

Cardiac Findings on Chest CTs: Sometimes the Problem is the Heart

David M. Naeger, MD

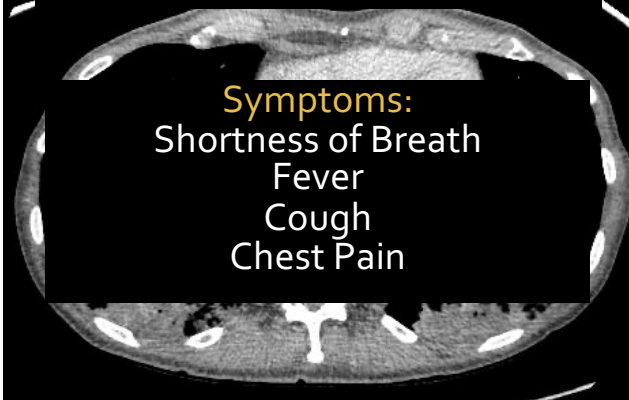
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Most chest CTs are obtained for
respiratory concerns

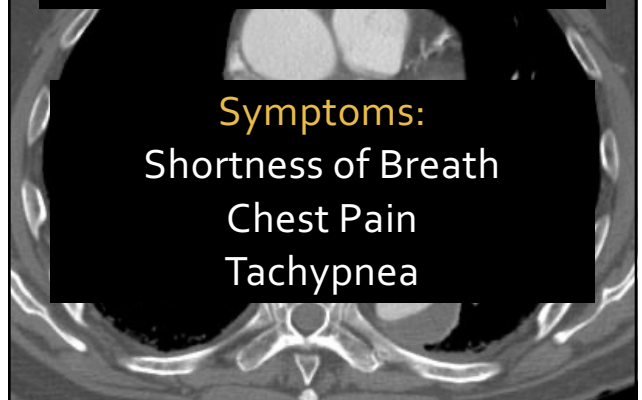
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Pneumonias

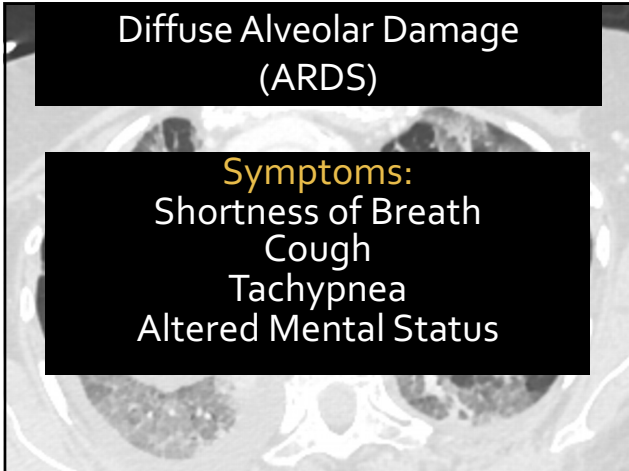


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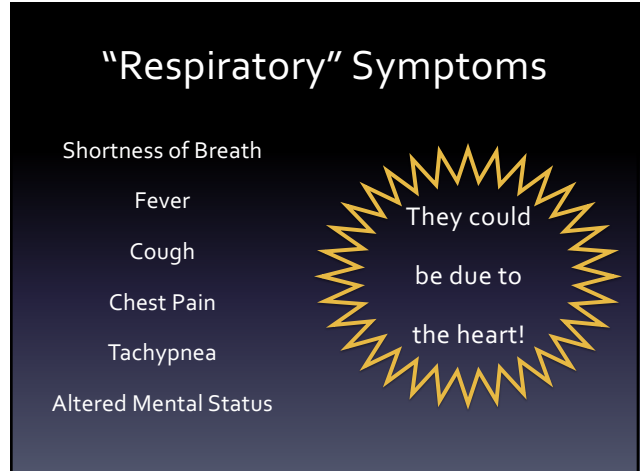
Pulmonary Emboli



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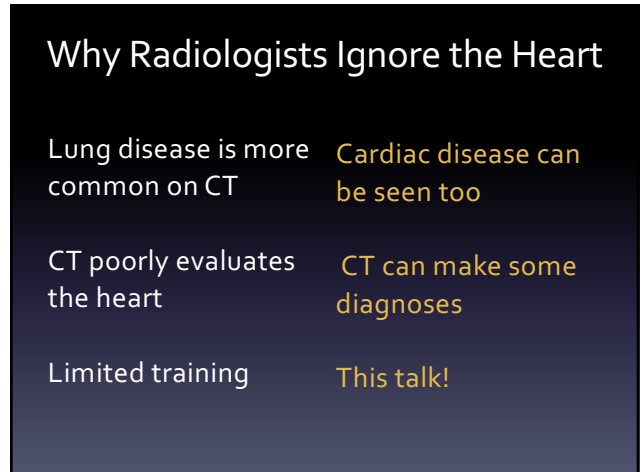
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The Message:

Sometimes, the key diagnosis to make on a chest CTs is cardiac.

Radiologists should evaluate the heart on every scan.

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Topics

Review easily detectable cardiac findings that can cause common chief complaints.

We will not focus on incidental findings.

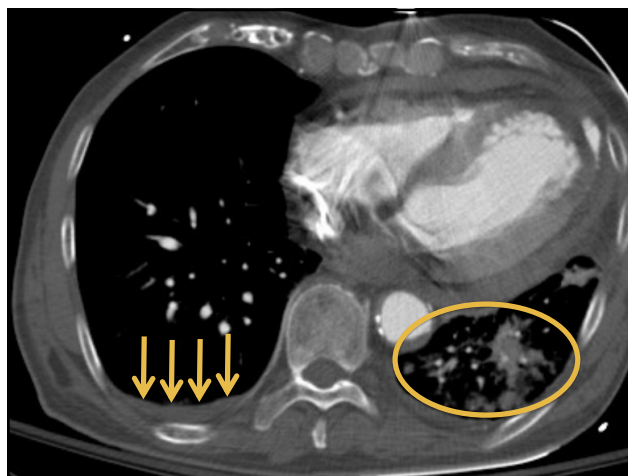
A case-based review.

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Case 1

Acute Chest Pain


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What is the most important abnormality?

