AMSER Case of the Month September 2025

53 y/o male presenting with recurrent DVT/PE

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Patient Presentation

- HPI: 53-year-old male with past history of left leg DVT and massive PE that have occurred over the past several years, who is presenting to clinic for diagnostic workup of recurrent DVT/PE. Patient does complain of occasional recurrent left leg swelling and persistent mild dyspnea with exertion but otherwise has not had any other complaints.
- Other PMH: Obstructive sleep apnea on CPAP, hypertension
- Social History: No history of smoking, otherwise unremarkable

Pertinent Exam/Labs

- Vitals: stable within normal limits, saturating well on room air
- Physical exam: unremarkable
- CMP/CBC: unremarkable
- BNP: not elevated
- Prior echocardiogram: moderately elevated pulmonary arterial pressure, otherwise unremarkable

What Imaging Should We Order?

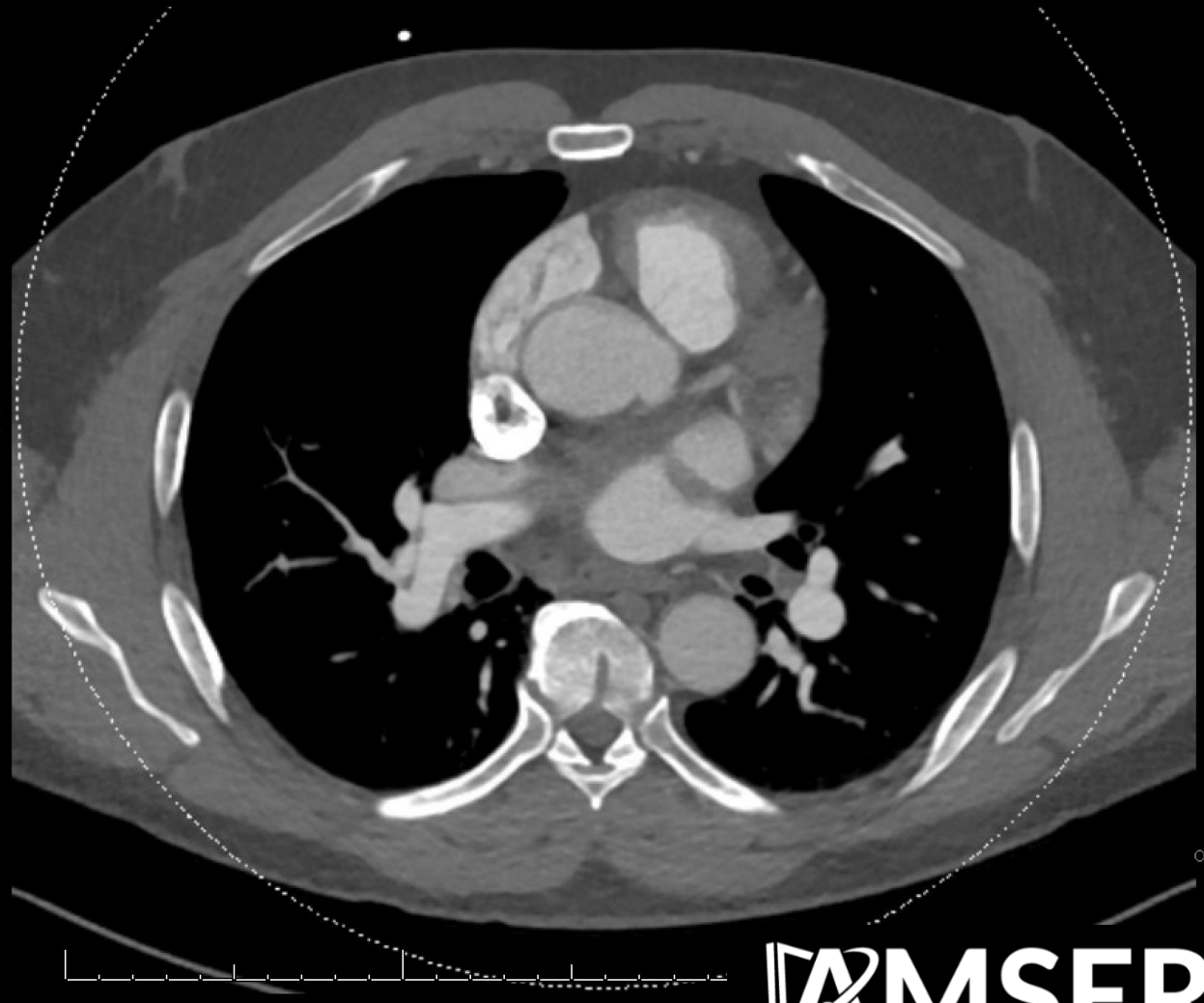
ACR Appropriateness Criteria

Variant 1: **Adult. Known history of acute pulmonary embolism. Suspected recurrent or residual embolic disease. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRA chest with IV contrast	Usually Appropriate	O
CTA pulmonary arteries with IV contrast	Usually Appropriate	☢☢☢
V/Q scan lung	Usually Appropriate	☢☢☢
V/Q scan with SPECT or SPECT/CT lung	Usually Appropriate	☢☢☢
US echocardiography transthoracic resting	May Be Appropriate	O
MRA chest without and with IV contrast	May Be Appropriate	O
MRA chest without IV contrast	May Be Appropriate	O
US echocardiography transesophageal	Usually Not Appropriate	O
Radiography chest	Usually Not Appropriate	☢
Arteriography pulmonary	Usually Not Appropriate	☢☢☢☢
Arteriography pulmonary with right heart catheterization	Usually Not Appropriate	☢☢☢☢
MRI heart function and morphology without and with IV contrast	Usually Not Appropriate	O
MRI heart function and morphology without IV contrast	Usually Not Appropriate	O
CT chest with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without and with IV contrast	Usually Not Appropriate	☢☢☢
CT chest without IV contrast	Usually Not Appropriate	☢☢☢
CT heart function and morphology with IV contrast	Usually Not Appropriate	☢☢☢☢

