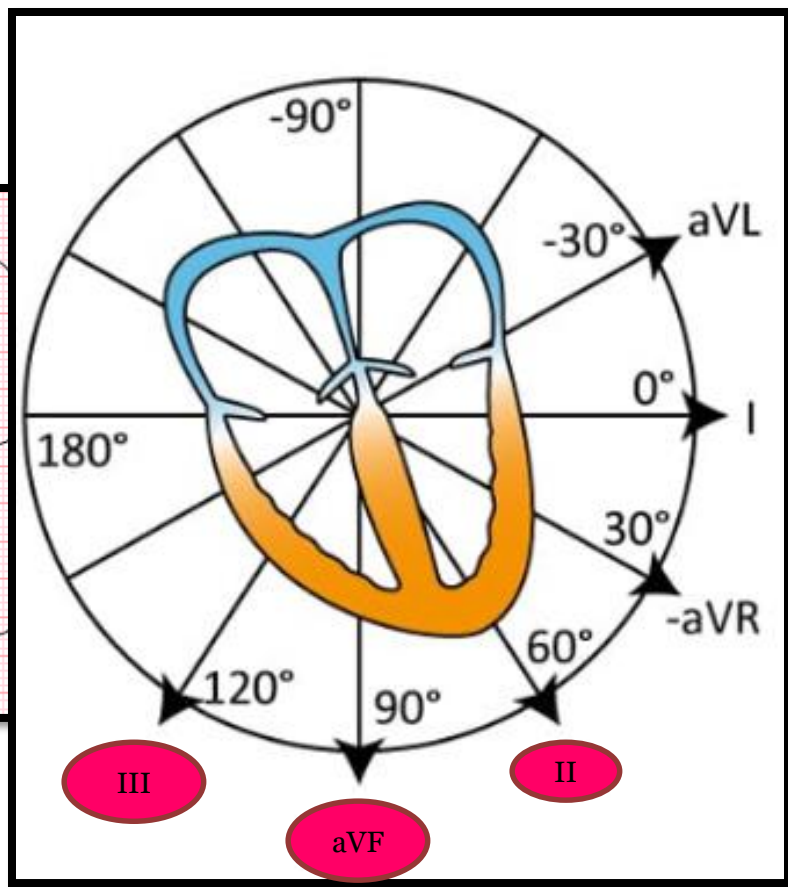
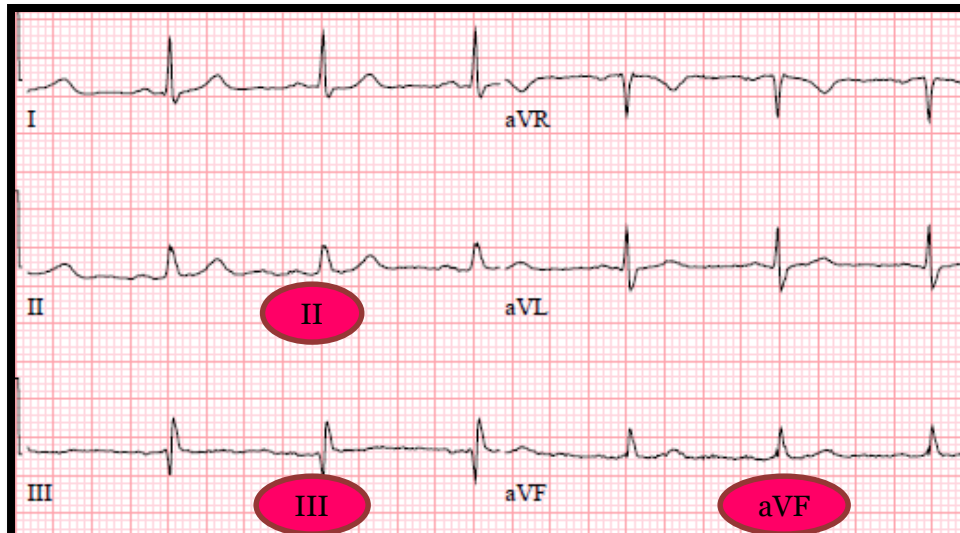
1/3

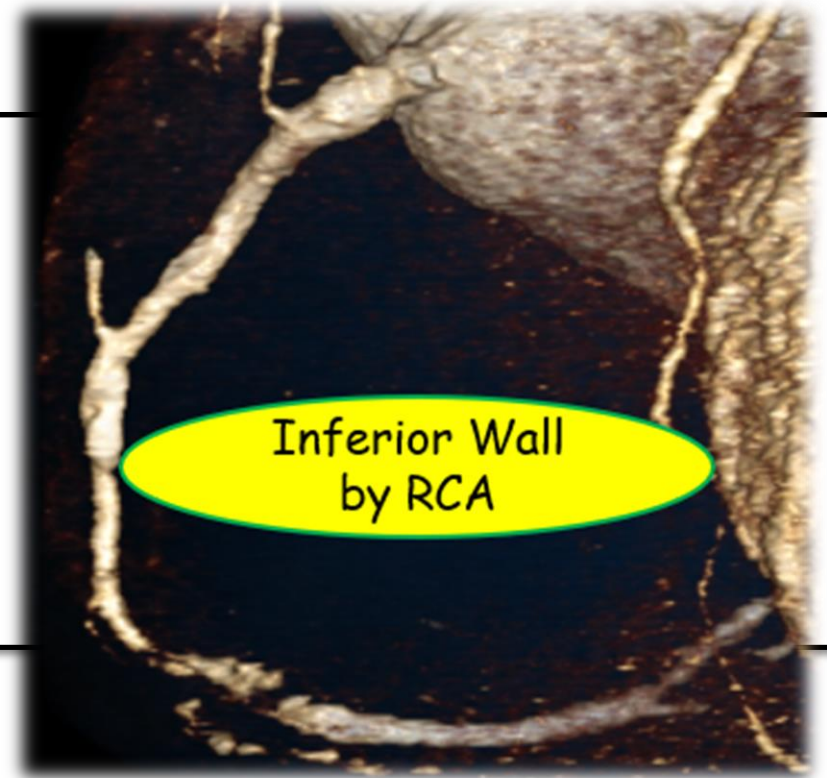
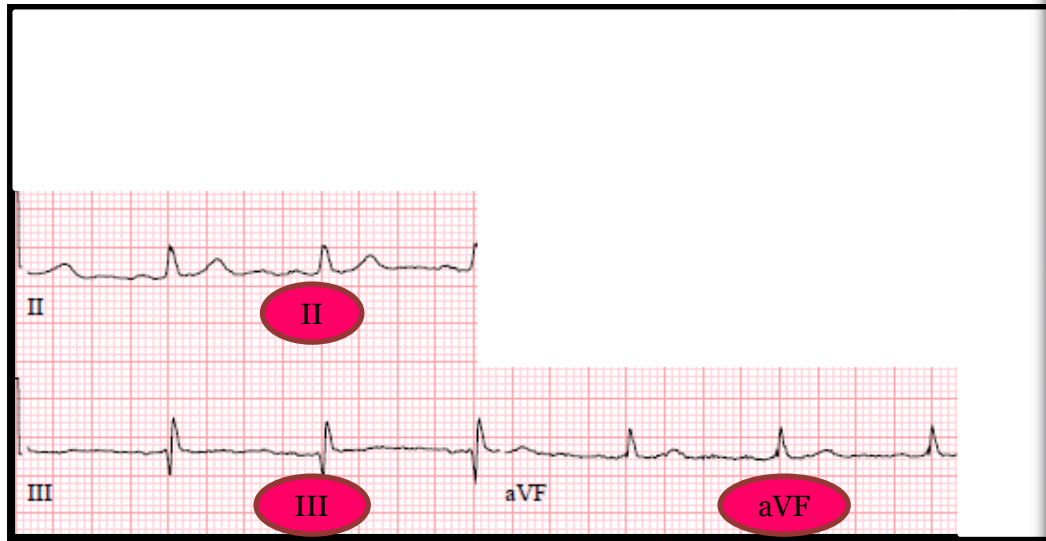
2/3

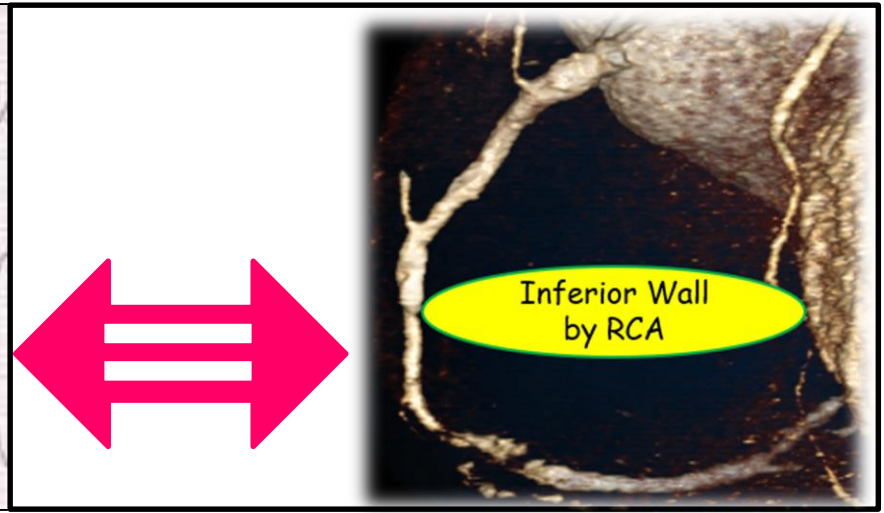
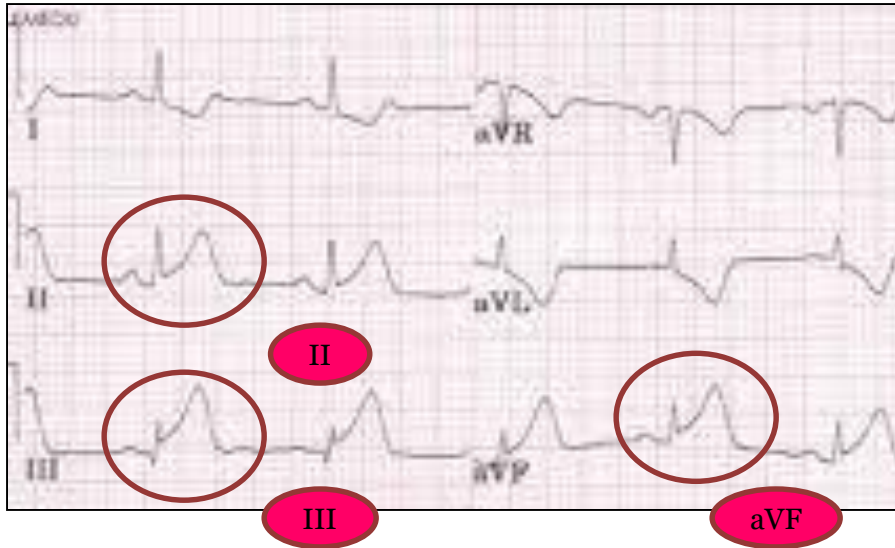
Inferior Wall
by RCA

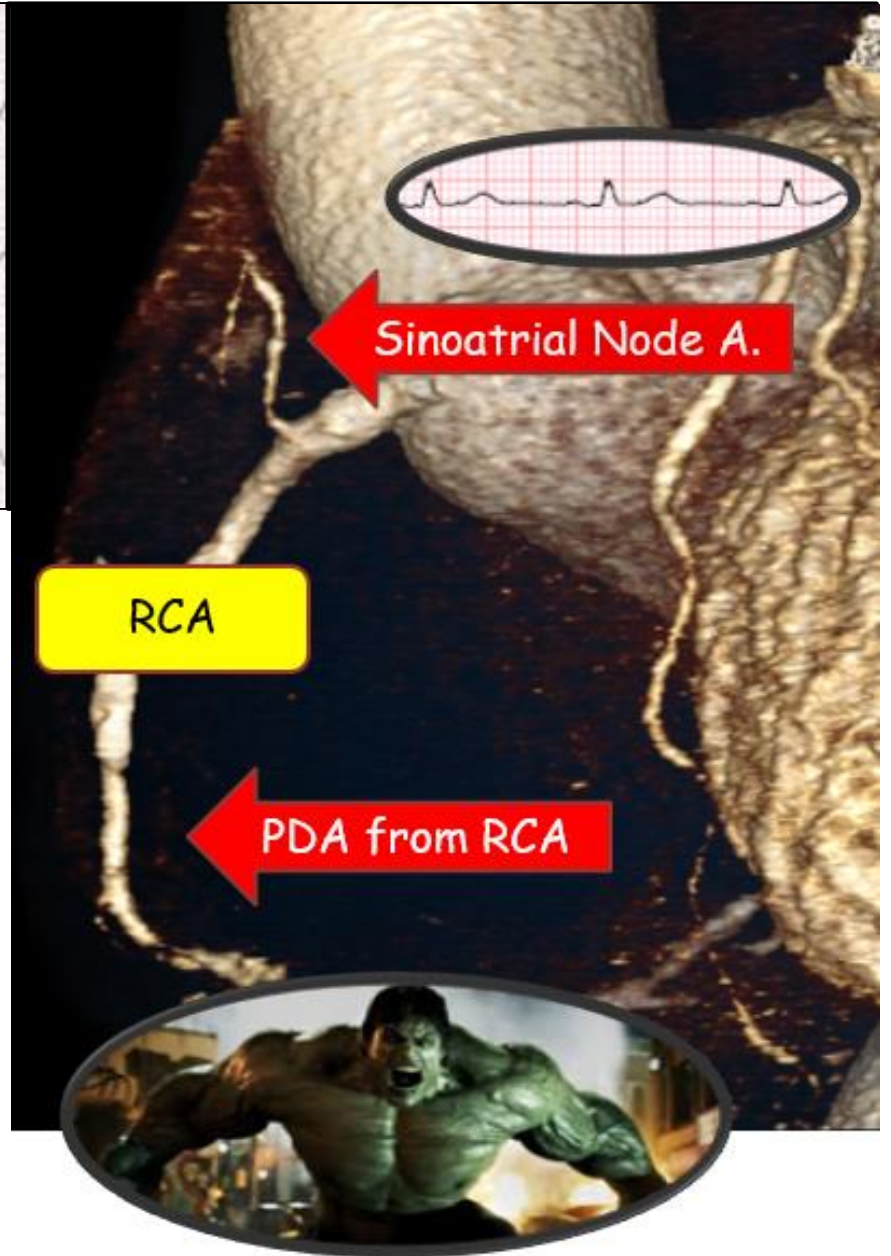
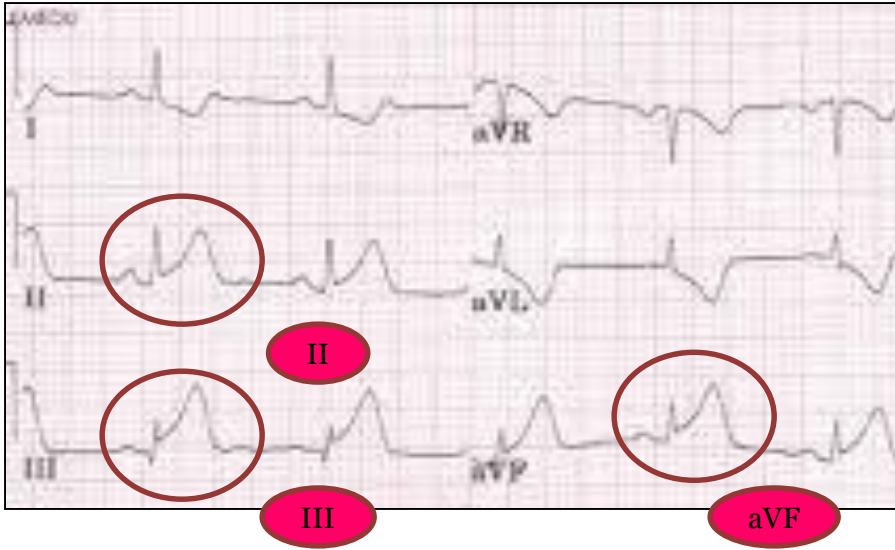