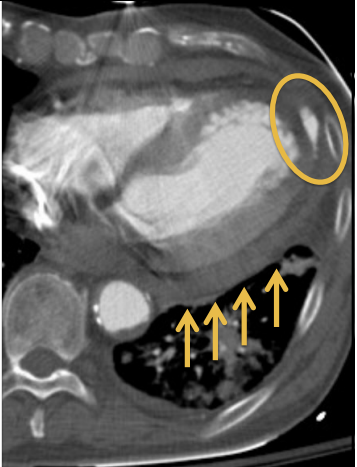
1. Thrombus
2. Dilated left ventricle
3. Myocardial infarct
4. Cardiac mass



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What is the most important abnormality?

1. Thrombus
2. Dilated left ventricle
3. Myocardial infarct
4. Cardiac mass



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Acute Myocardial Infarctions

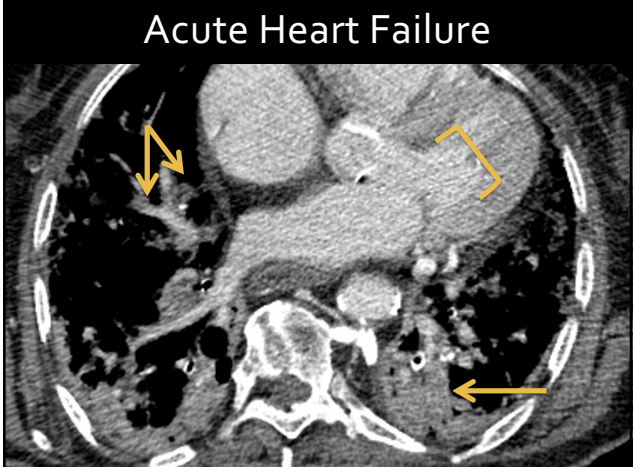
Possible acute findings:

- Evidence of LV failure: large LV, pulmonary edema
- Complications: Pseudoaneurysm, rupture
- Perfusion defect (Hard to see!)

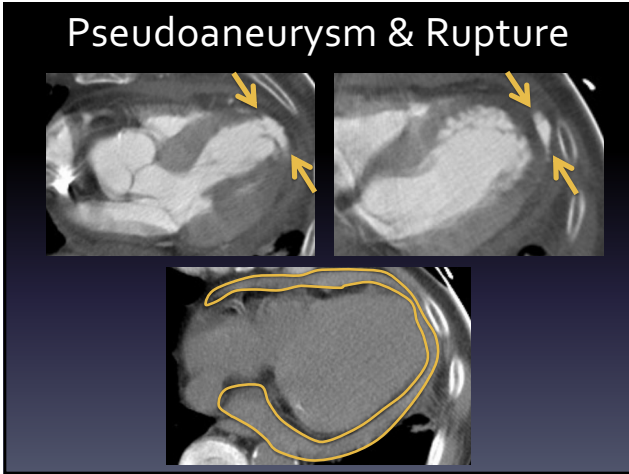
Shraki et al. AJR 2012; 198: 496.

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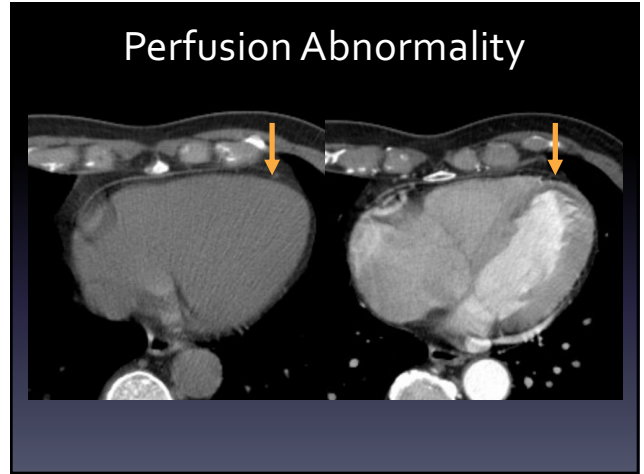
Acute Heart Failure



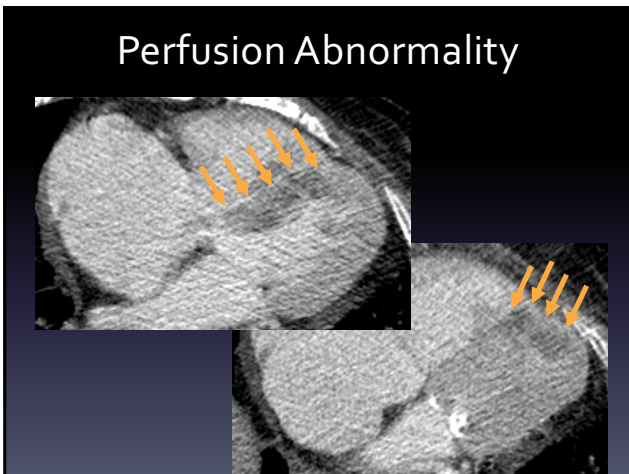
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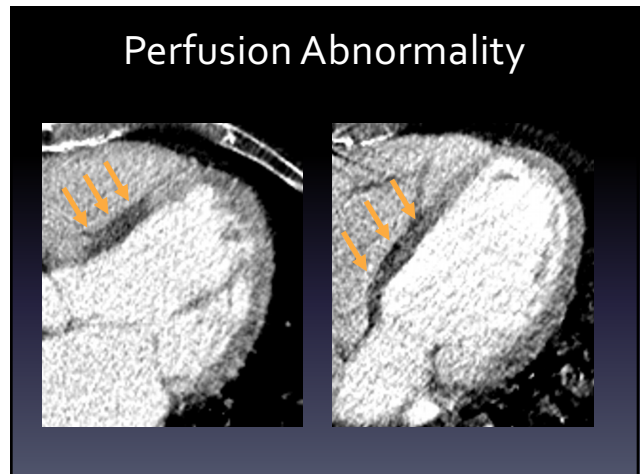
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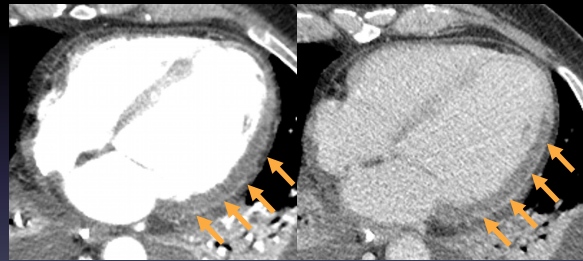
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Perfusion abnormality

- Sensitivity much better with gating (90%)
- Window narrowly and look for artifacts
- Ideal phase: late arterial (later than PE study)

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Perfusion Abnormality



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Myocardial Infarctions Acute vs. Chronic

- CT rarely ordered to evaluate acute or chronic myocardial infarctions
- It is easier to find evidence of chronic infarctions. Findings are usually incidental.