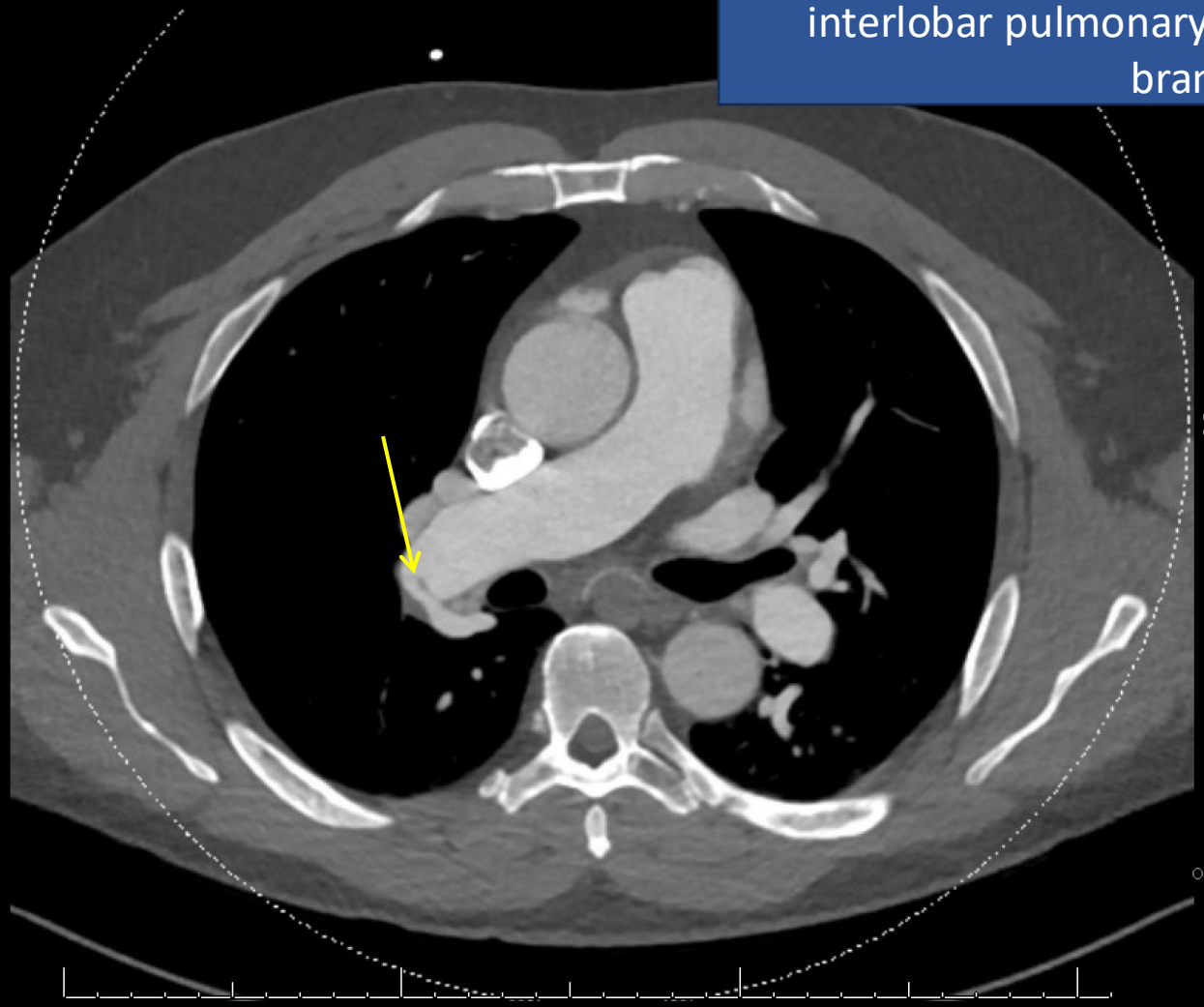
This imaging modality was ordered