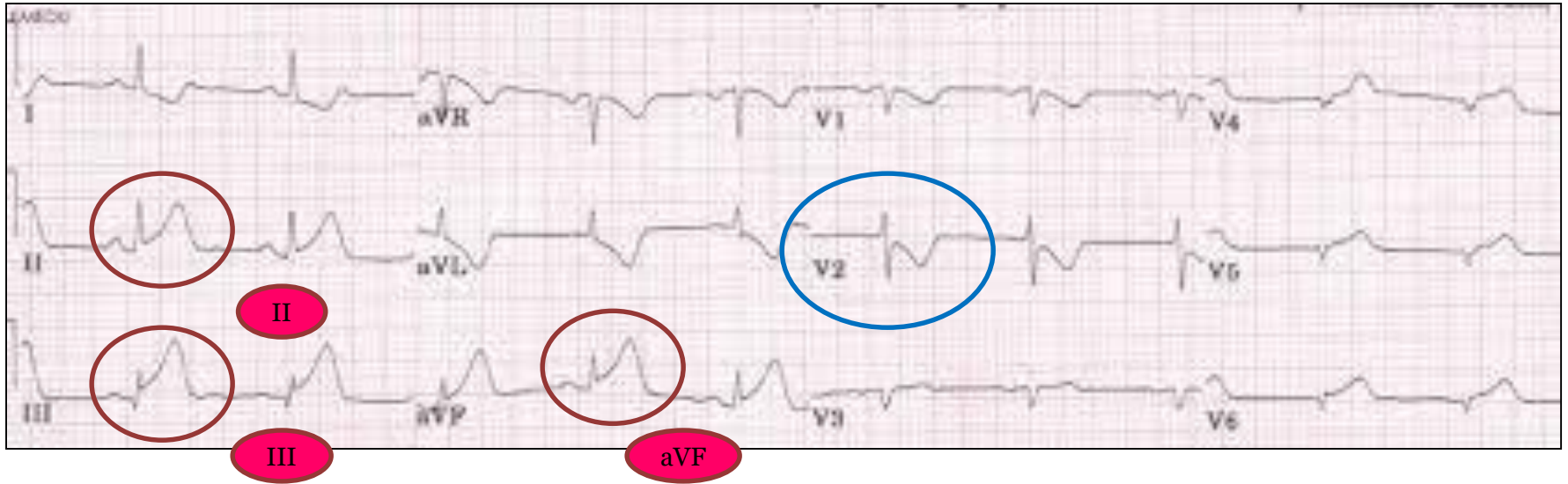










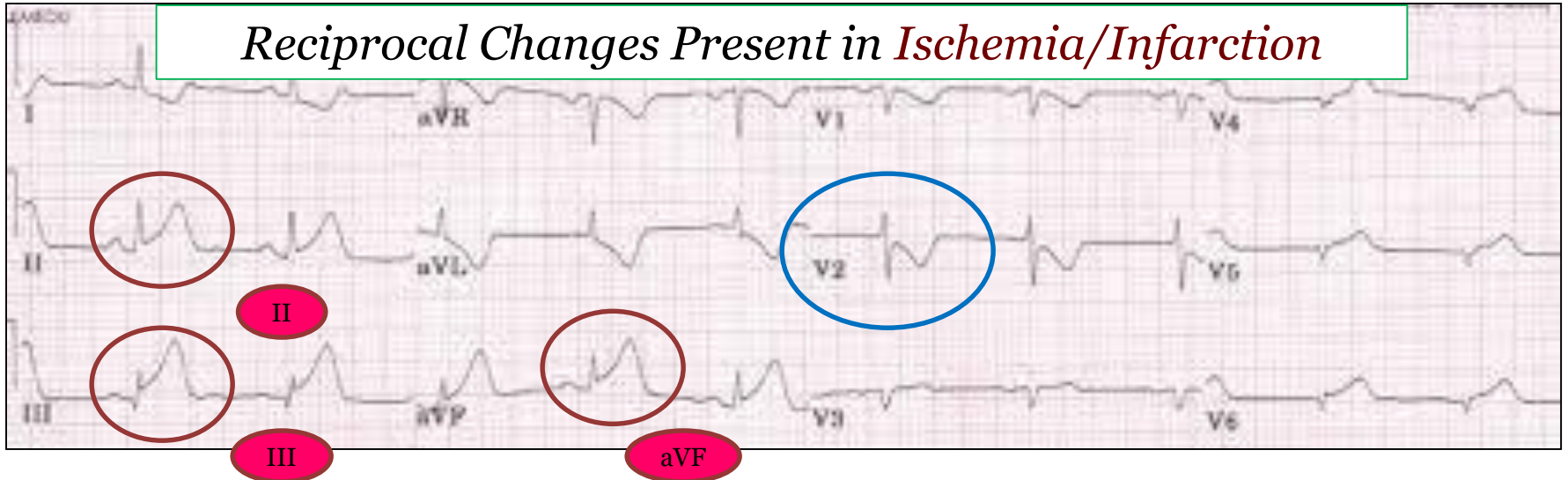


Reciprocal Changes:

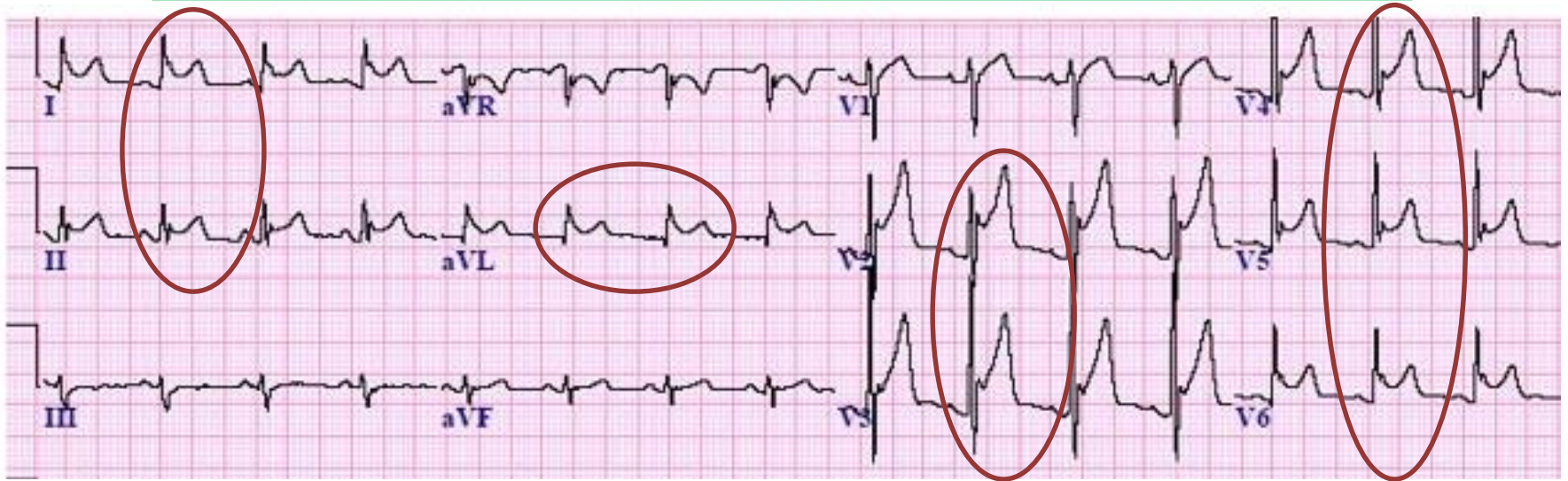
If the inferior wall has ST elevations, the anterior (contralateral) wall will have ST depressions (opposite vectors)



Reciprocal Changes Present in Ischemia/Infarction

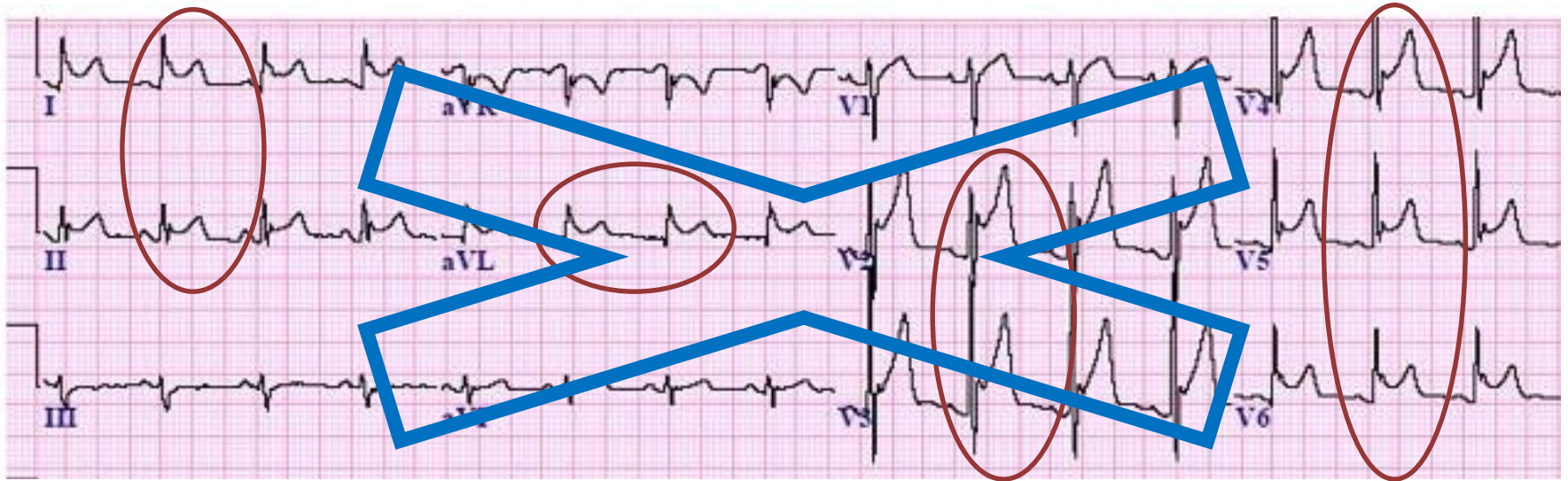


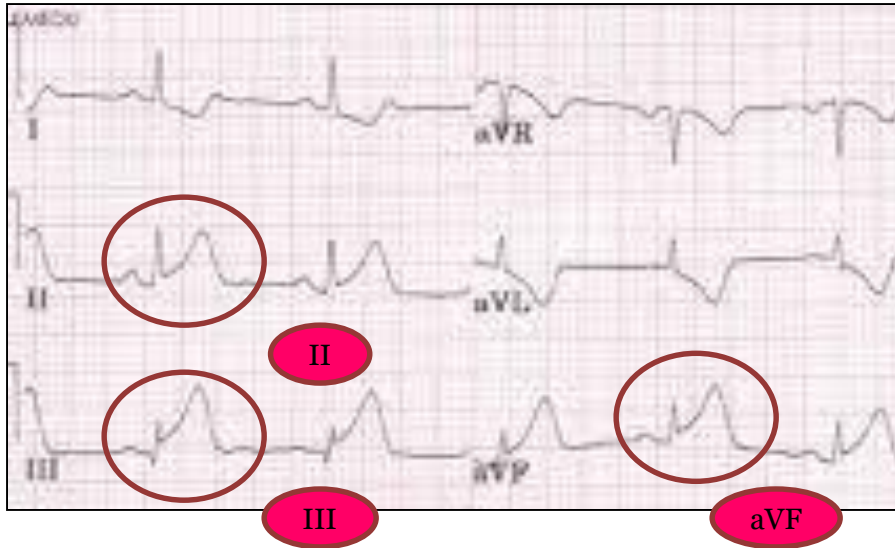
Acute Pericarditis: diffuse (inferior, anterior and lateral) ST-segment elevation devoid of reciprocal changes