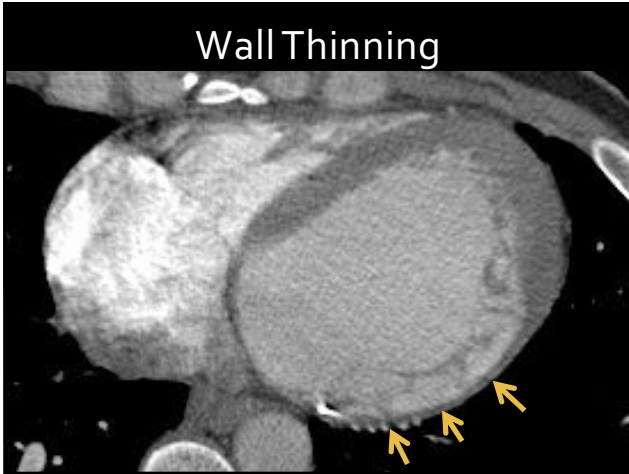
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Myocardial Infarctions Chronic

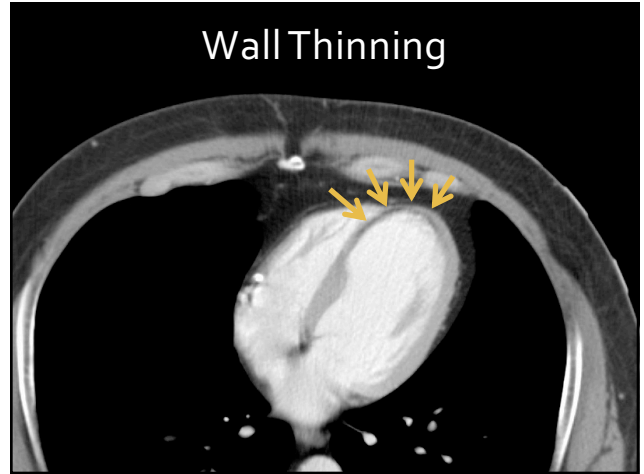
- Wall thinning
- Wall calcifications or fat
- True aneurysm
- Thrombus

Shriki et al. AJR 2012; 198: 496.

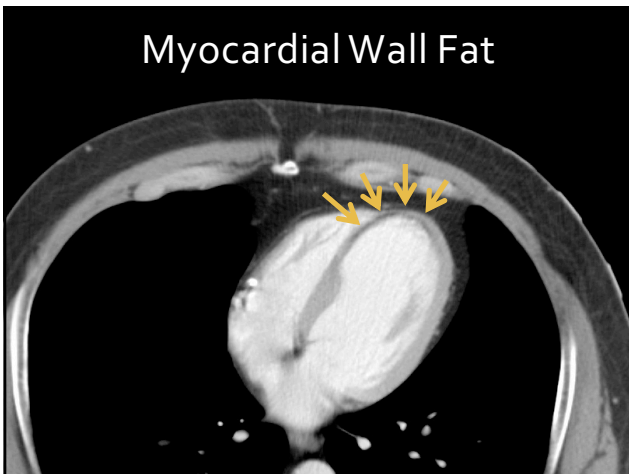
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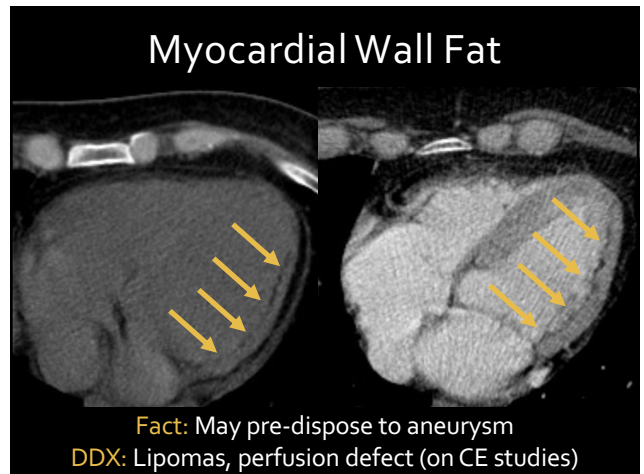
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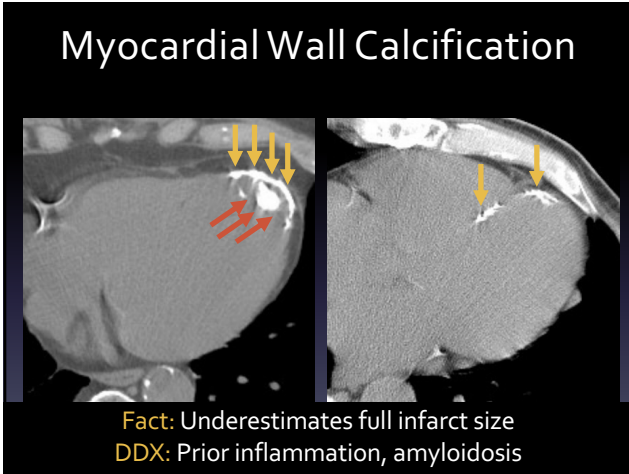
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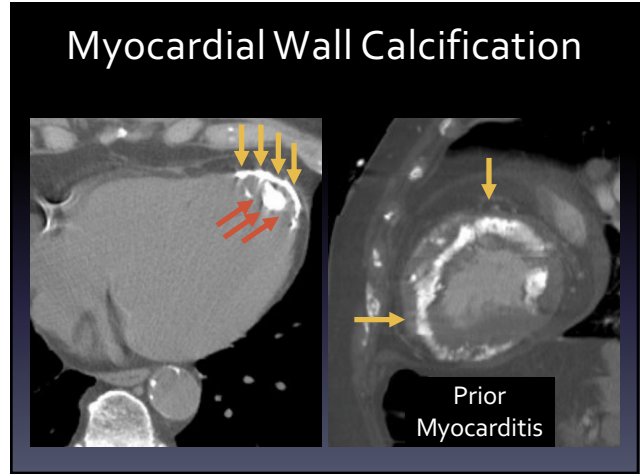
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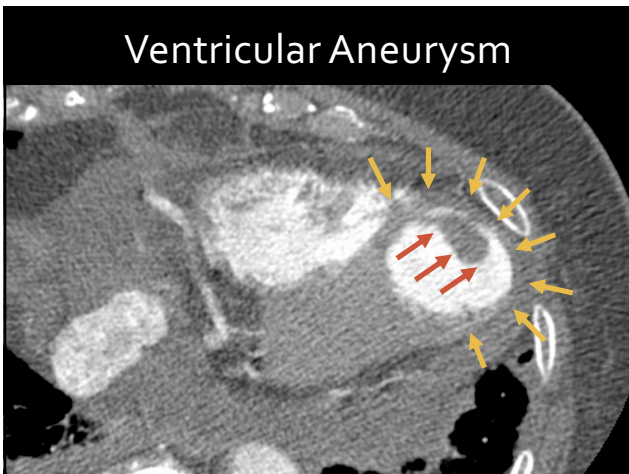
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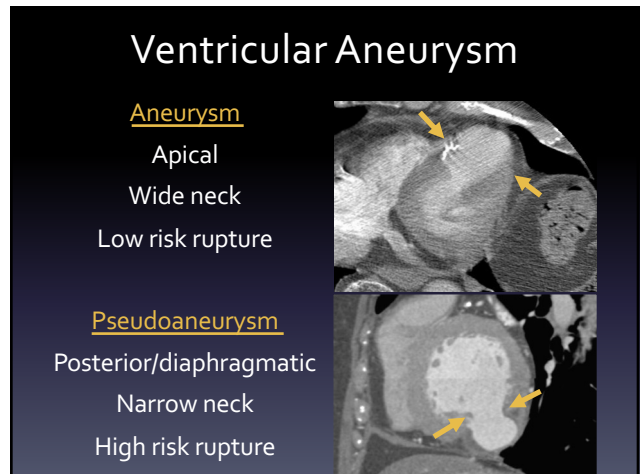
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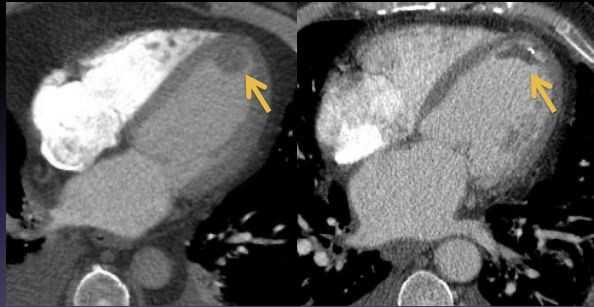