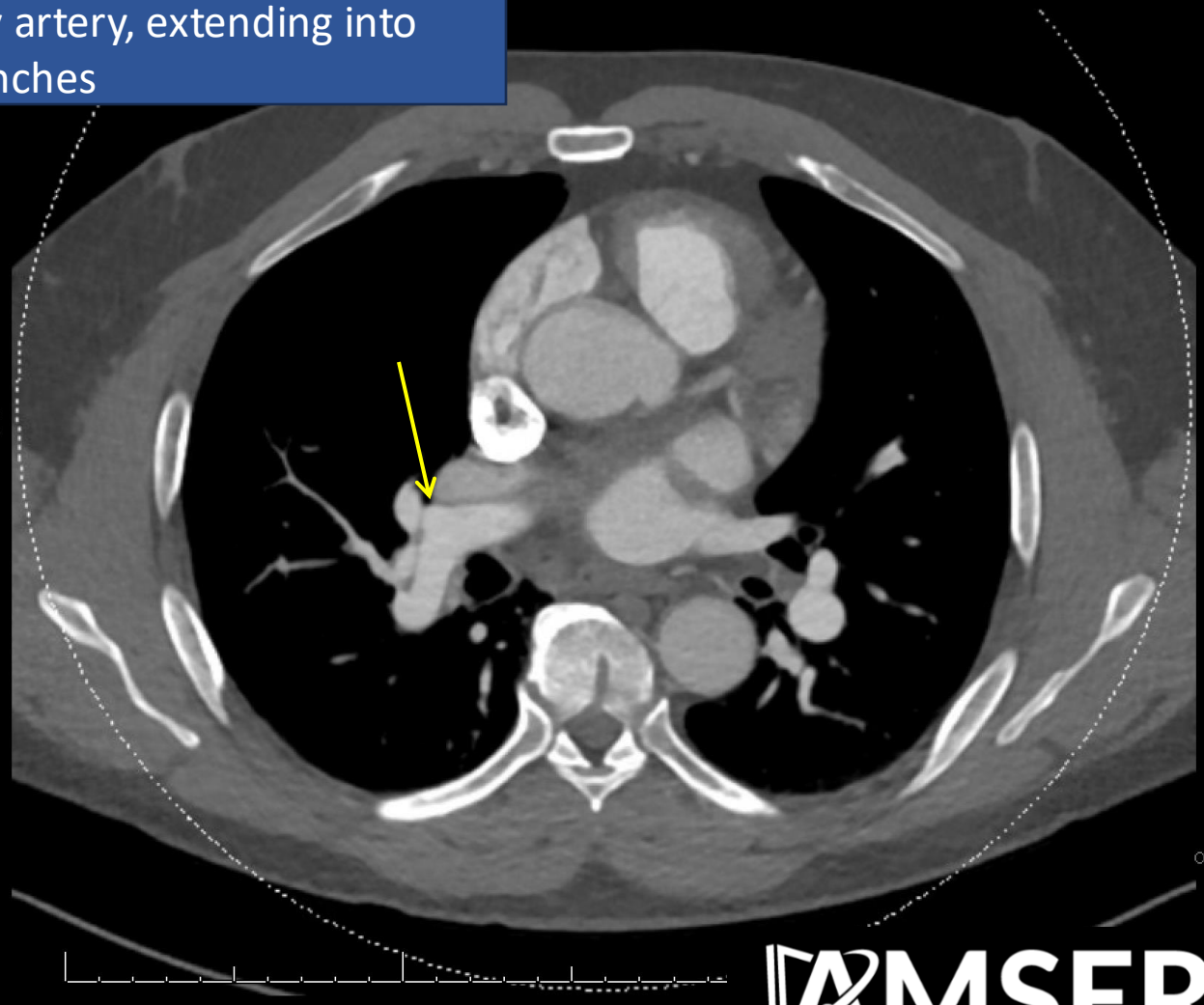
Findings



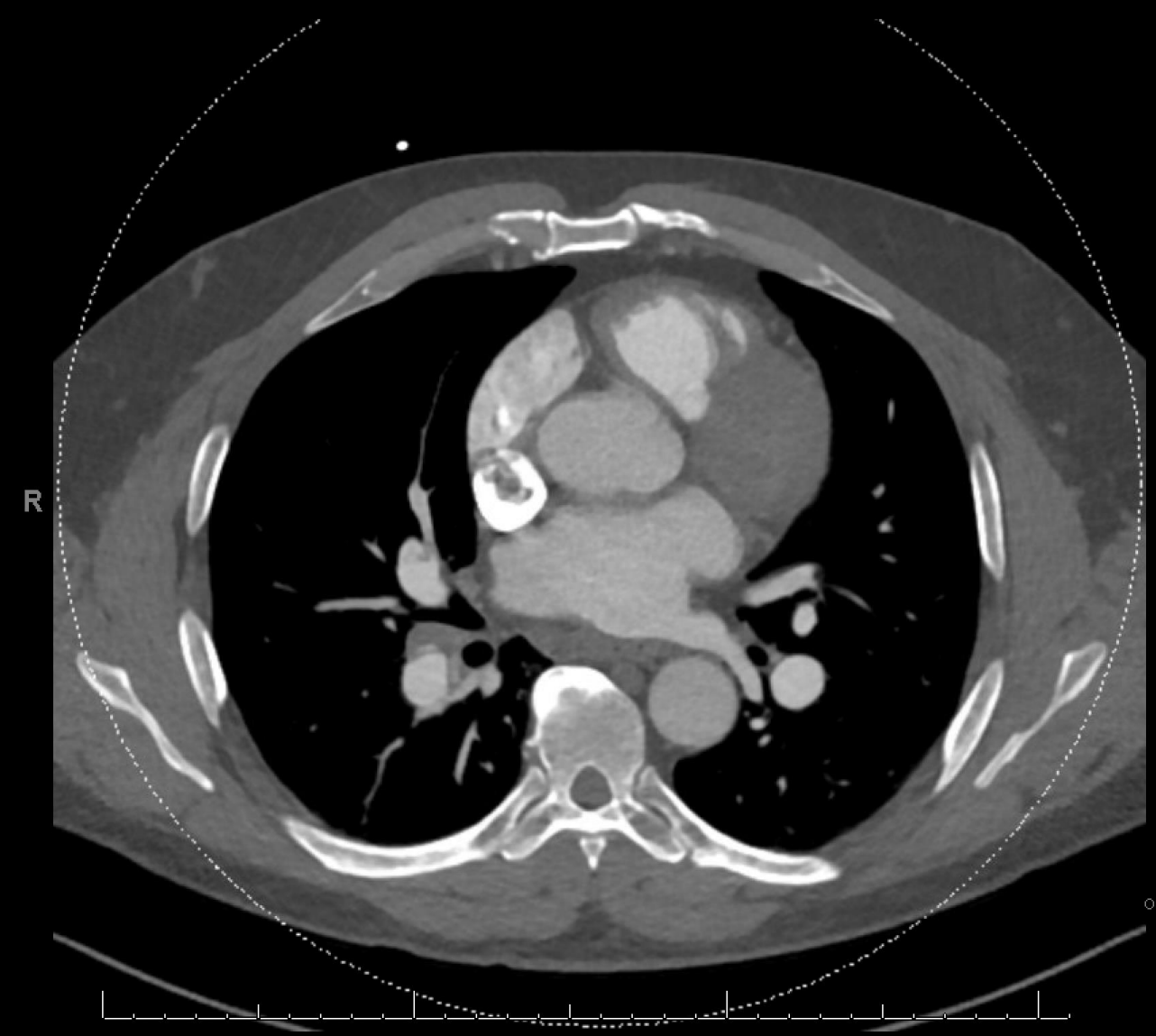
Findings (labeled)