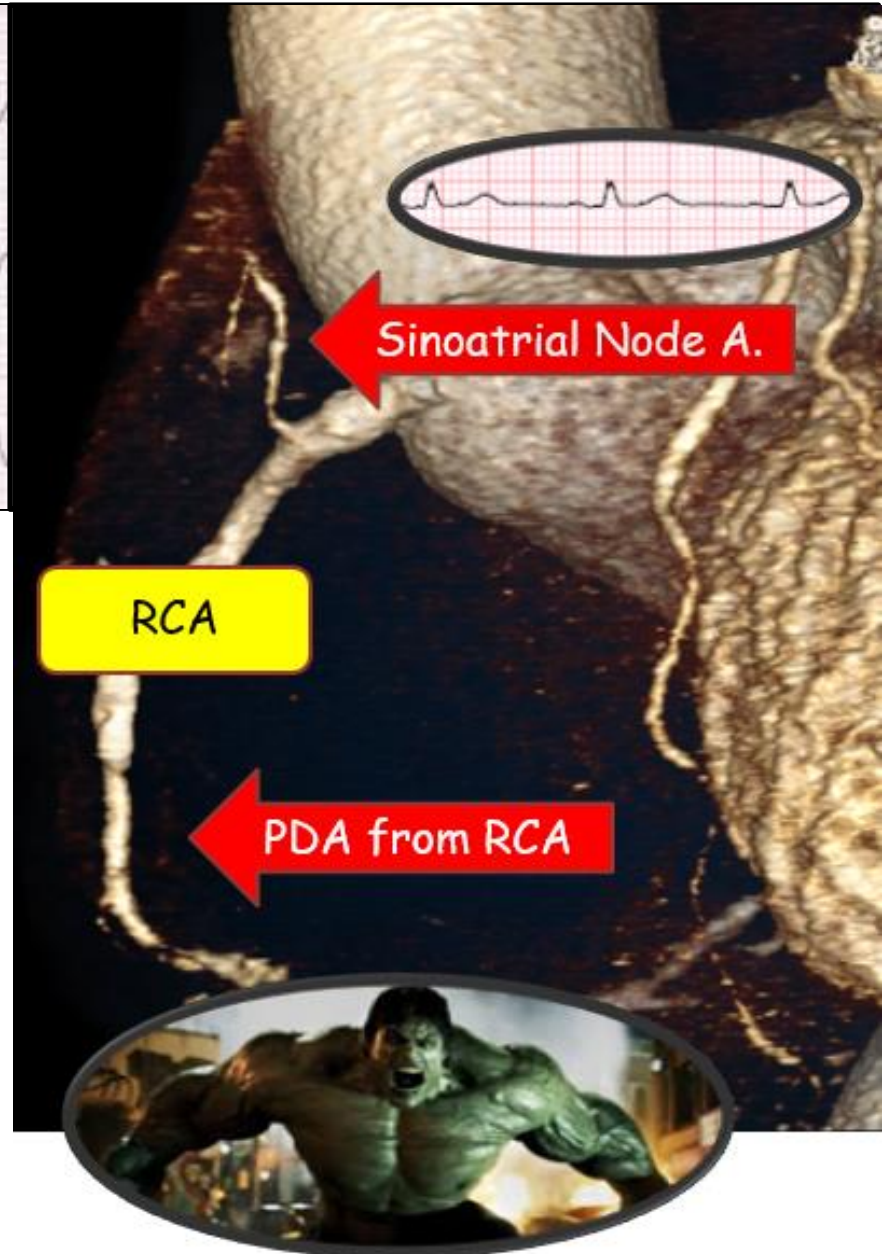
Patient experiences STEMI 3 days ago. Now with sharp chest pain relieved while leaning forward.
VSS; lungs clear; cor - scratchy heart sound.
Choose the correct diagnosis?:

- A. Acute pericarditis
- B. Extension of myocardial infarction

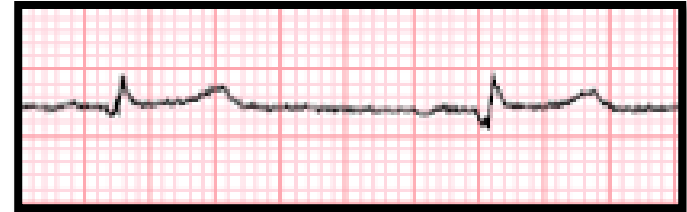
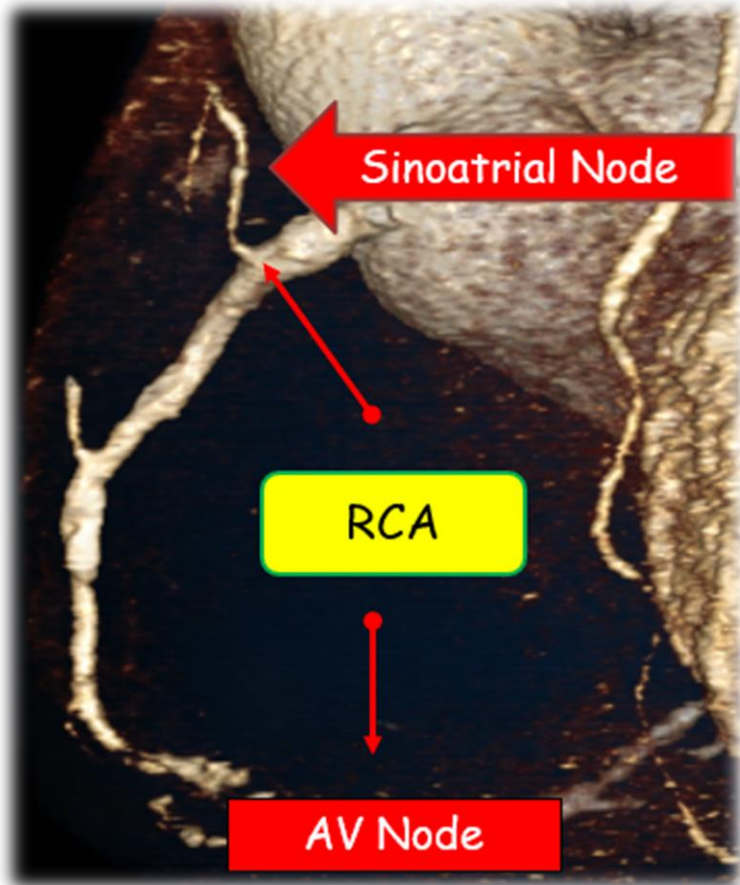




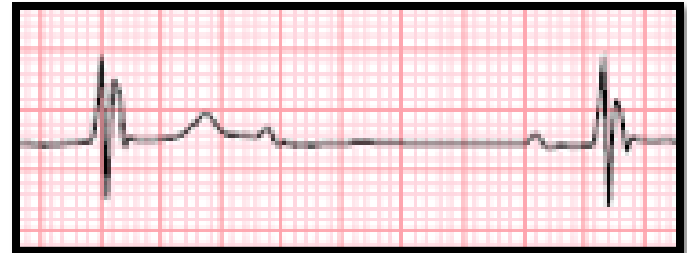
Derivatives:
 RCA occlusion/IMI (inferior wall MI)



RCA occlusion (IMI) → Bradyarrhythmias

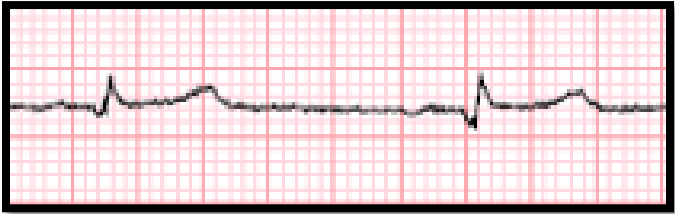


Sinus Bradycardia

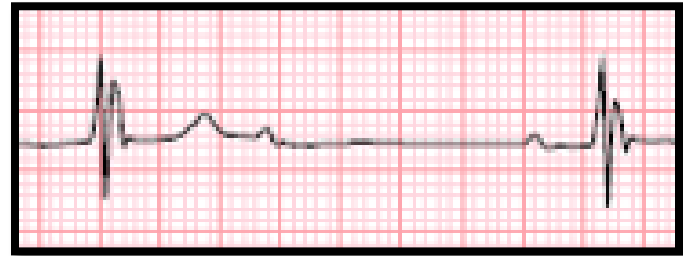


2nd Degree Heart Block

RCA occlusion (IMI) → Bradyarrhythmias



Sinus Bradycardia

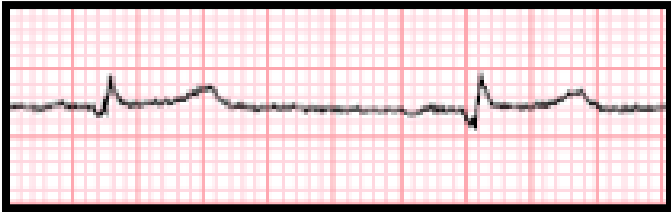


2nd Degree Heart Block

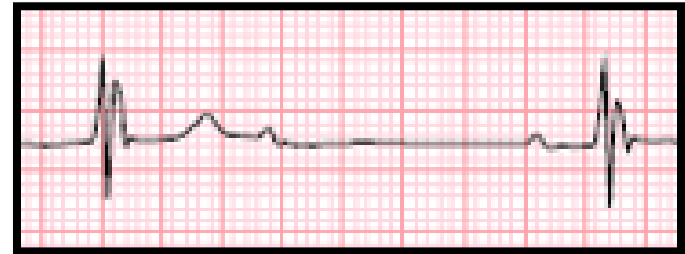
Patient with chest pain and elevated troponin. Rhythm strip shown.

- Occlusion of which vessel is most likely?
- EKG will show elevations in which leads?

RCA occlusion (IMI) → Bradyarrhythmias



Sinus Bradycardia

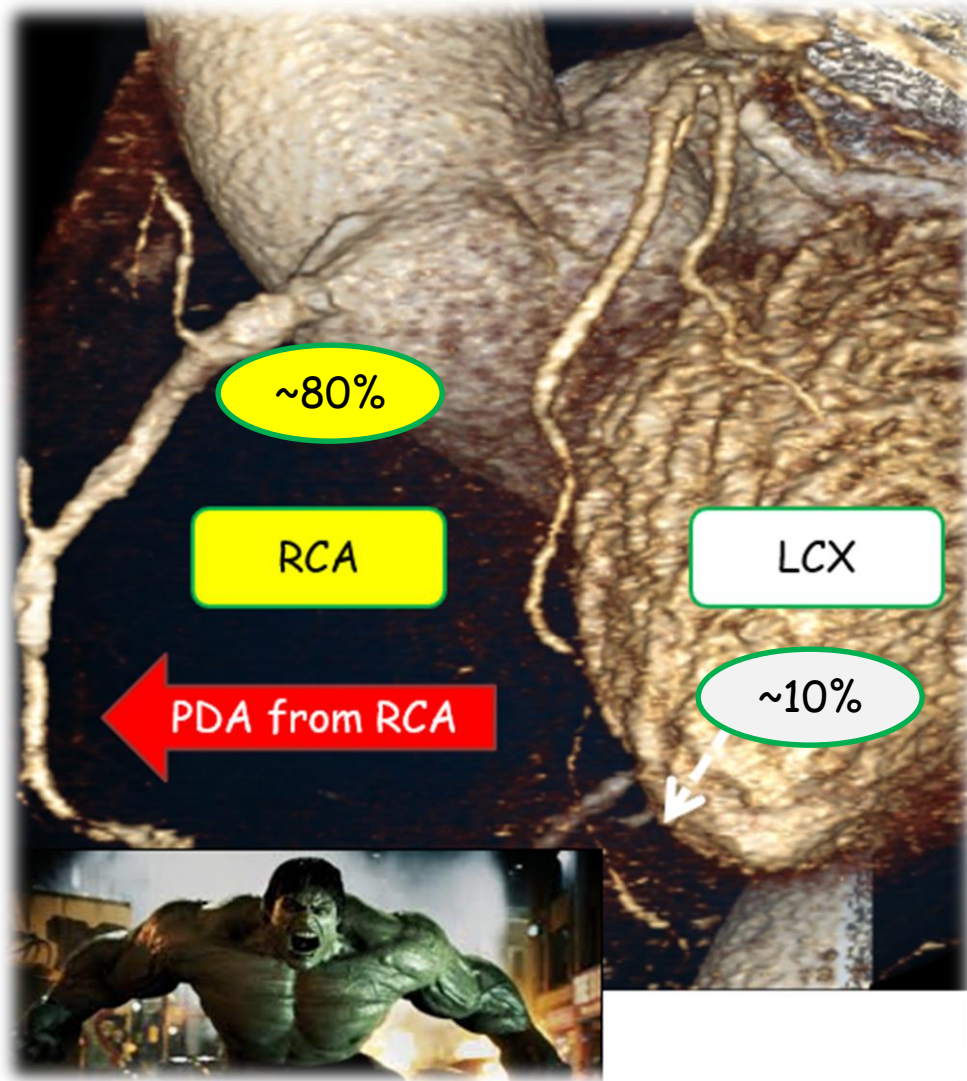


2nd Degree Heart Block

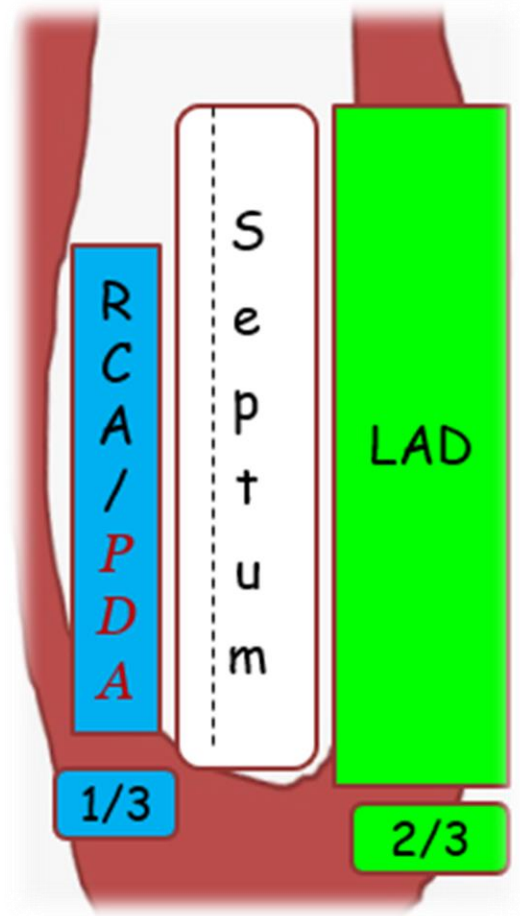
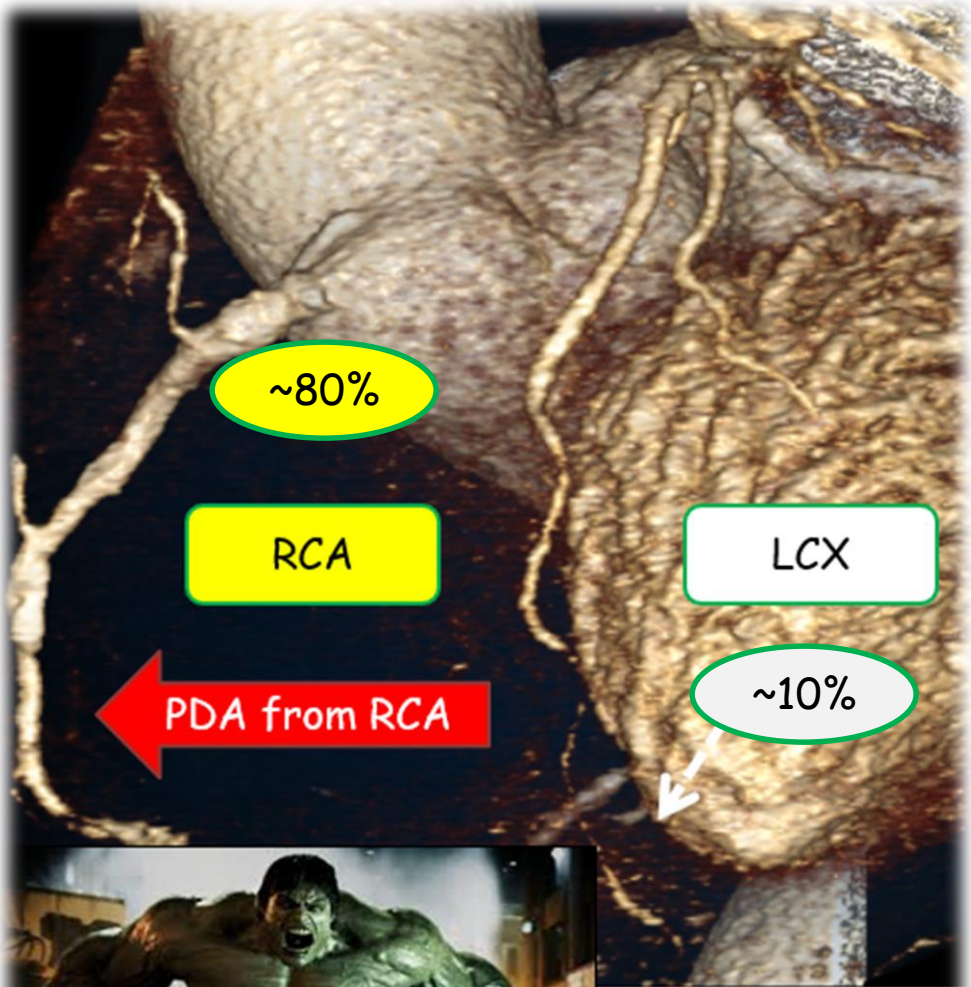
Patient with chest pain and elevated troponin. Rhythm strip shown.