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Thrombus



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Ventricular Thrombus

- Up to 10% of infarcts
- Can form in 2 weeks
- Round mass or lining the walls
- Can also form with DCM, myocarditis, and hypercoagulable states

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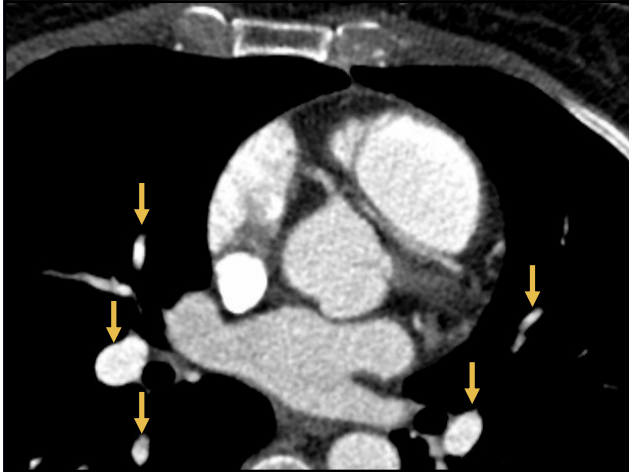
Case 2

24 year old, acute chest pain with running

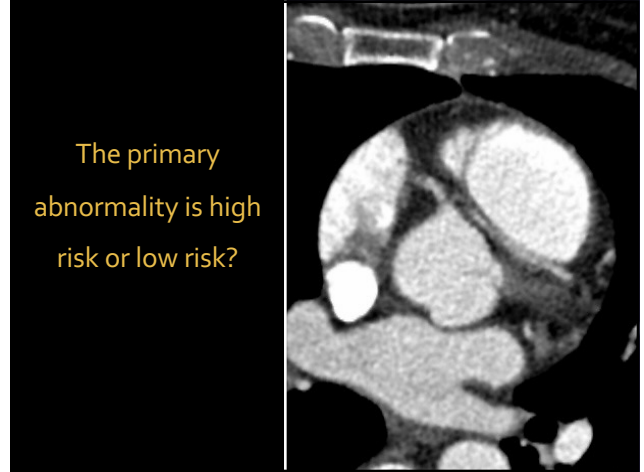
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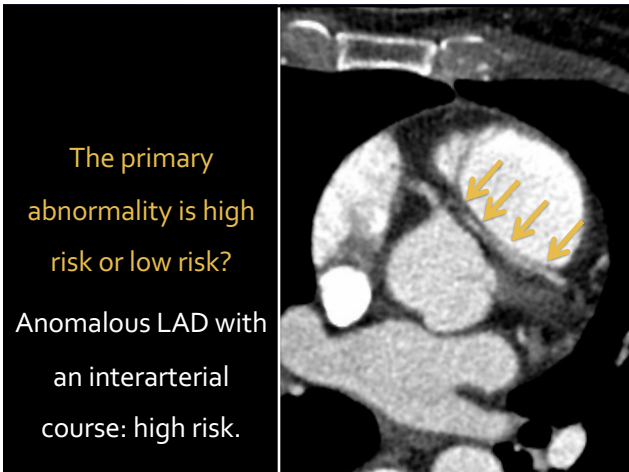


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The primary abnormality is high risk or low risk?