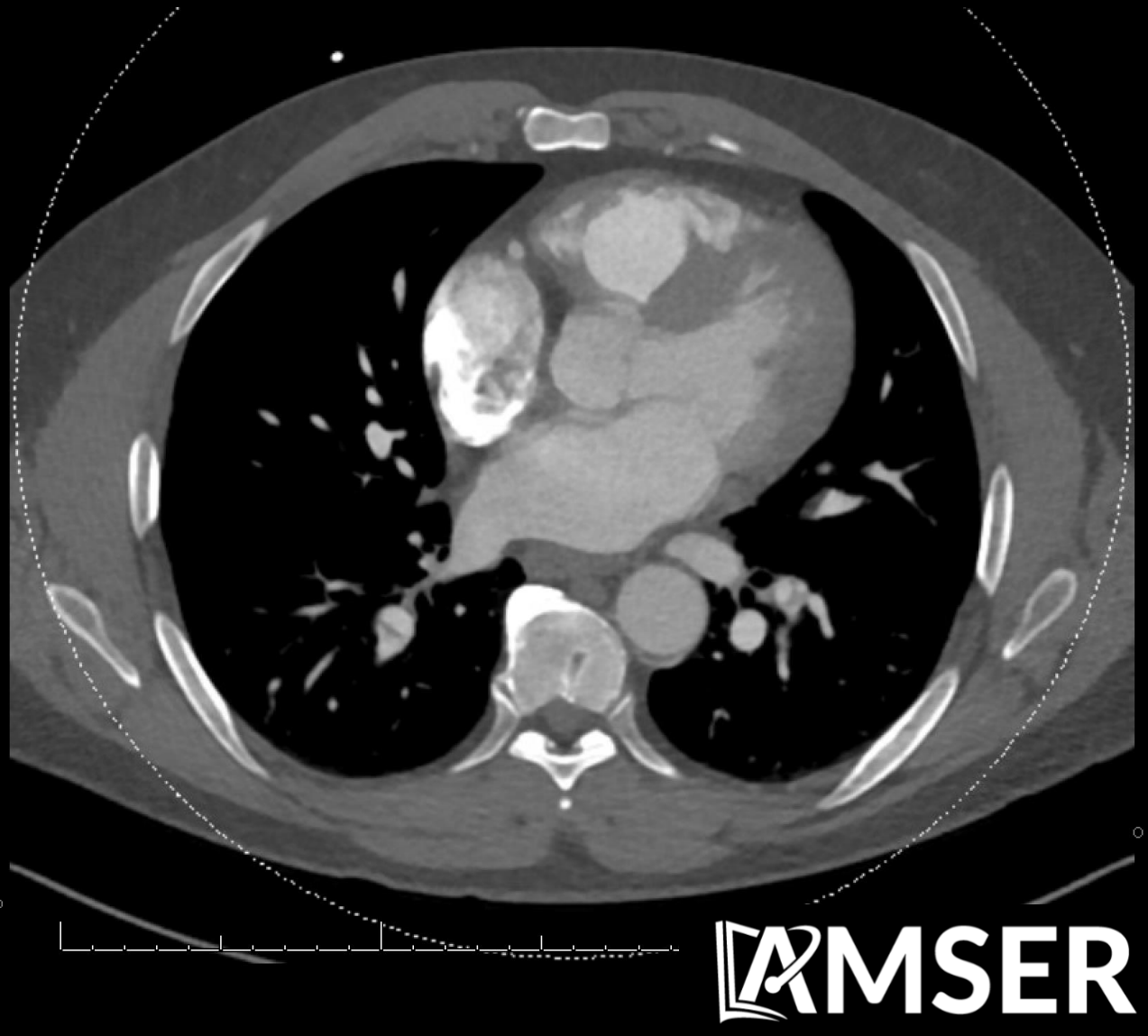
Intraluminal web-like filling defects in distal right interlobar pulmonary artery, extending into branches