- Occlusion of which vessel is most likely → RCA (or PDA)
- EKG will show elevations in which leads → II, III, aVF

RCA → Posterior Descending Artery → Dominance (or Co-dominance)



RCA → PDA → Dominance (Posterior 1/3 Septum)



An anatomical illustration of the heart and lungs. The right ventricle (RV) is shown on the left side of the image, and the left ventricle (LV) is on the right. The RV is significantly enlarged and flattened against the diaphragm, which is characteristic of a right ventricular infarct. The coronary arteries are visible, branching out from the base of the heart. The lungs are shown in a dark, textured appearance. Two text boxes are overlaid on the image: a yellow box on the left and a white box on the right.

RV Infarct

Left Ventricle:

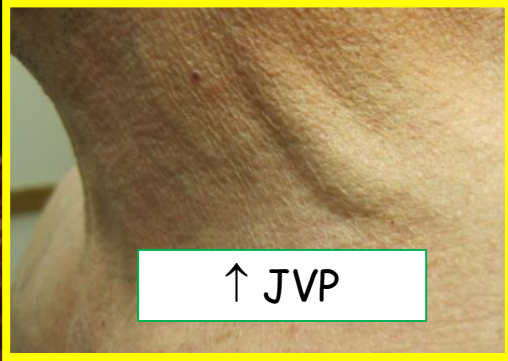
- EF?
- PCWP?
- Lung exam?



RV Infarct

Left Ventricle:

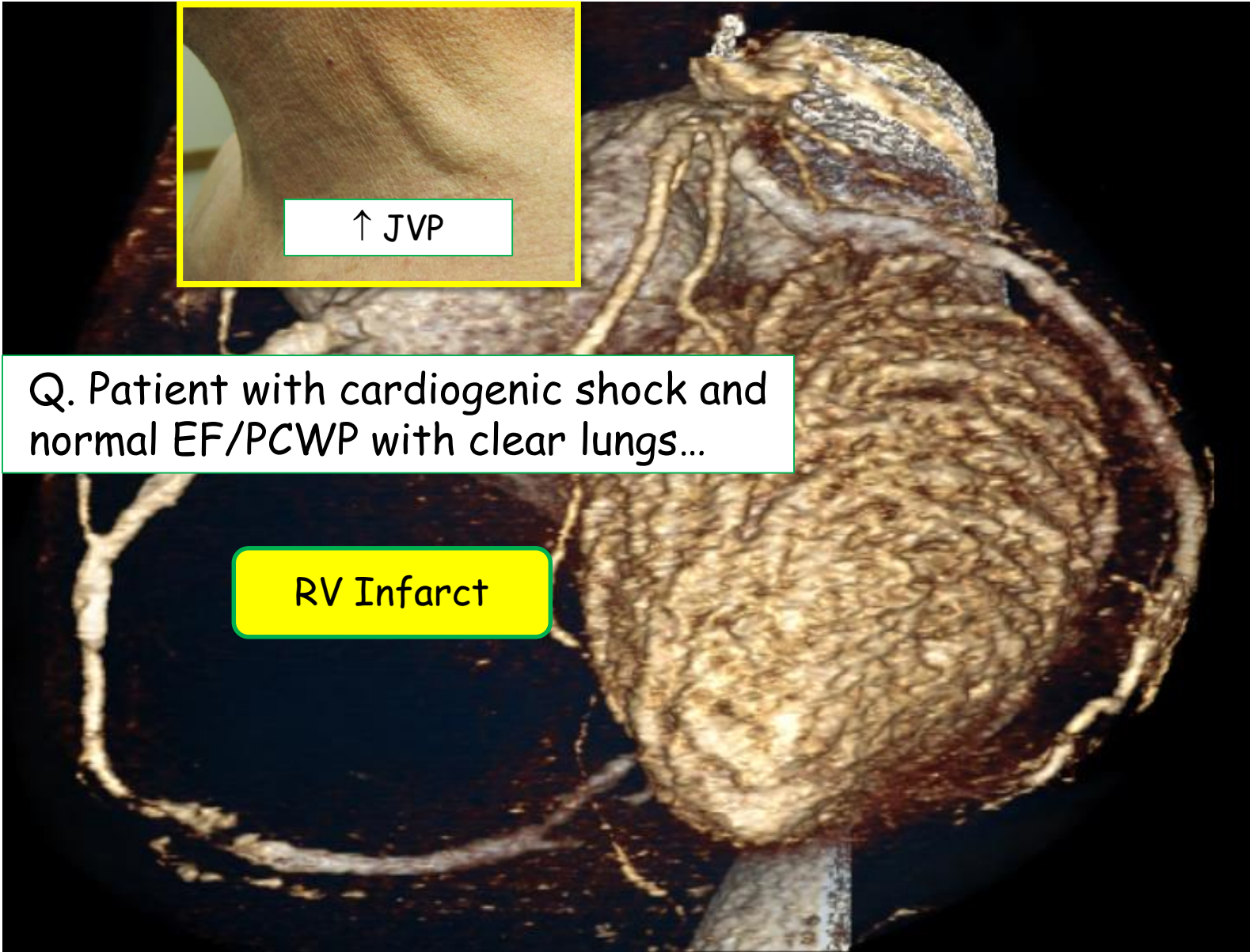
- EF: normal
- PCWP: normal
- Lung exam: clear



↑ JVP

Q. Patient with cardiogenic shock and normal EF/PCWP with clear lungs...

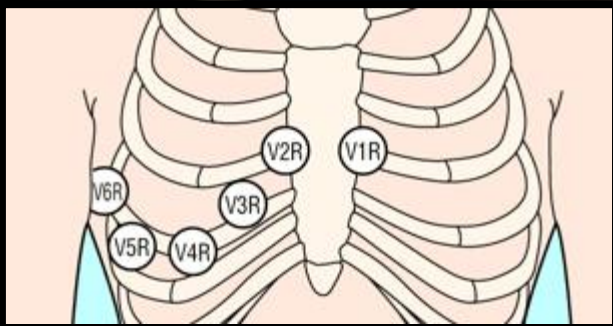
RV Infarct



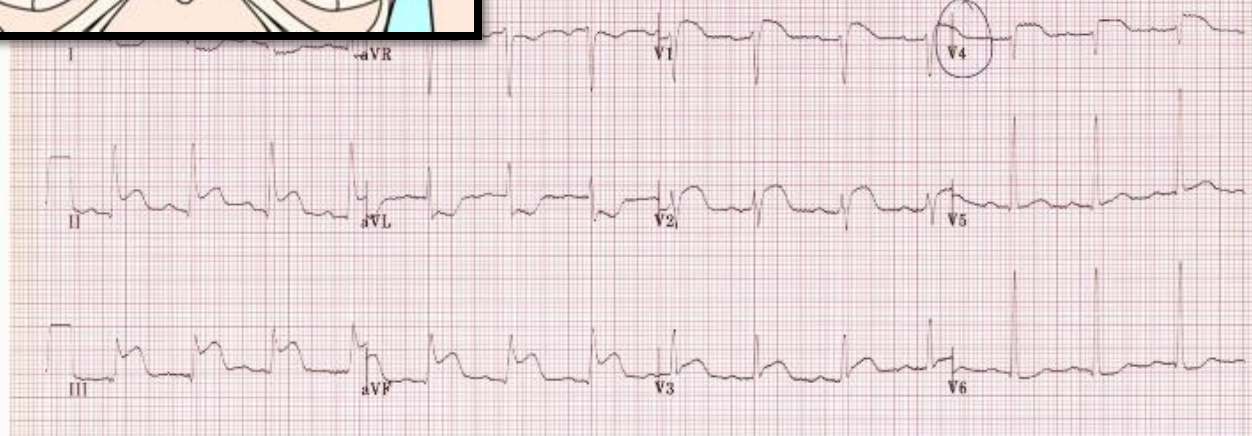
RCA → RV infarct

- Hypotension
- Elevated CVP
- Clear lungs
- High index of suspicion

Very pre-load dependent: push fluids, avoid nitrates

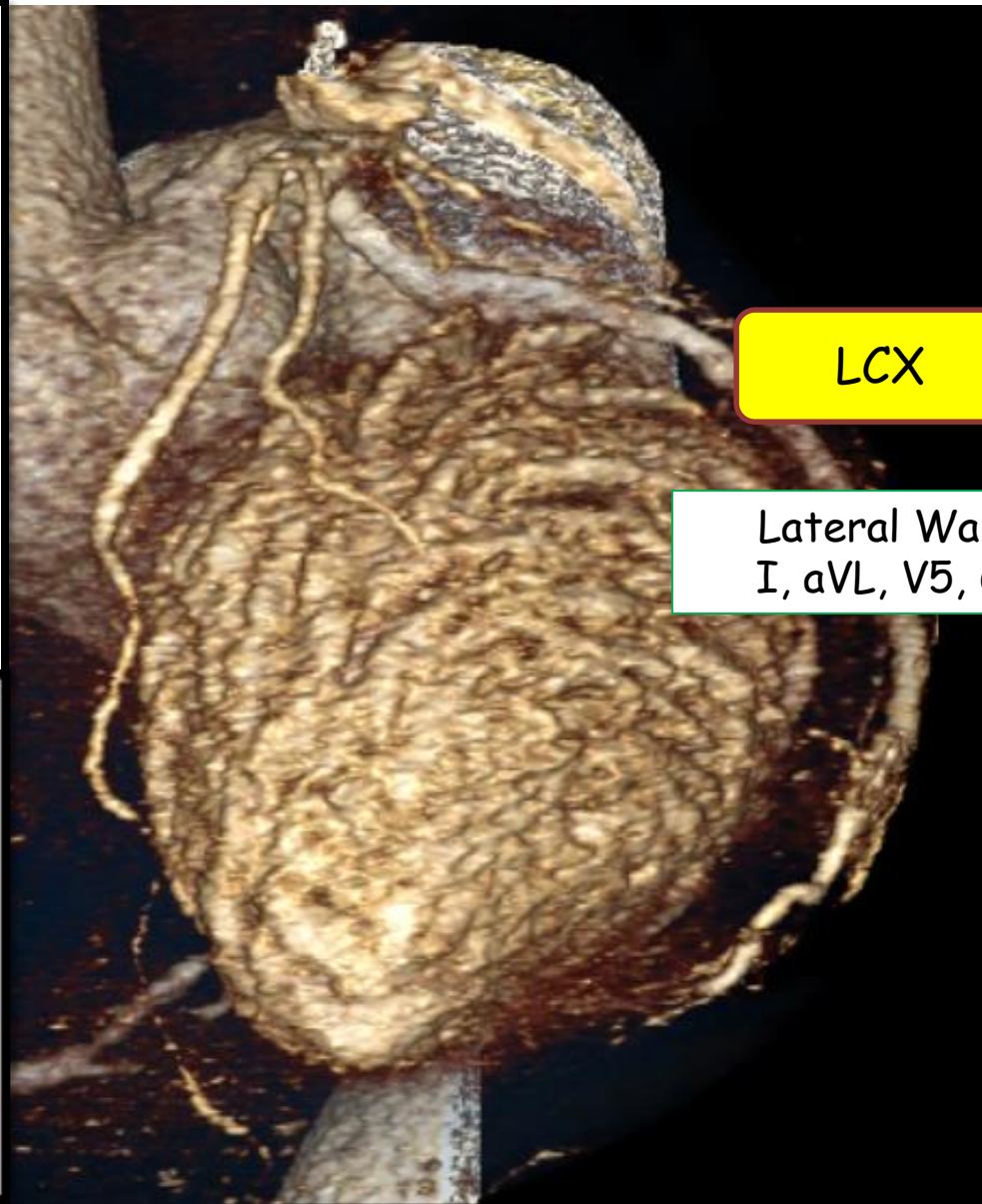
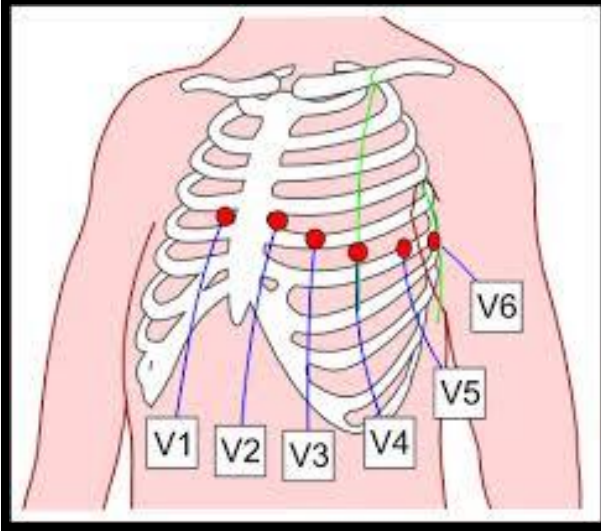
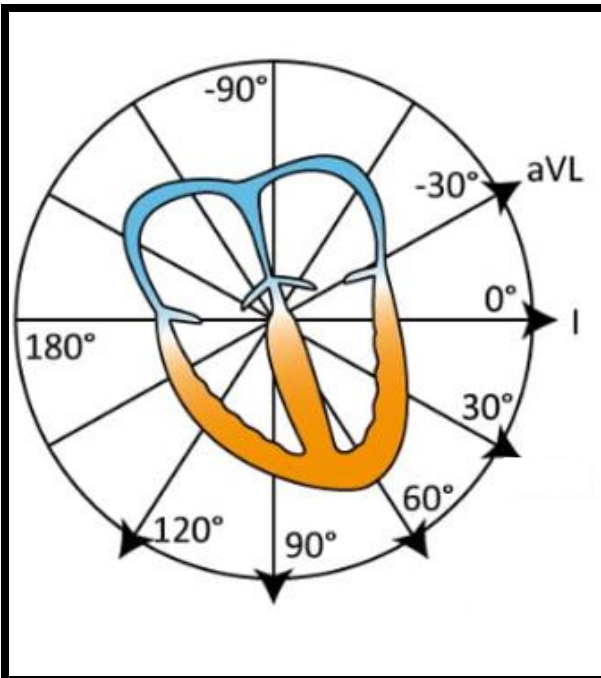