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The primary abnormality is high risk or low risk?
Anomalous LAD with an interarterial course: high risk.

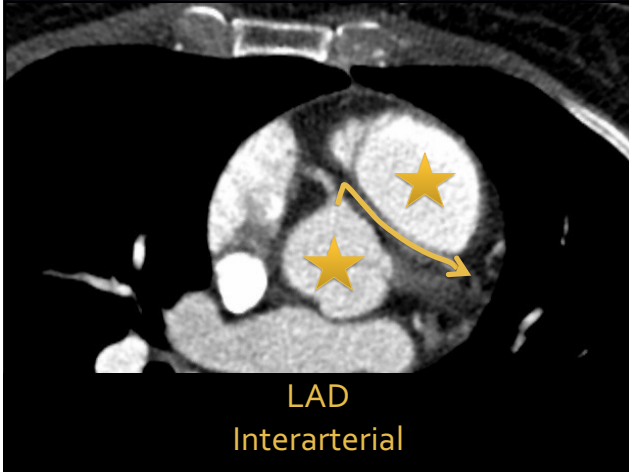
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Anomalous Coronary Courses

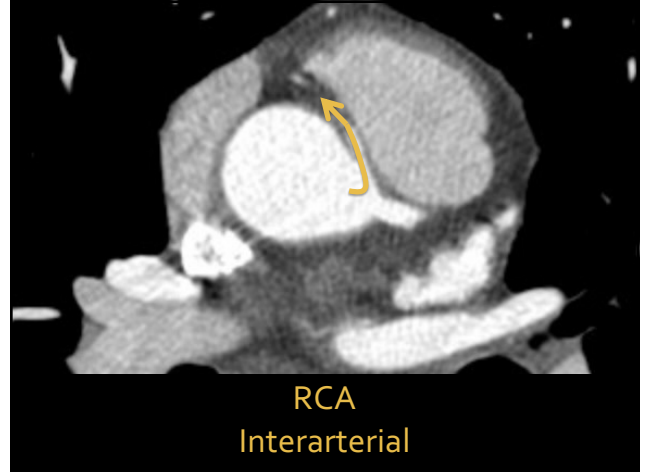
<u>Courses</u>	<u>Anomalous Arteries</u>
Interarterial	LM, LAD, or LCx
Septal	RCA
Prepulmonic	
Retroaortic	

Shriki et al. Radiographics 2012; 32: 453.

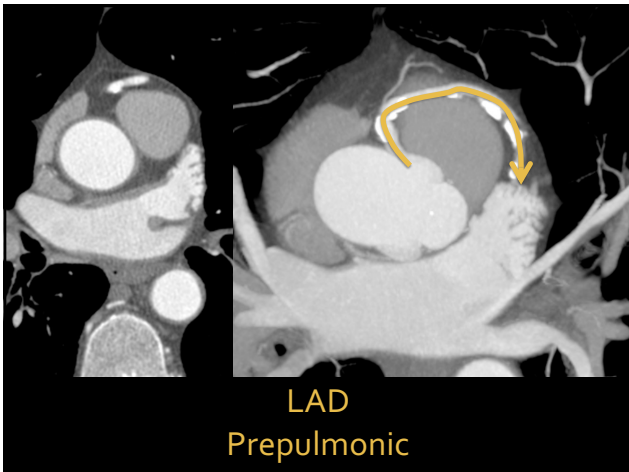
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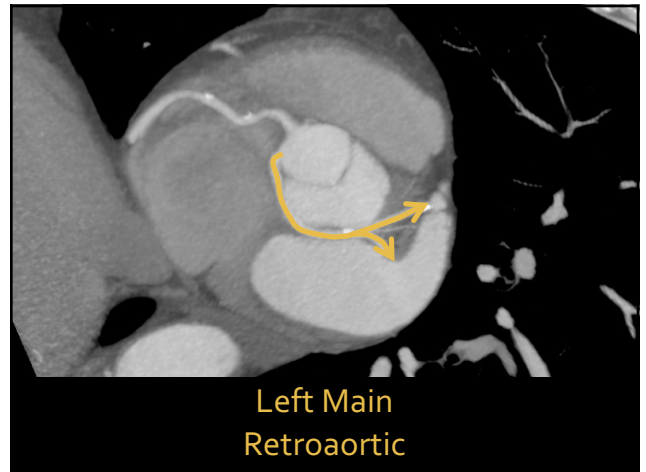
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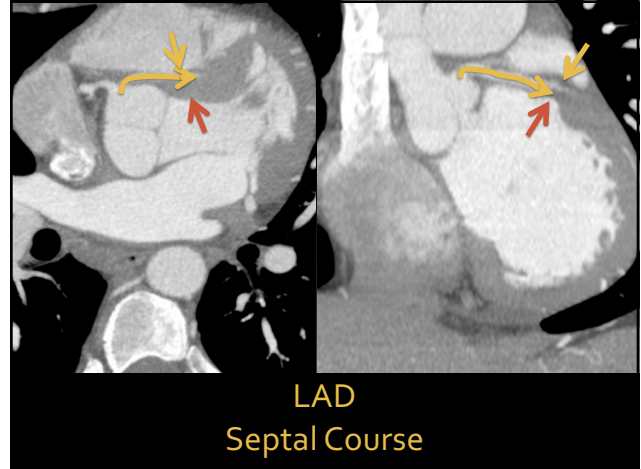
Septal (transseptal) Course

Confused with the interarterial variant

Downward course and surrounded by septal myocardium

Not associated with a slit-like orifice

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Courses

Interarterial

-Intramural-

-Not intramural-

Septal

Prepulmonic

Retroaortic

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Intramural

- This may be the cause of sudden death
 - Sudden death: left > right
- Shares media w/o intervening adventitia

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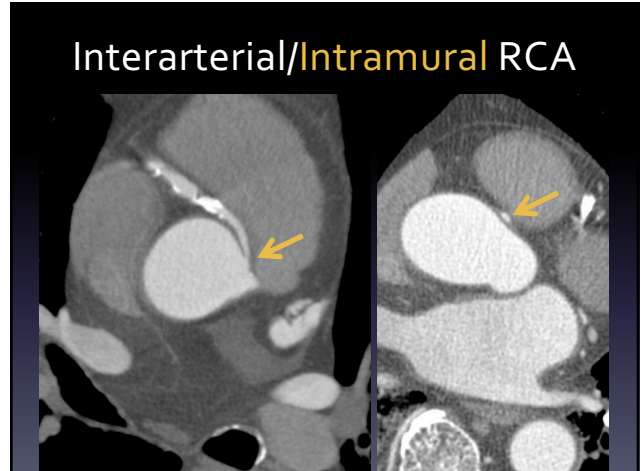
How can we see that?