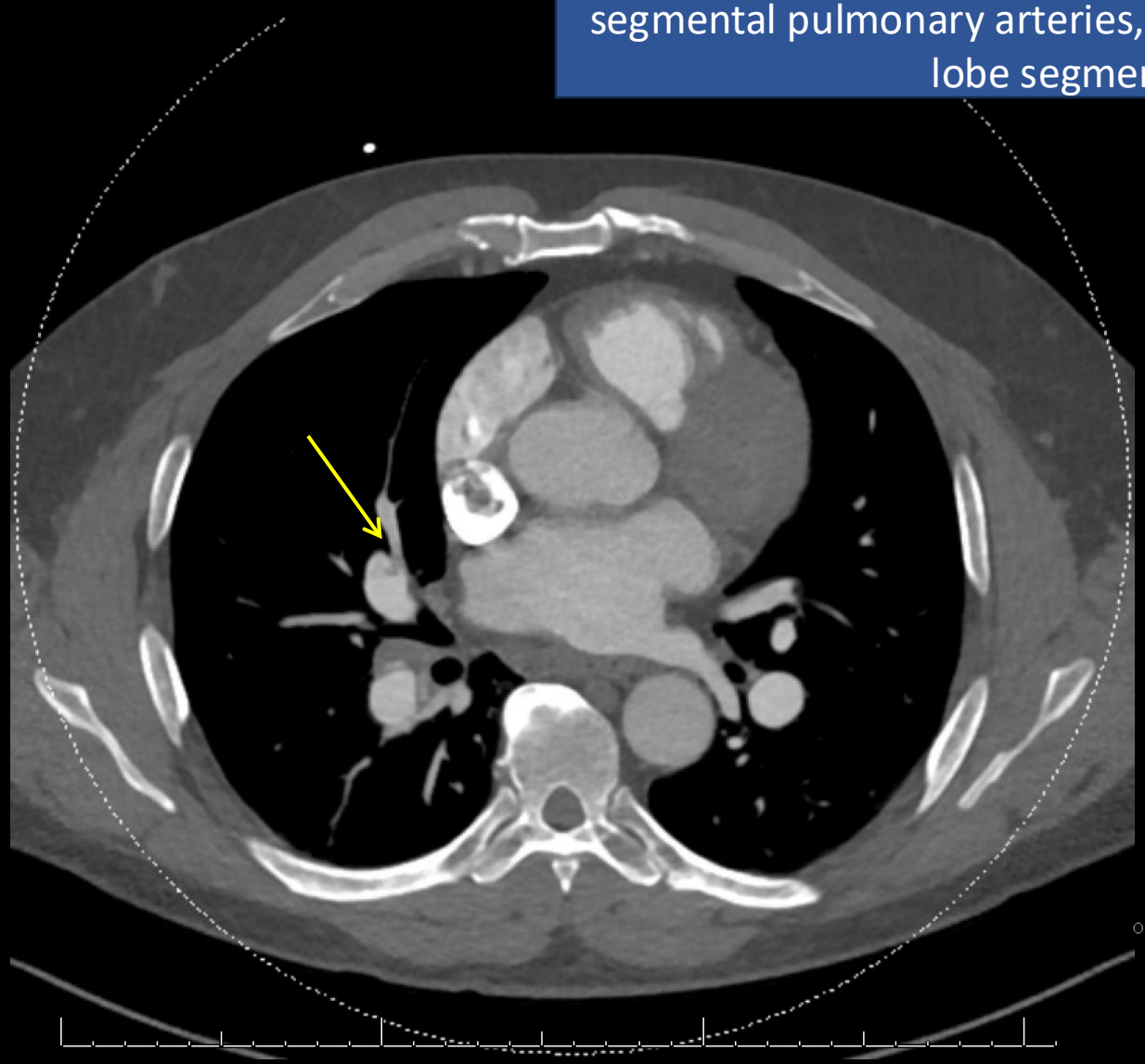
Findings

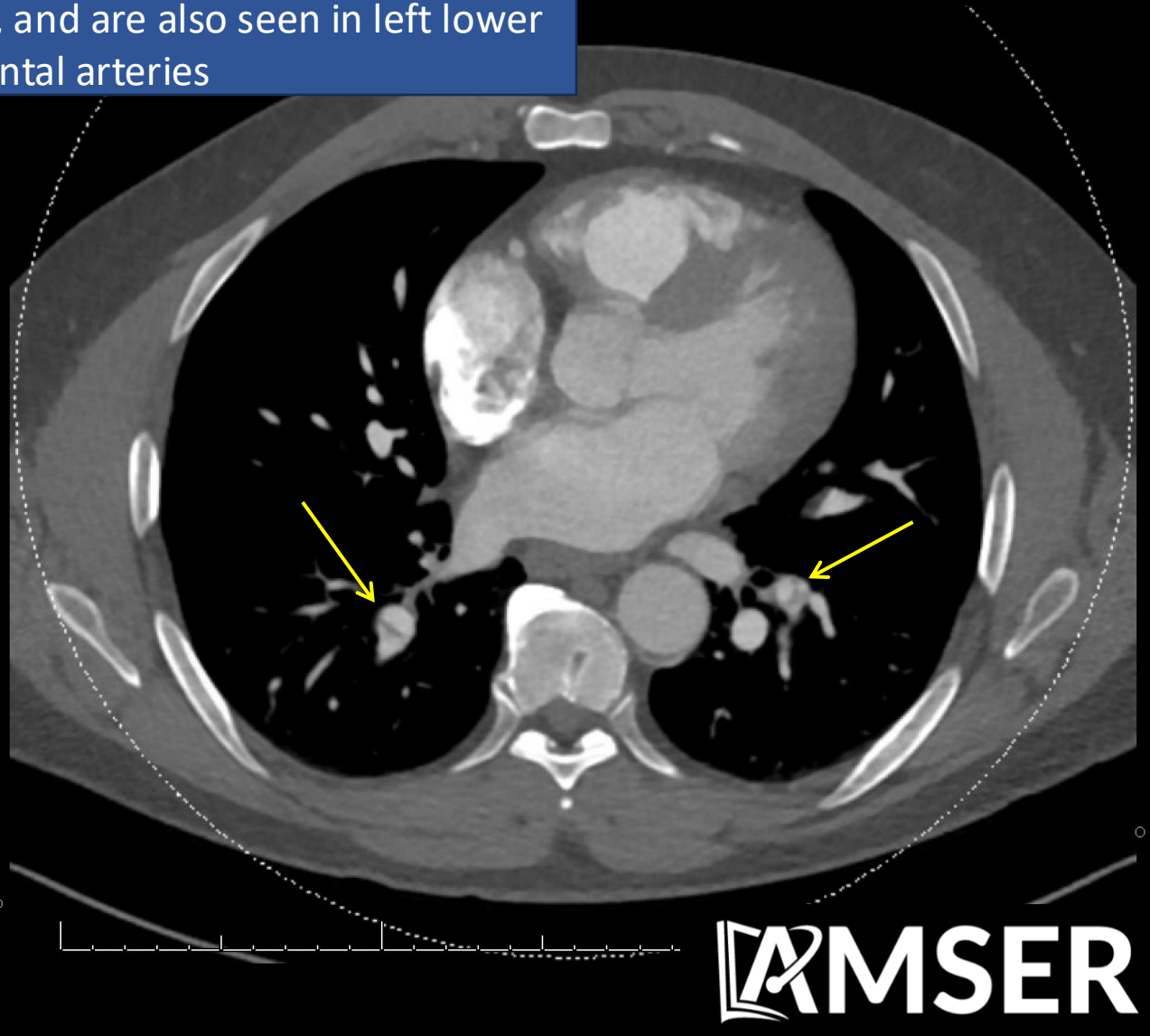




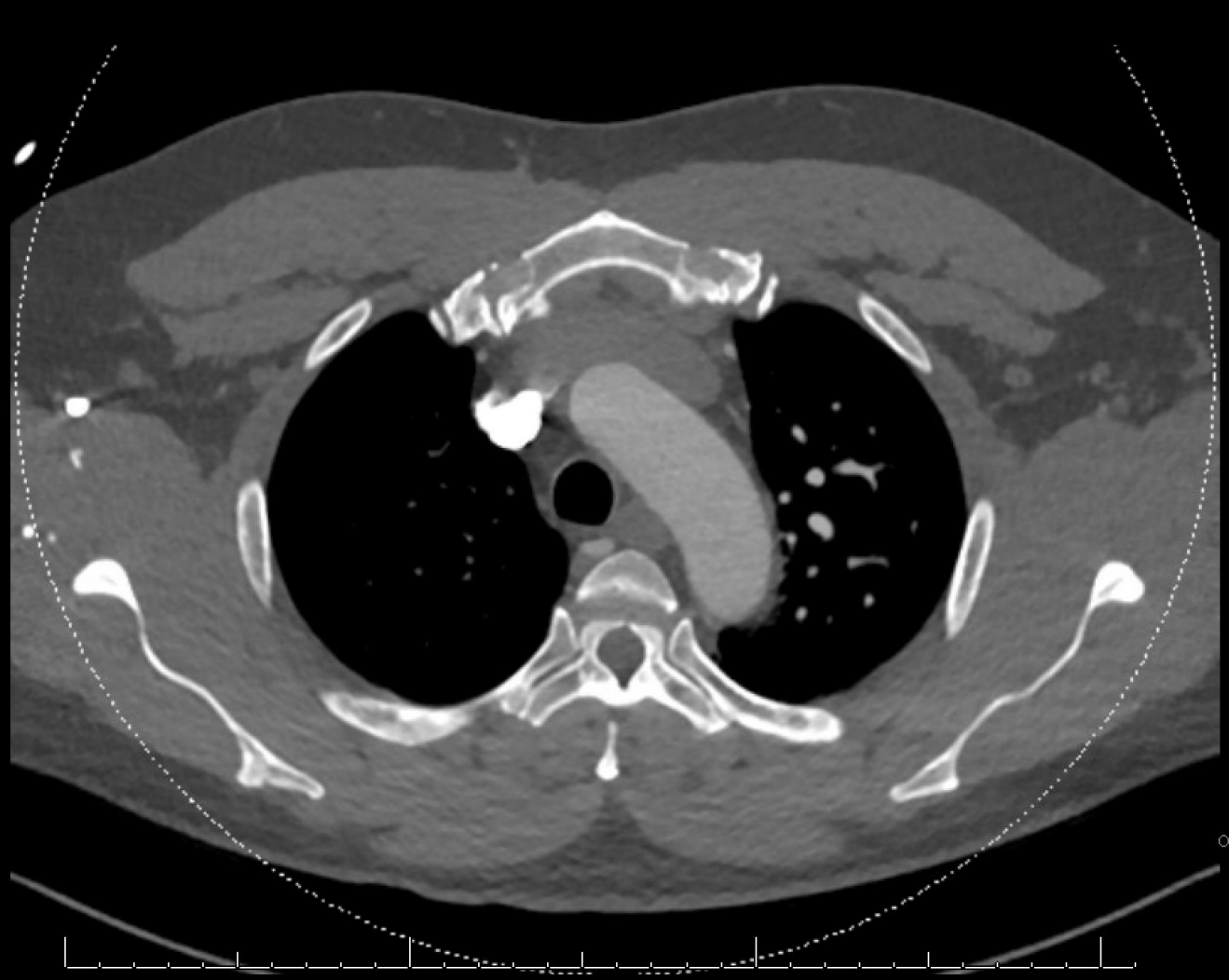
Findings (labeled)

Web-like filling defects continue to extend into right-sided segmental pulmonary arteries, and are also seen in left lower lobe segmental arteries