Right sided chest leads



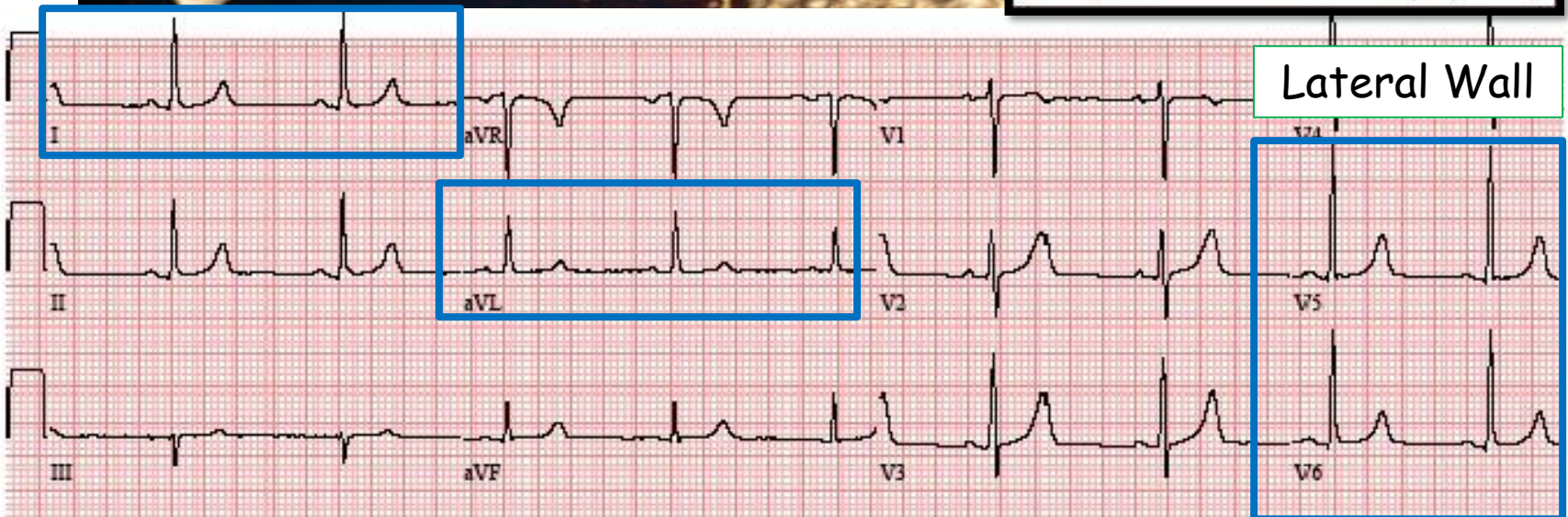
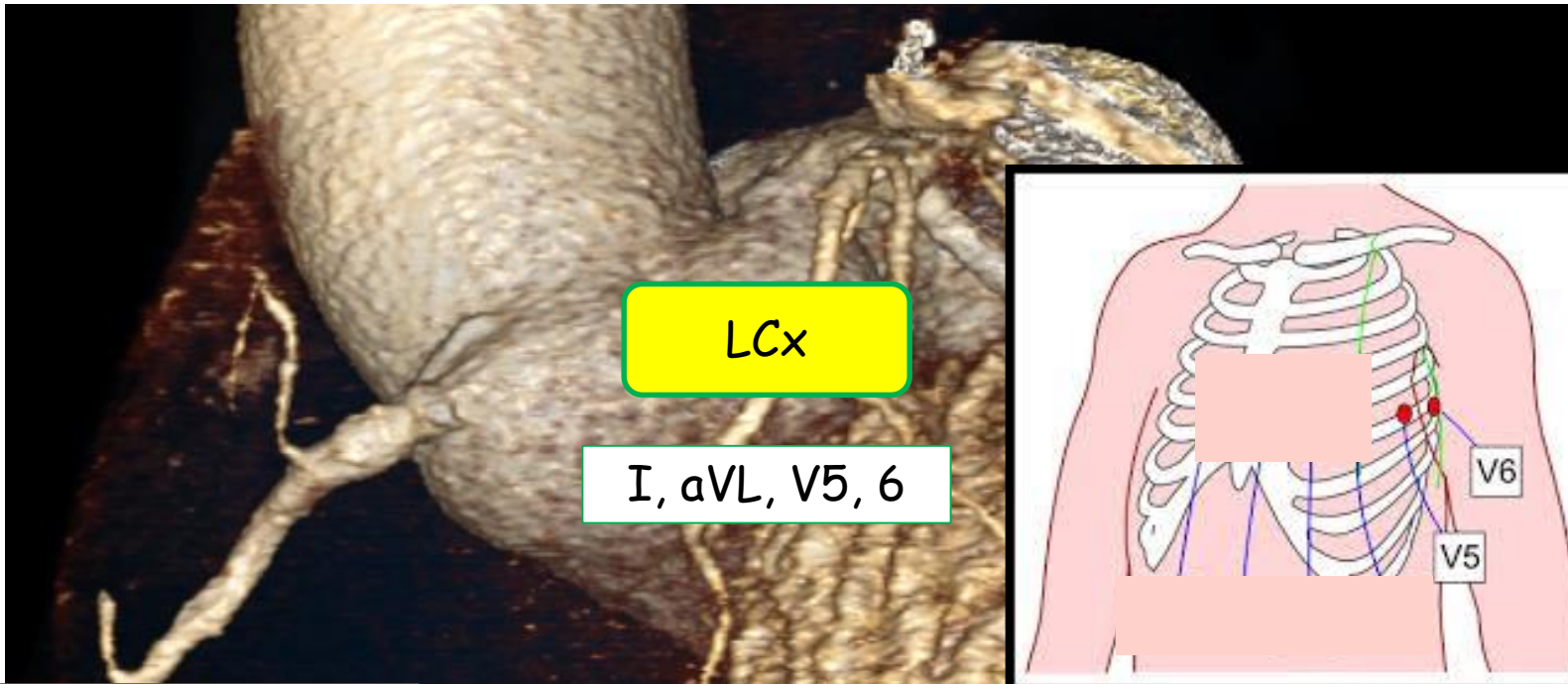
Coronary Vessels, EKG Localization of STEMI and Derivatives for USMLE Step One

- **Right Coronary Artery [inferior (posterior) wall]**
 - Leads: II, III, aVF
 - Sinoatrial and AV Nodes → bradyarrhythmia
 - Dominance: supplies the posterior descending a.
 - *Posterior 1/3 of septum*
 - RV infarct: cardiogenic shock without ↑ LV EDV
- Left Circumflex (lateral wall)
- Left Anterior Descending
- Special Notes:
 - Reciprocal changes



LCX

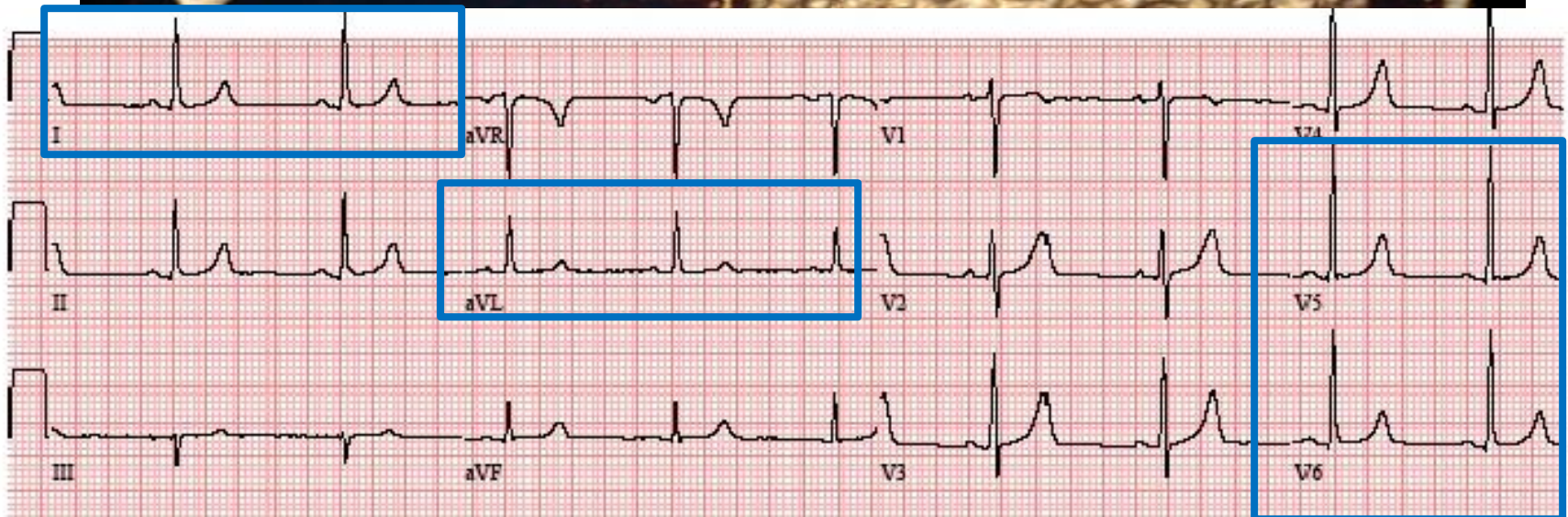
Lateral Wall
I, aVL, V5, 6





Take homes for Left Circumflex:

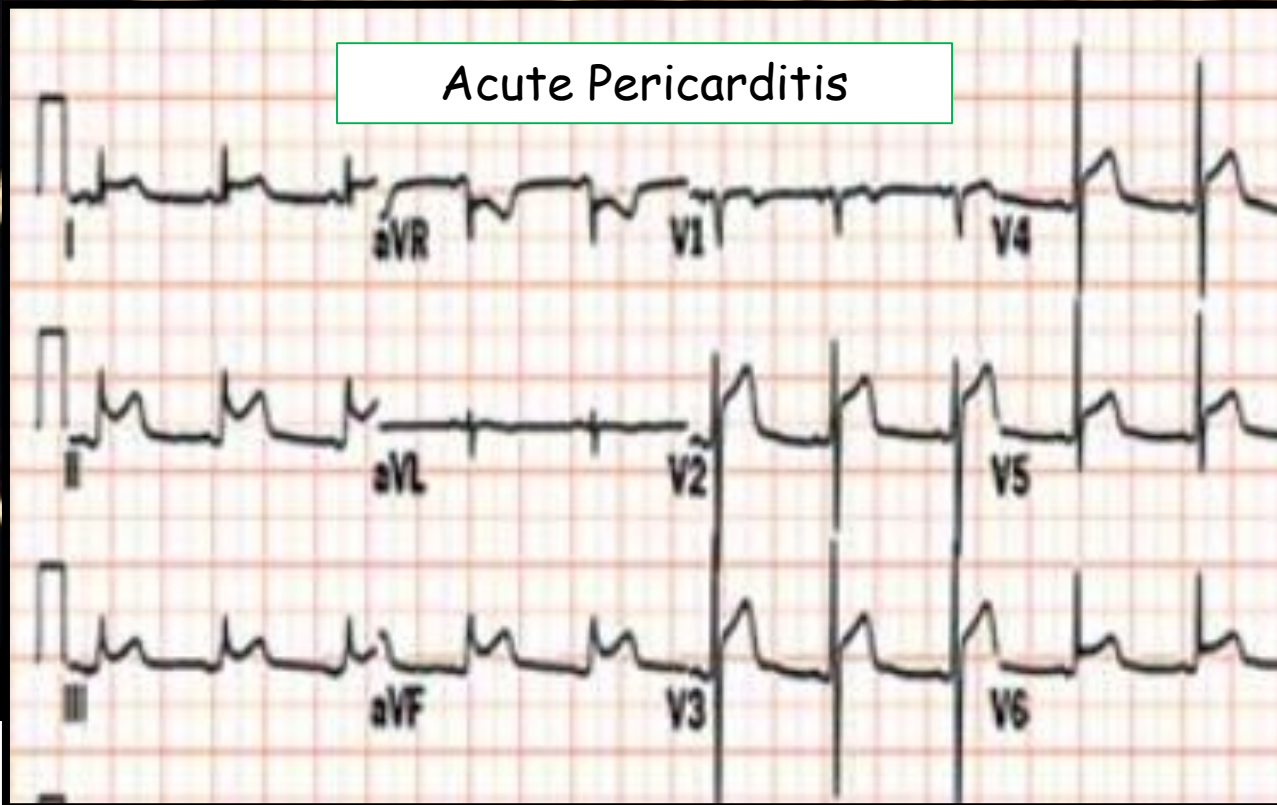
1. Dominance: infrequent; if dominant, supplies PDA (and posterior 1/3 septum)
2. Territorial pattern: overall pattern of elevations in acute pericarditis





Take homes for Left Circumflex:

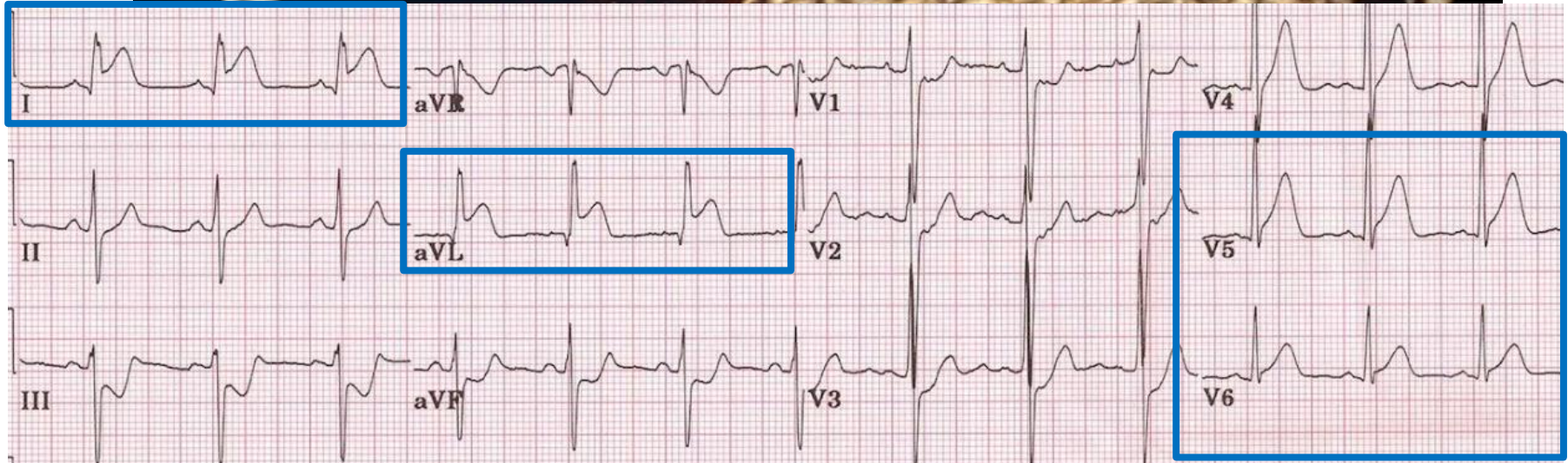
1. Dominance: infrequent; if dominant, supplies PDA (and posterior 1/3 septum)
2. Territorial pattern: overall pattern of elevations in acute pericarditis

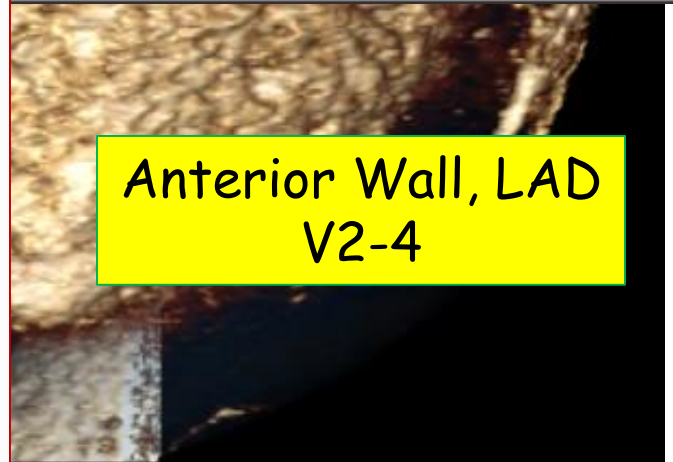
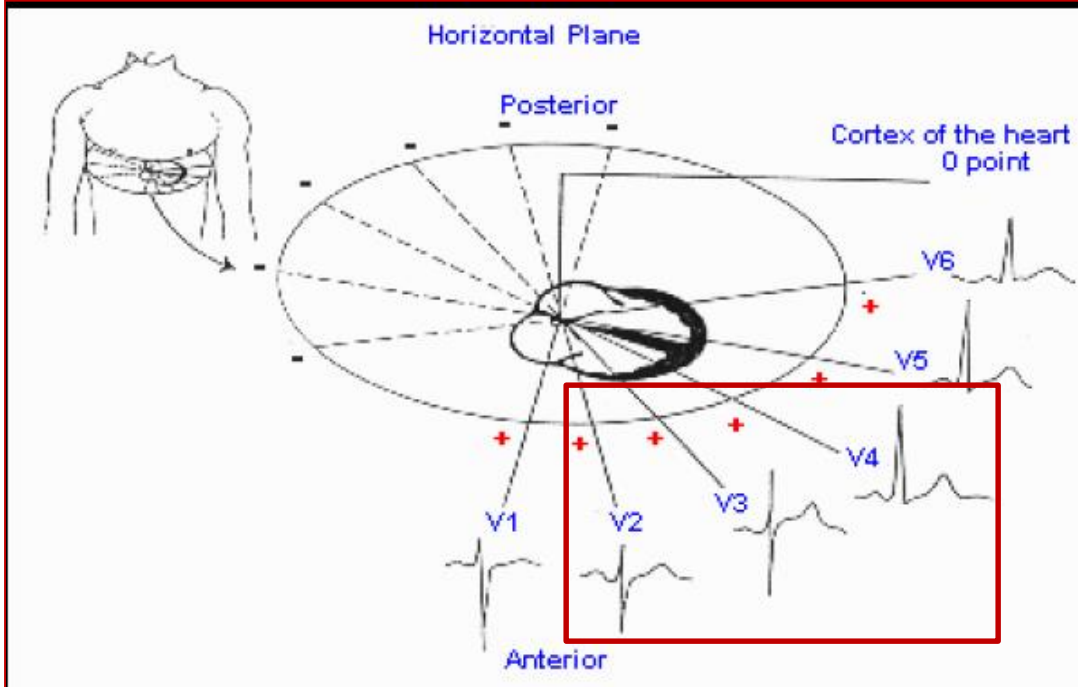
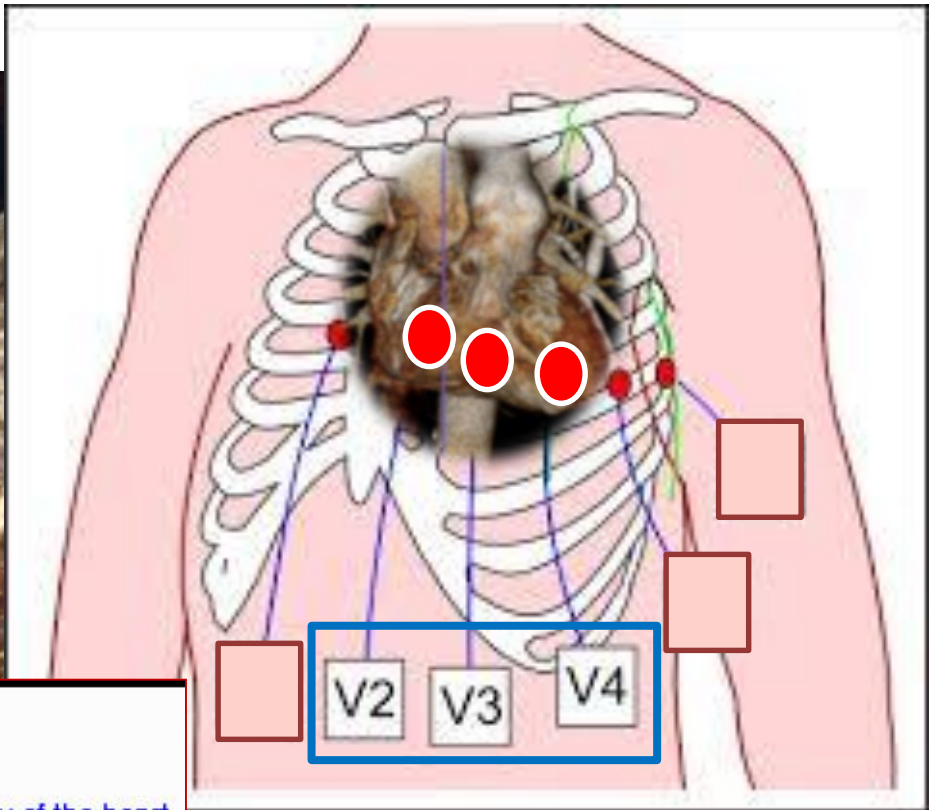
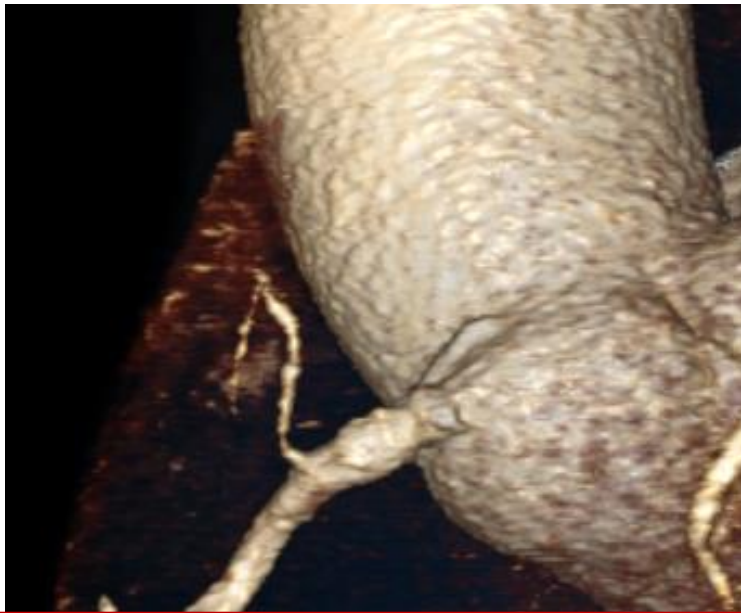




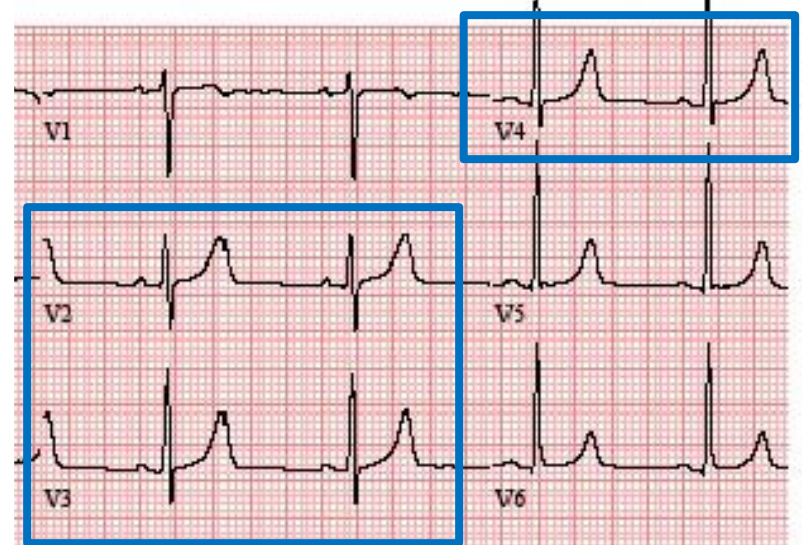
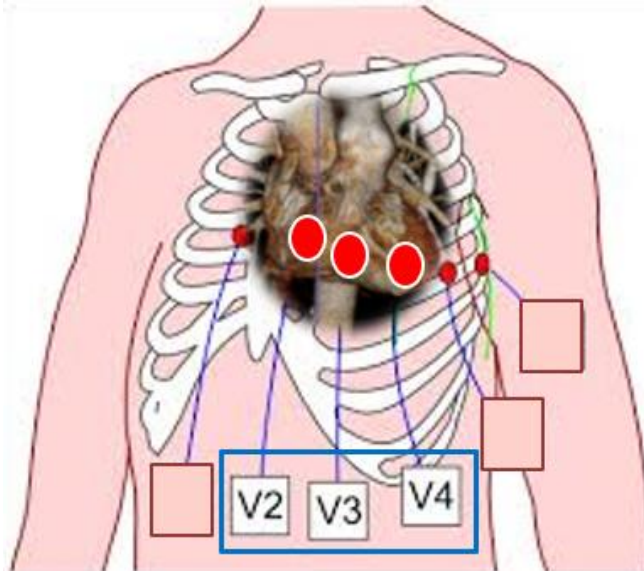
Take homes for Left Circumflex:

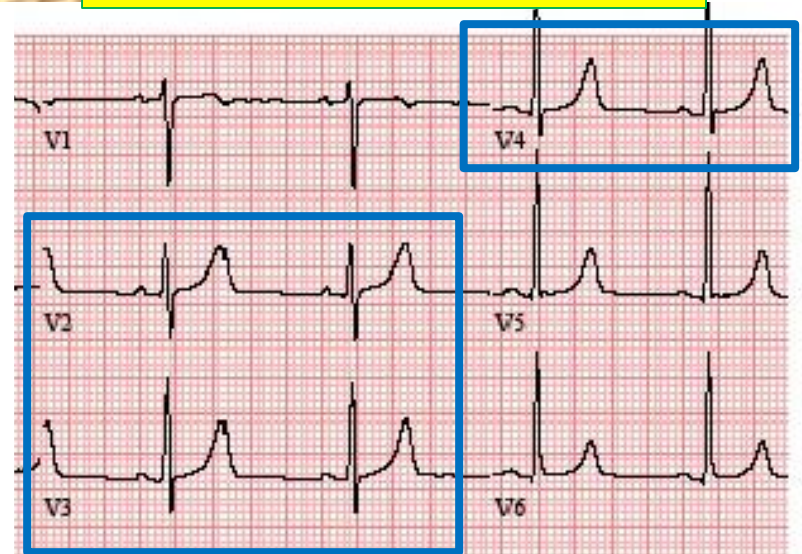
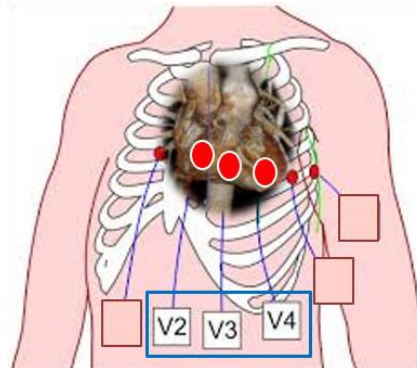
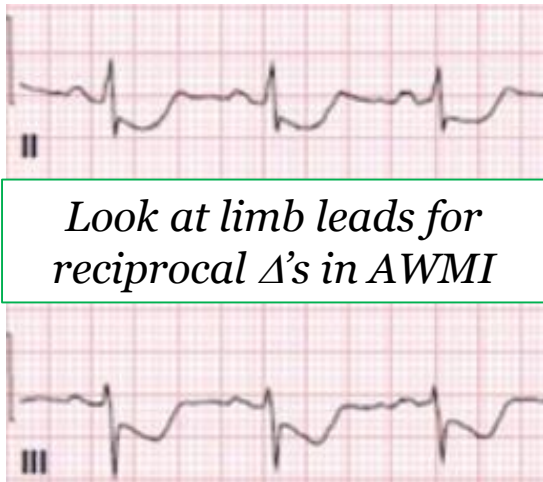
1. Dominance: infrequent; if dominant, supplies PDA (and posterior 1/3 septum)
2. Territorial pattern: overall pattern of elevations in acute pericarditis
3. Occlusion: lateral wall infarction