A segment wraps around the aorta

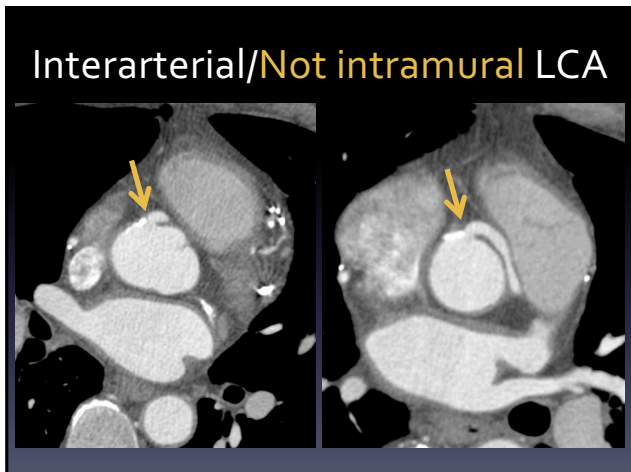
Tight angle

Slit-like orifice/proximal segment

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Intramural: Some Numbers

Feature	Intramural	Not intramural
% of cases	73%	27%
Angle from aorta	18°	49°
Slit like origin	100%	0%
Elliptical shaped cross-section	100%	0%
Ratio height/width	2.2	1.0

Miller et al. Int J of Cardiovasc Img 2012; 28: 1525

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Intramural: Some Numbers

Feature	Intramural	Not intramural
% of cases	73%	27%
Angle from aorta	18°	49°
Slit like origin	100%	0%
Elliptical shaped cross-section	100%	0%
Ratio height/width	2.2	1.3

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Courses

Interarterial RCA

-High Course-

-Low Course-

Septal

Prepulmonic

Retroaortic

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Interarterial RCA

- High course: runs between aorta and PA
 - Angina: 43 vs 6 %
 - Major adverse cardiac events (MACE): 28 vs 6%
- Low course: runs between aorta and RVOT

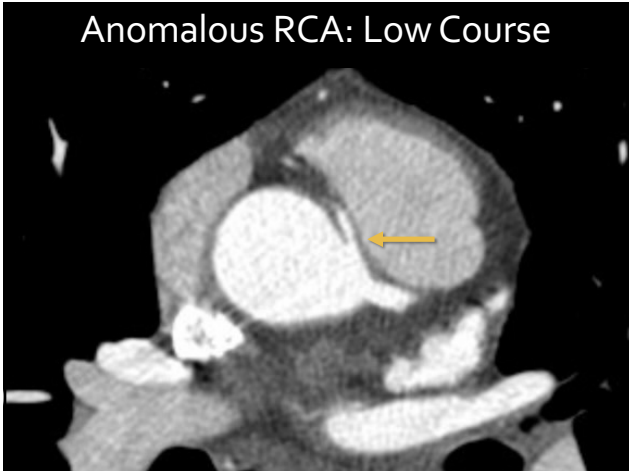
Lee. Radiology 2012; 262: 101

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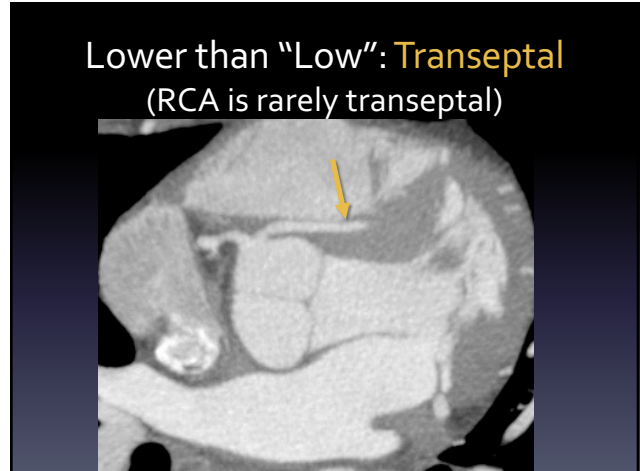
Anomalous RCA: High Course



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Anomalous Coronary Arteries

Treatment:

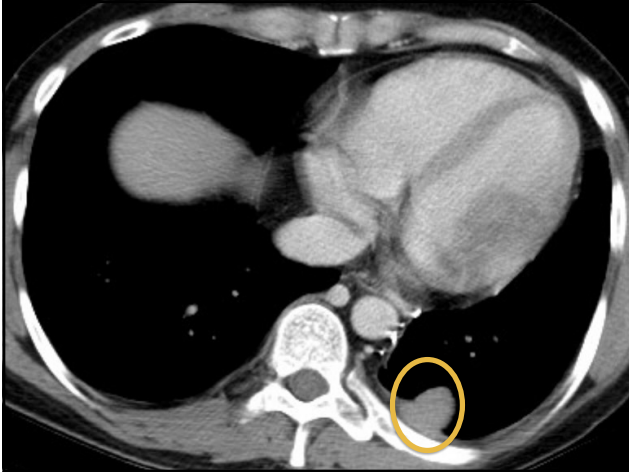
- Elected if ischemia, LM, and others
 - Unroofing for intramural
- Also possible: Re-implantation/CABG

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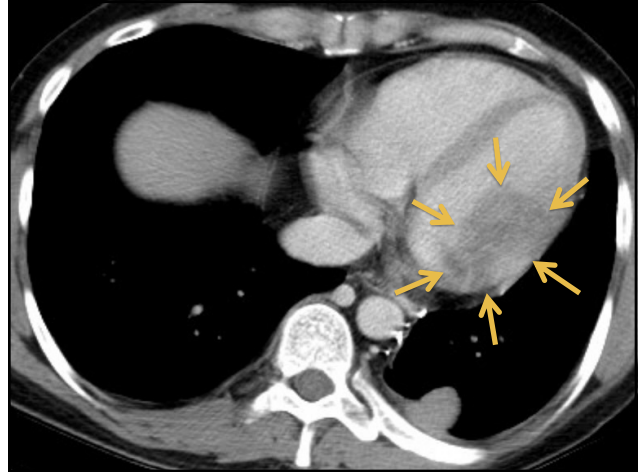
Case 3