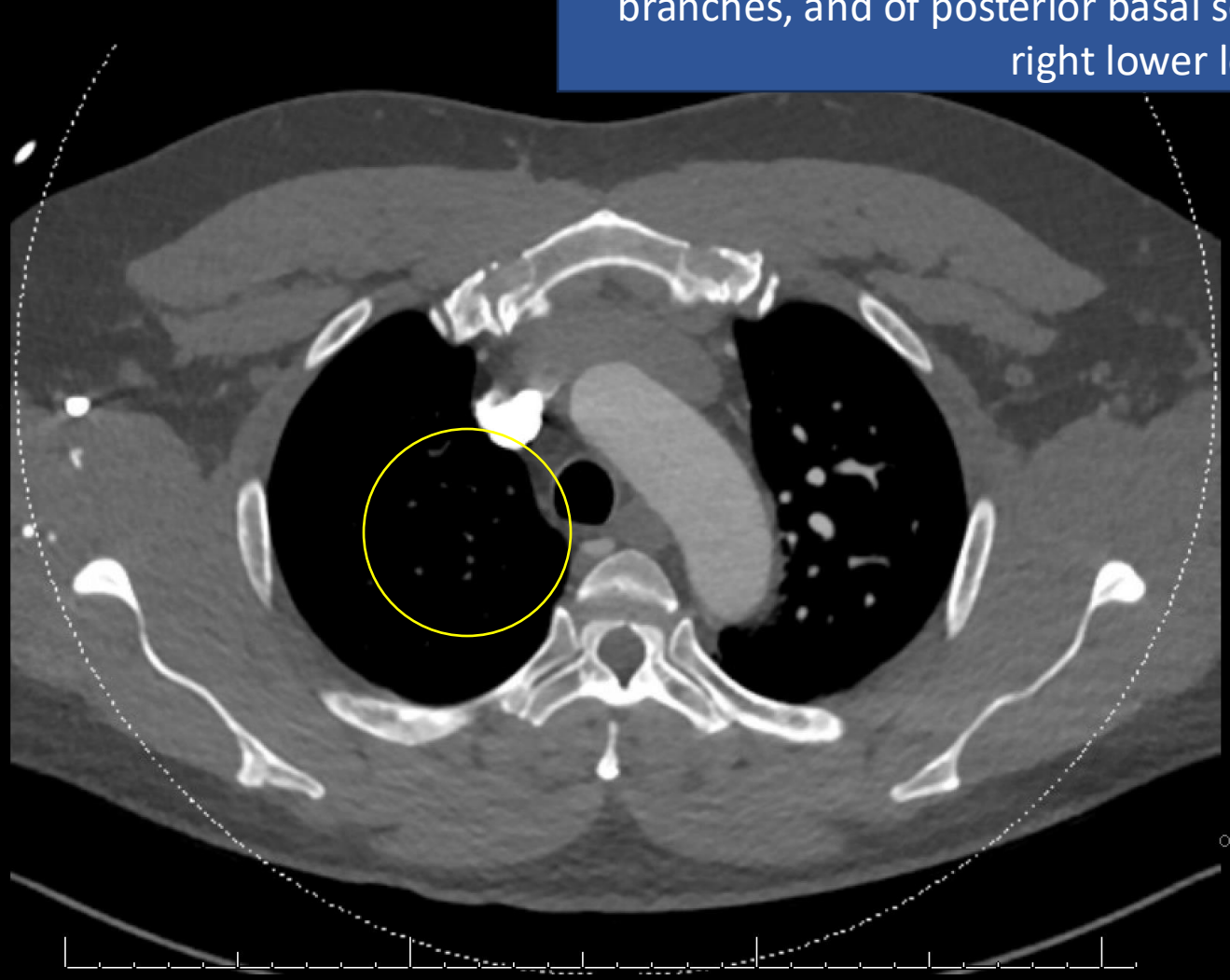


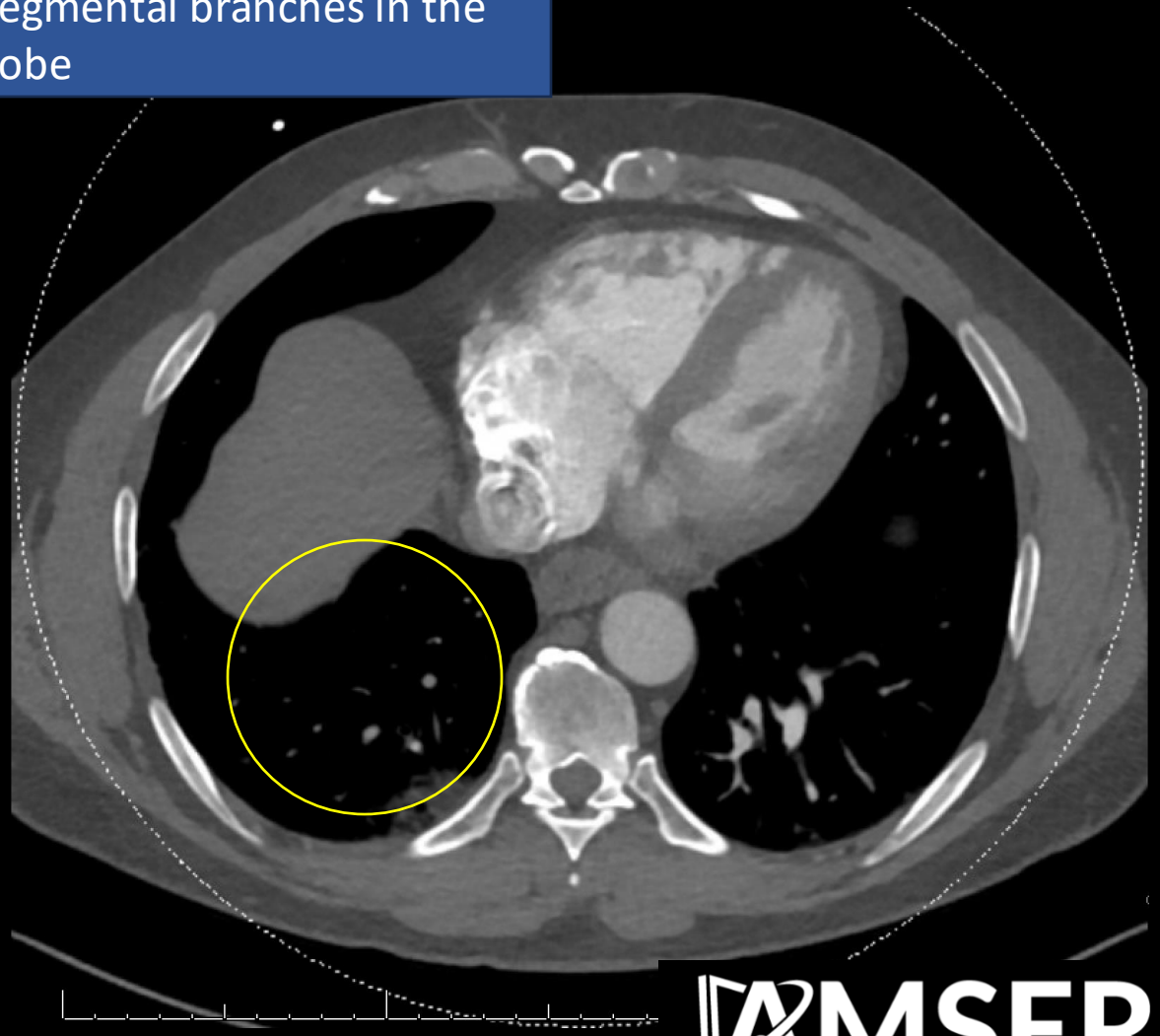
Findings



Findings (labeled)

Contraction of apical right upper lobe pulmonary artery branches, and of posterior basal segmental branches in the right lower lobe