Anterior Wall, LAD
V2-4



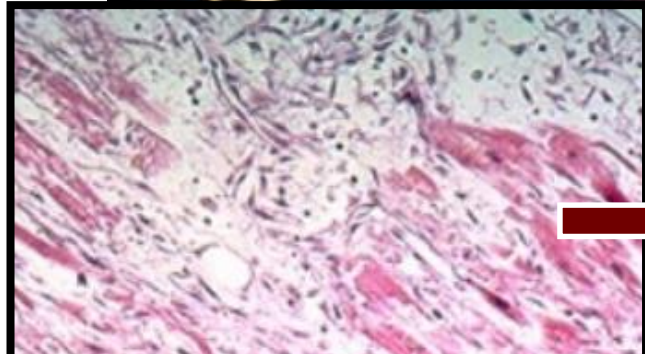
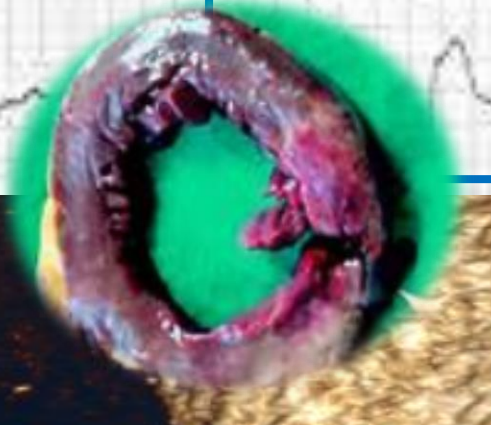
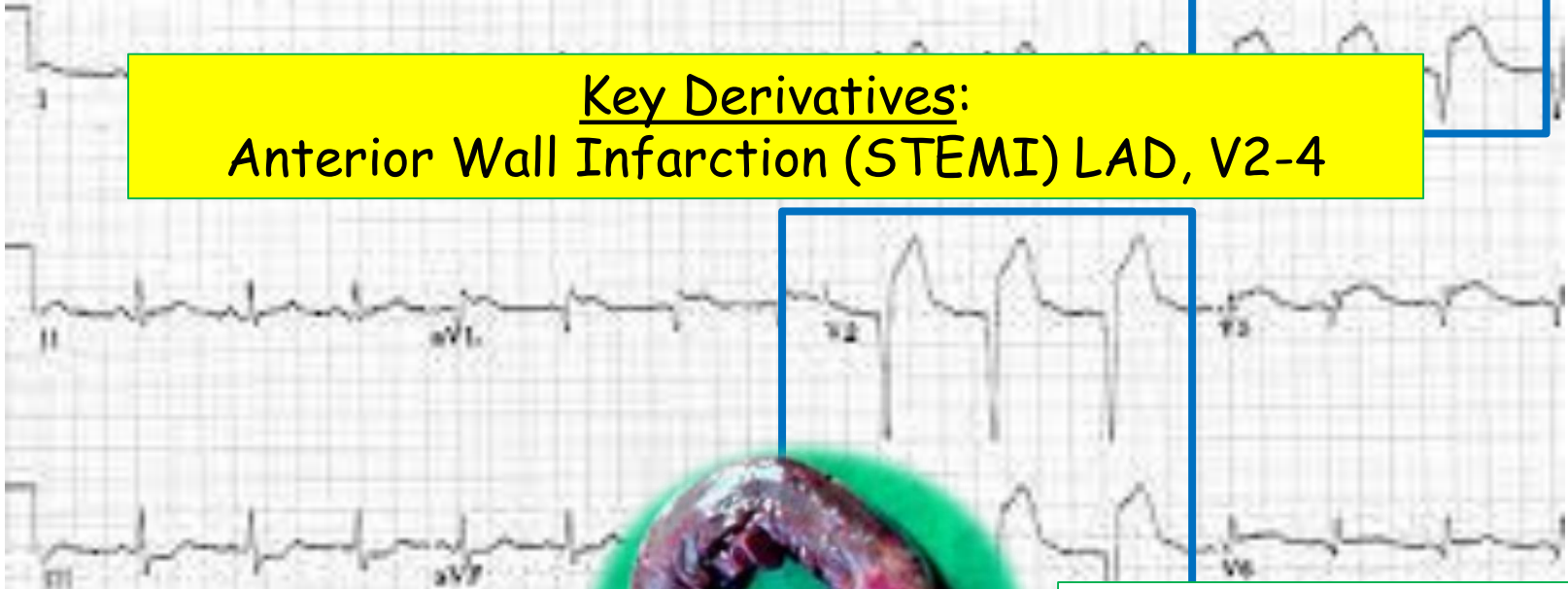




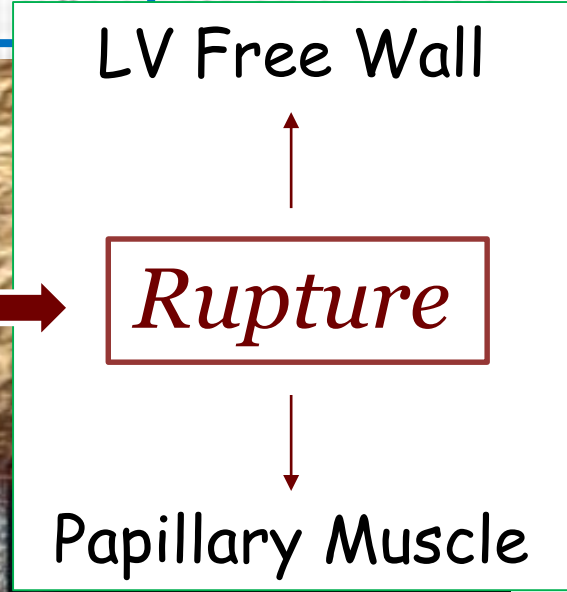
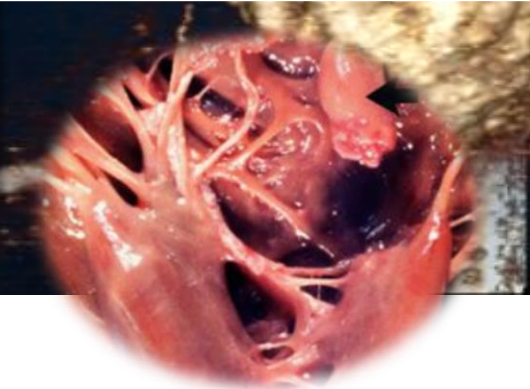
Anterior Wall Infarction (STEMI)
LAD, V2-4



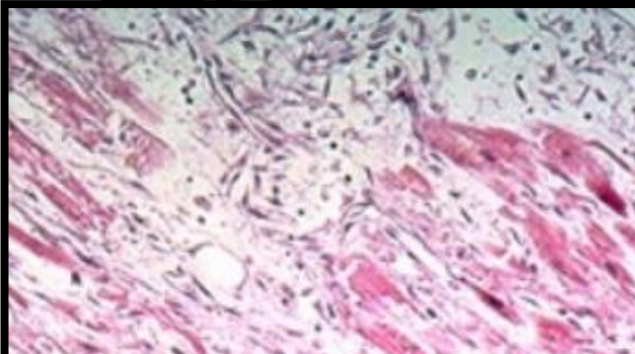
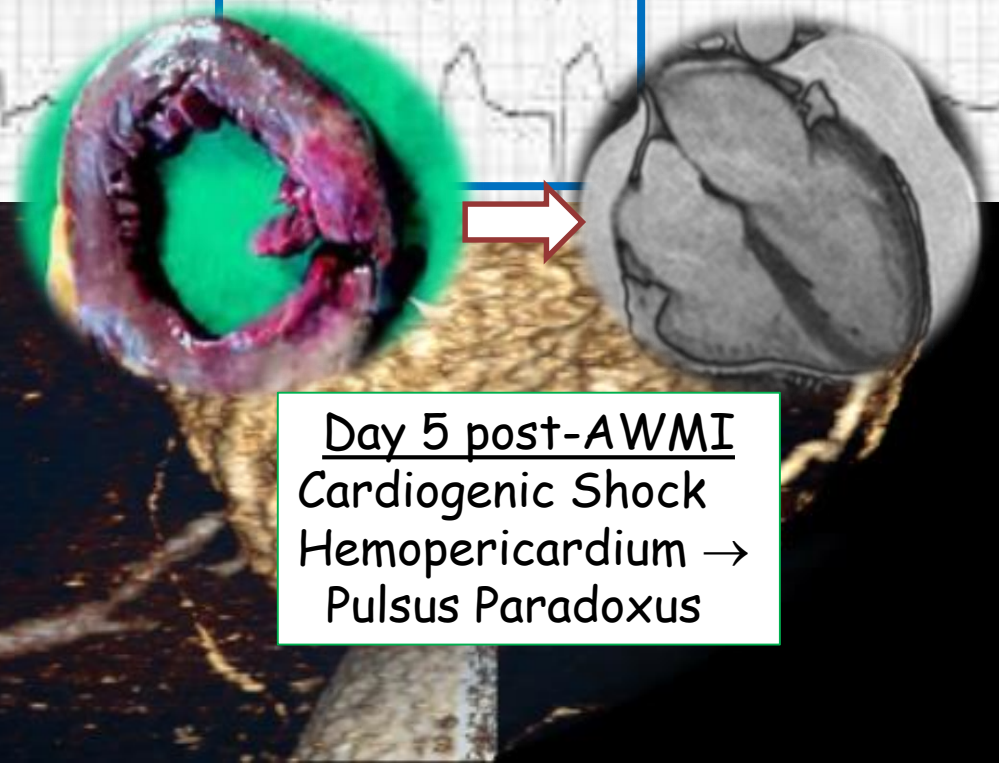
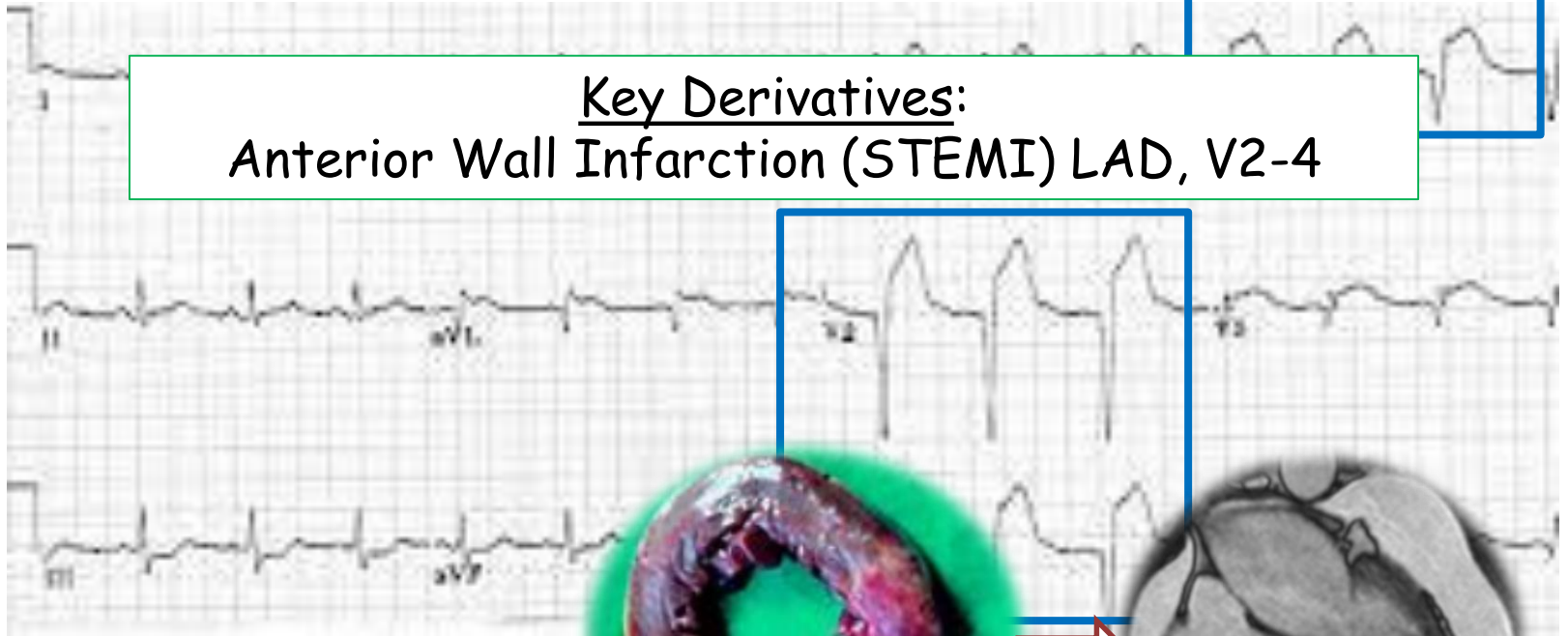
Key Derivatives:
Anterior Wall Infarction (STEMI) LAD, V2-4



Macrophage Phase



Key Derivatives:
Anterior Wall Infarction (STEMI) LAD, V2-4



Macrophage Phase

Day 5 post-AWMI
Cardiogenic Shock
Hemopericardium →
Pulsus Paradoxus

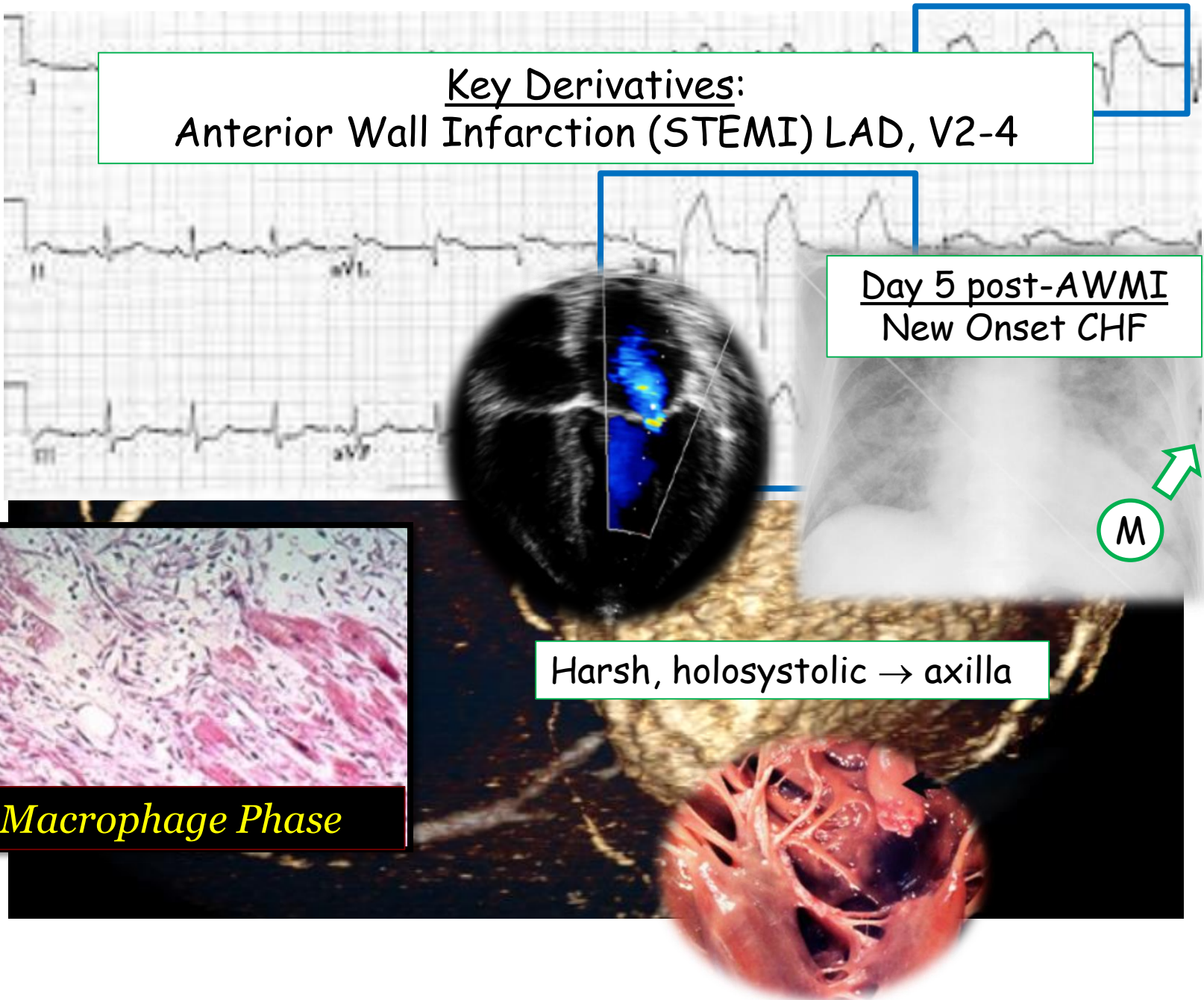
Key Derivatives:
Anterior Wall Infarction (STEMI) LAD, V2-4