Loss of Consciousness

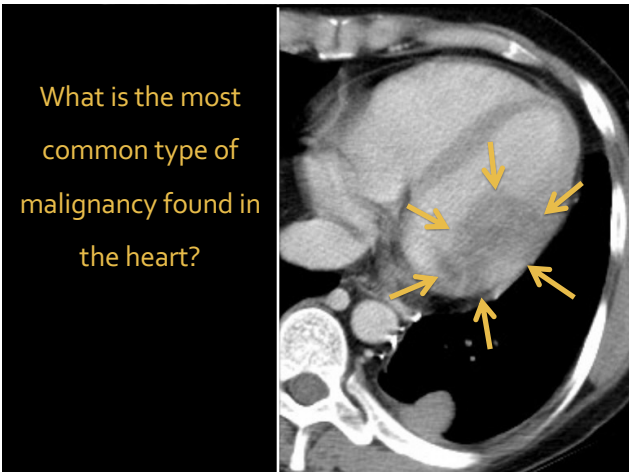
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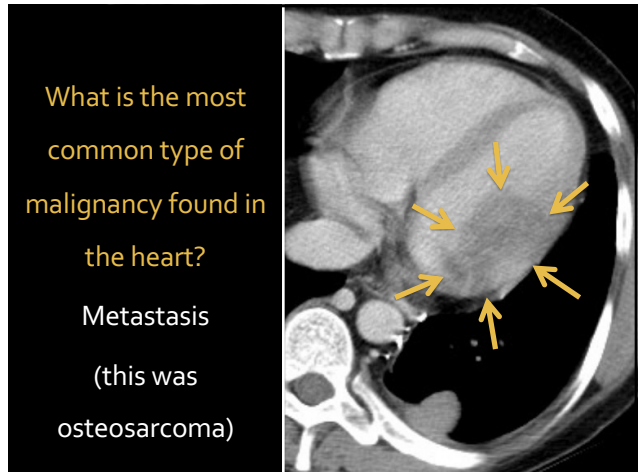
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The Most Common Primary Malignancy:



Angiosarcoma

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What is the Most Common...

- Cardiac mass -> Thrombus
- Cardiac tumor -> Metastasis
- 1° Cardiac tumor -> Myxoma
- 1° Malignant cardiac tumor -> Angiosarcoma

Buckley et al. AJR 2011; 197: W842

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Left Ventricle Thrombus



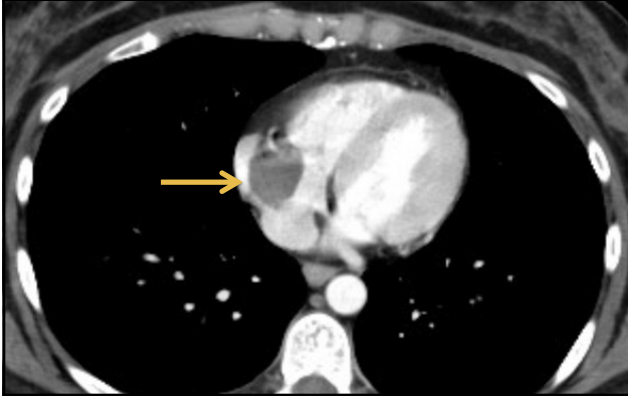
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Right Ventricle Thrombus



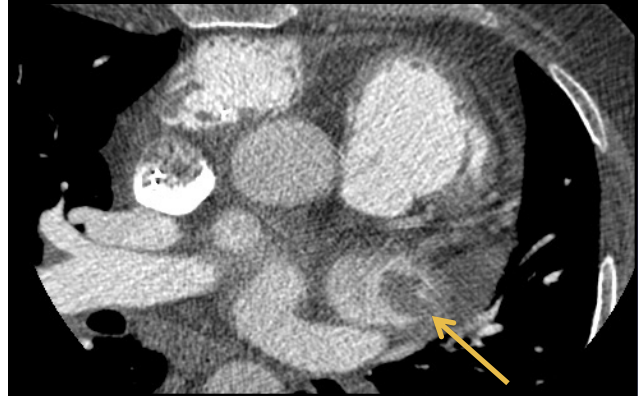
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Right Atrial Thrombus



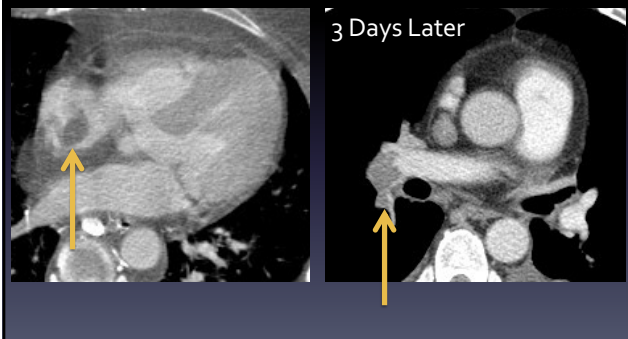
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Left Atrial Thrombus



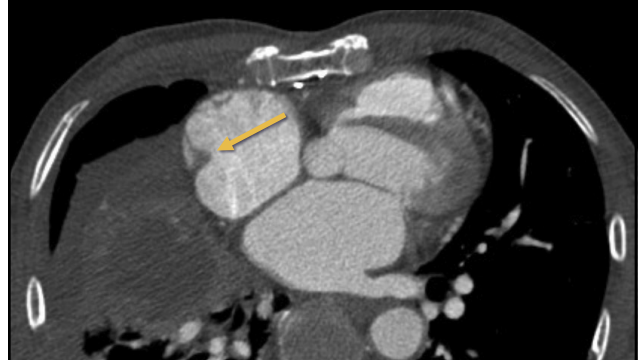
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How Can Thrombi Cause Acute Symptoms?