Day 5 post-AWMI
New Onset CHF

Harsh, holosystolic → axilla

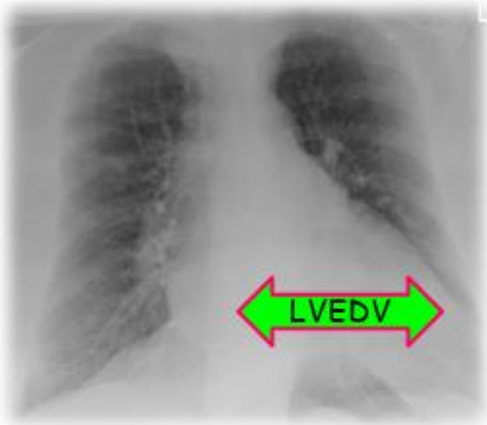
M

Macrophage Phase



Key Derivatives:
Anterior Wall Infarction (STEMI) LAD, V2-4

Inotropy ↓



EF%

CO ml/min

VR
(preload)

SVR/TPR



LVEDV

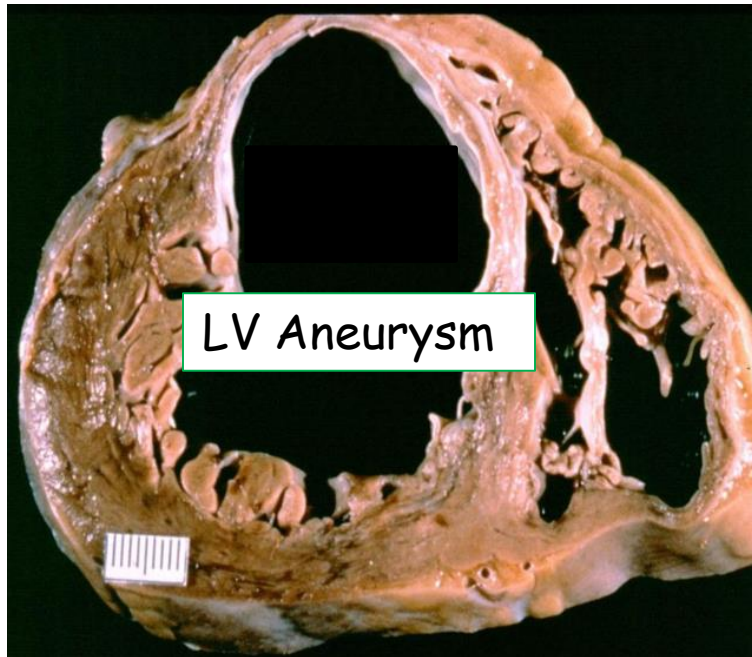
α -1/SNS

Cardiogenic Shock

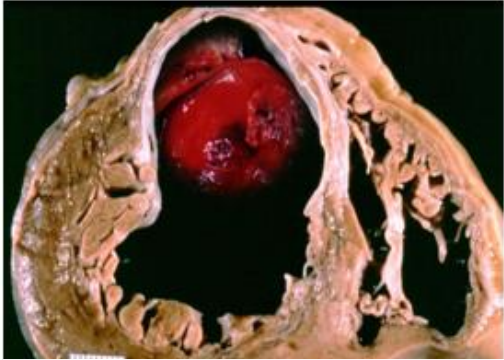
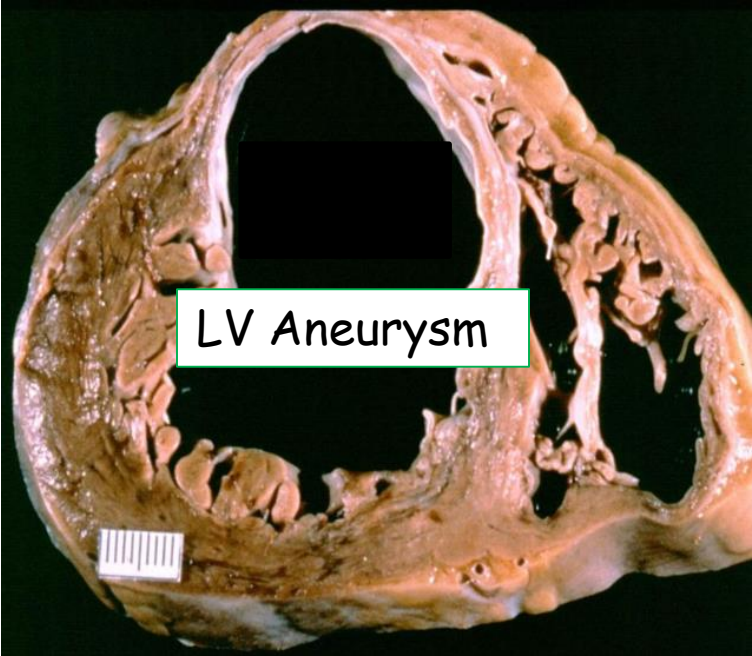
Pharmacorx
Dobutamine
 β -1 agonist

Inotrope, not a pressor

Key Derivatives:
Anterior Wall Infarction (STEMI) LAD, V2-4



Key Derivatives:
Anterior Wall Infarction (STEMI) LAD, V2-4



RCA

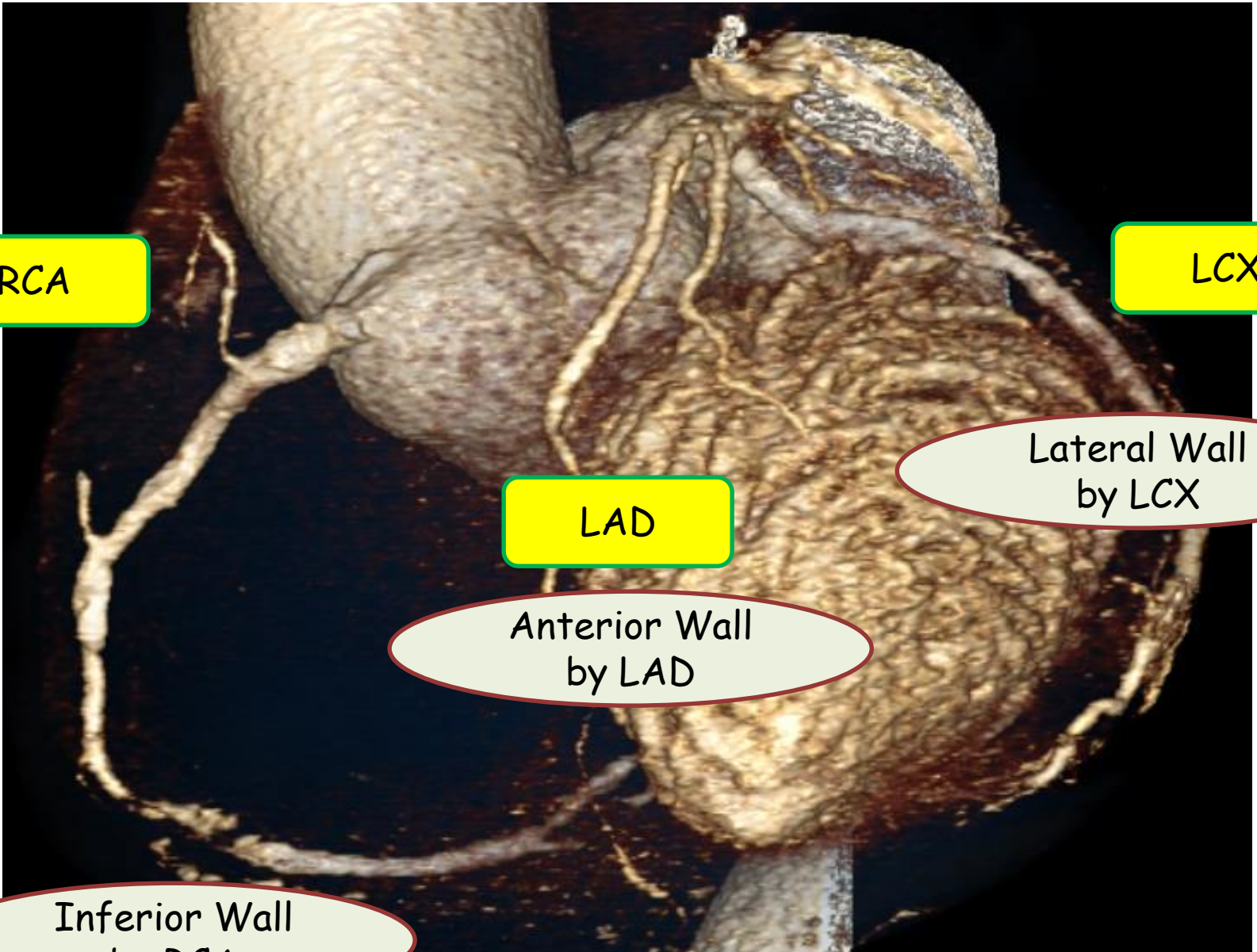
LCX

LAD

Lateral Wall
by LCX

Anterior Wall
by LAD

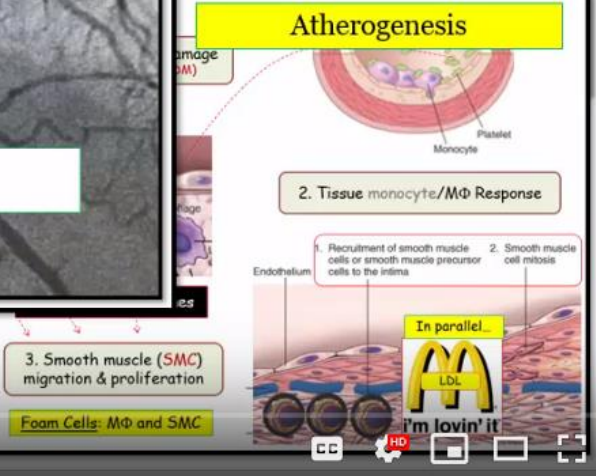
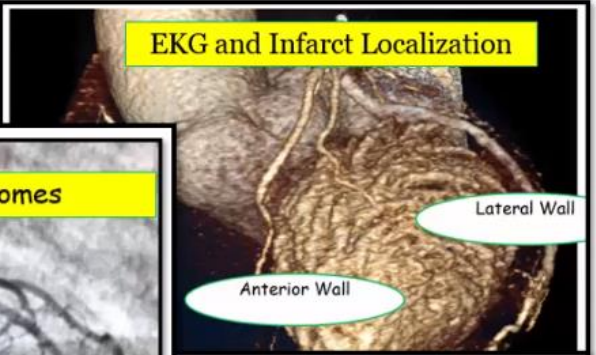
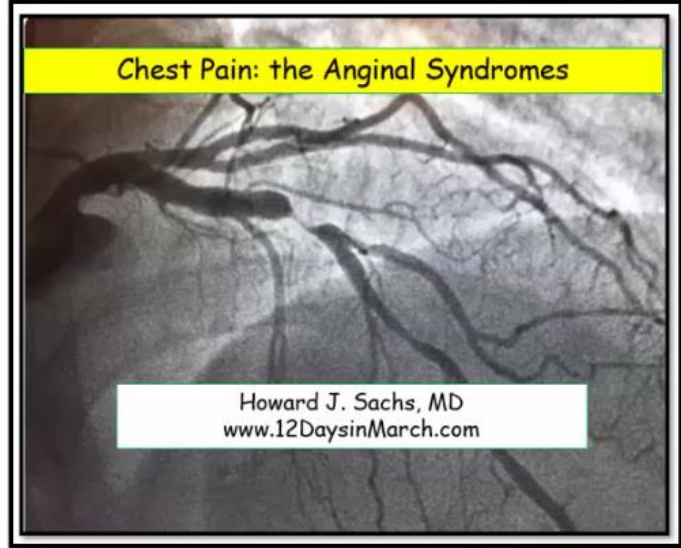
Inferior Wall
by RCA



RCA

-CX

Wall



0:37 / 14:59

12DaysinMarch, ASHD#3: Cardiac Pathology of Myocardial Infarction for the USMLE Step One Exam

Inferior wall by RCA

Coronary Vessels, EKG Localization of STEMI and Derivatives for USMLE Step One

- Right Coronary Artery [inferior (posterior) wall]
 - Leads: II, III, aVF
 - Sinoatrial and AV Nodes → bradyarrhythmia
 - Dominance: supplies the posterior descending a.
 - *Posterior 1/3 of septum*
 - RV infarct: cardiogenic shock without ↑ LV EDV
- Left Circumflex (lateral wall)
 - Leads: I, aVL, V5,6
 - Dominance
 - Territorial pattern
- Left Anterior Descending
 - Leads: V2,3,4
 - Major MI, Major Complications (for the boards)
 - Rupture: LV free wall → tamponade; Papillary muscle → mitral regurgitation, CHF
 - Cardiogenic shock → LV aneurysm and sequelae
- Special Notes:
 - Reciprocal changes and acute pericarditis

Atherosclerotic Heart Disease:
Coronary Vessels, EKG Localization of STEMI and
Complications/Derivatives for USMLE Step One



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