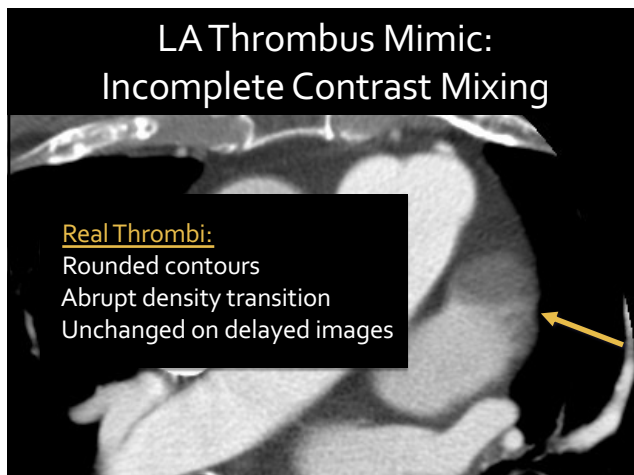


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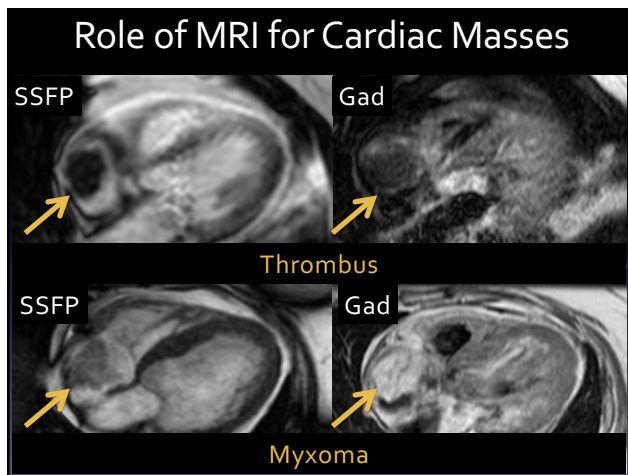
RA Mass Mimic: Crista Terminalis



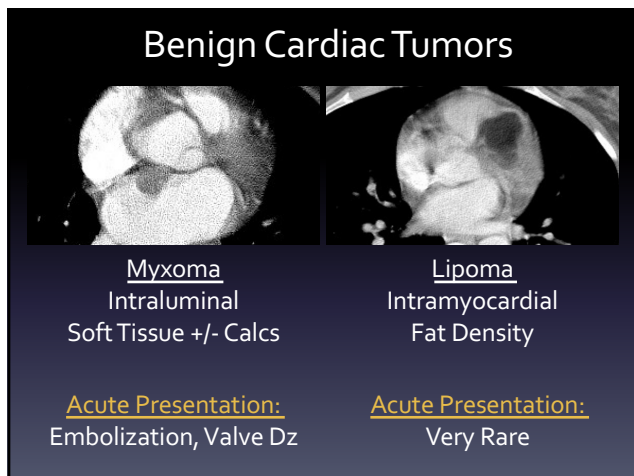
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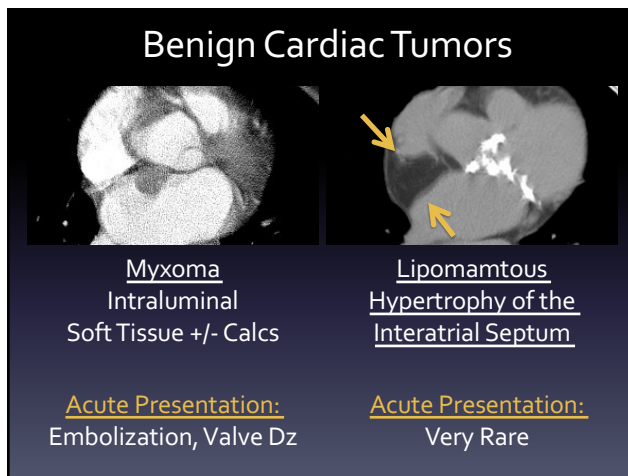
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Case 4
Found unresponsive

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What abnormal physiology is likely present?

- A. Pulmonary Hypertension
- B. Pulmonary Stenosis
- C. Cardiac Tamponade
- D. Atrial Fibrillation

Restrepo et al. Radiographics 2007; 27: 1595

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What abnormal physiology is likely present?

- A. Pulmonary Hypertension
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Hematoma

Restrepo et al. Radiographics 2007; 27: 1595

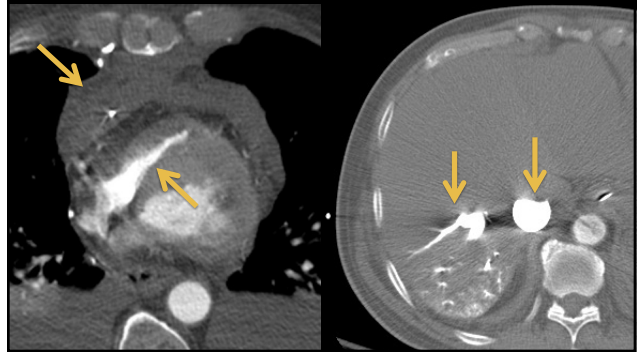
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CT Findings of Tamponade

- Pericardial effusion, blood, mass
- Mostly right sided chamber compression (static or dynamic)
- Septal deviation towards LV
- Dilated upstream vessels (e.g. IVC)

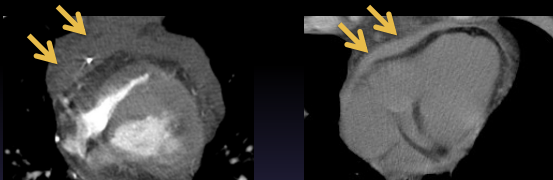
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Cardiac Tamponade



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Tamponade vs Constrictive Pericarditis



Acute/Subacute
Pericardial filling

Chronic
Thick or calcified

Overlap is possible: effusive-constrictive pericarditis
Confusing: Atrial sizes; Subtle hemodynamic differences

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Topics

Review easily detectable cardiac findings that can cause common chief complaints.

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The Message:

Sometimes, the key diagnosis to make on a chest CTs is cardiac.

Radiologists should evaluate the heart on every scan.

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References

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Thank you!

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