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Findings

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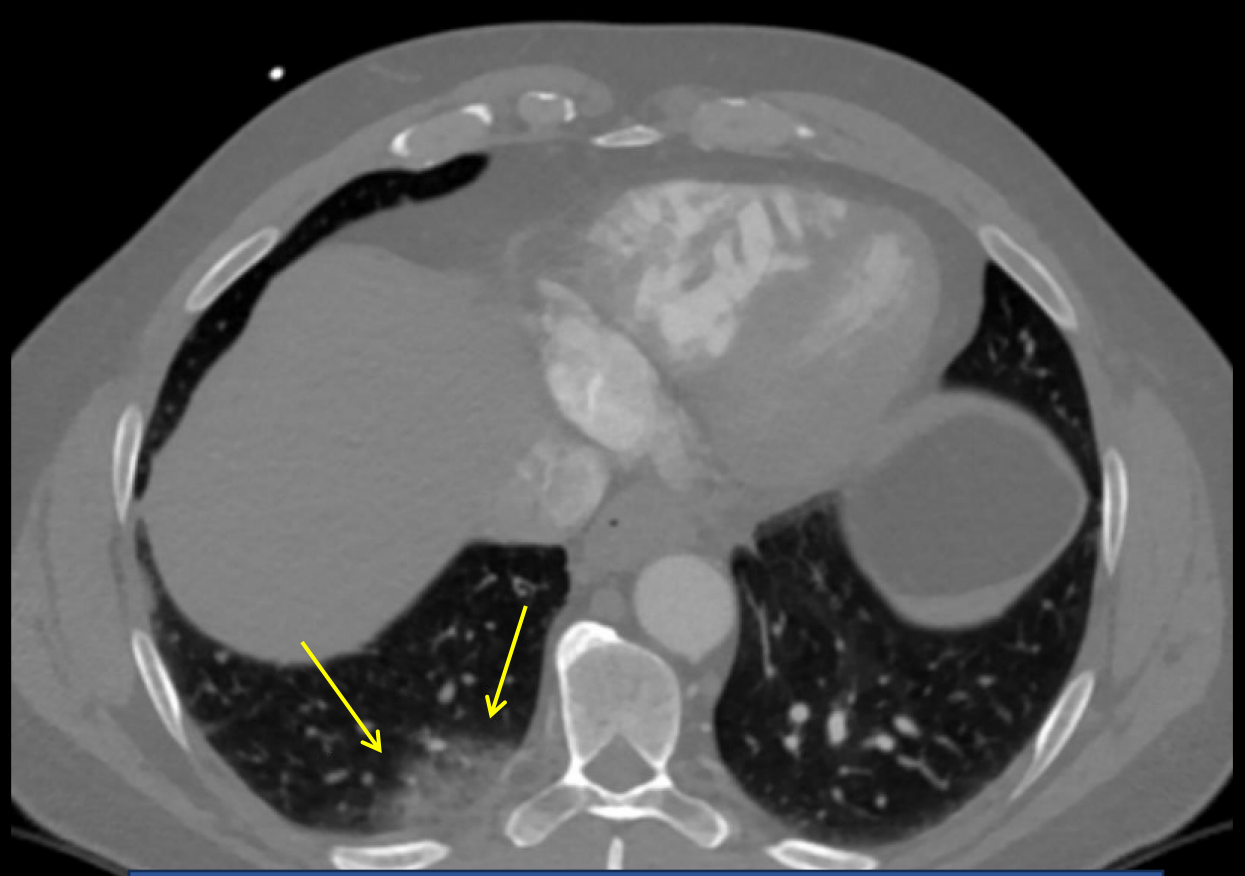
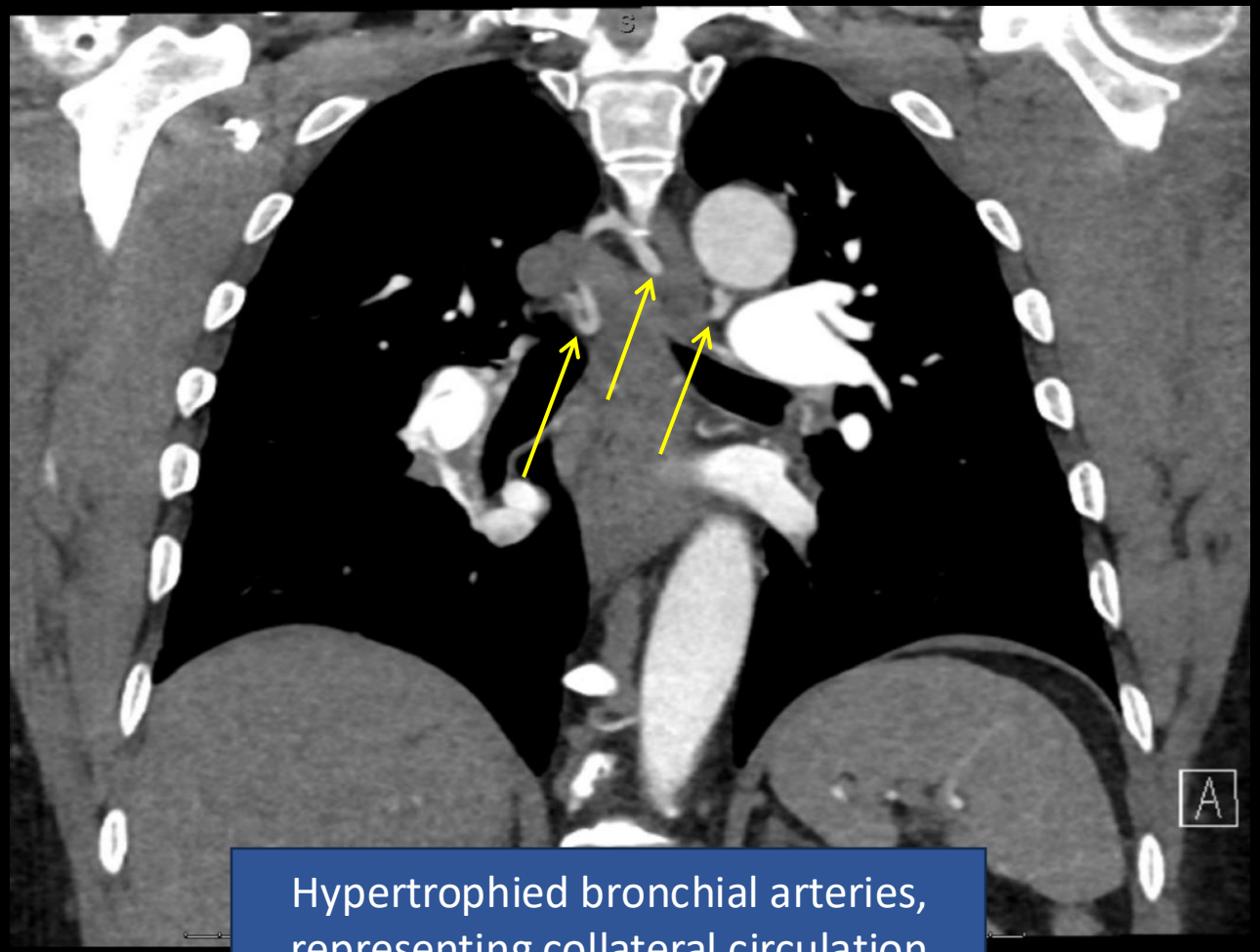
Findings (labeled)

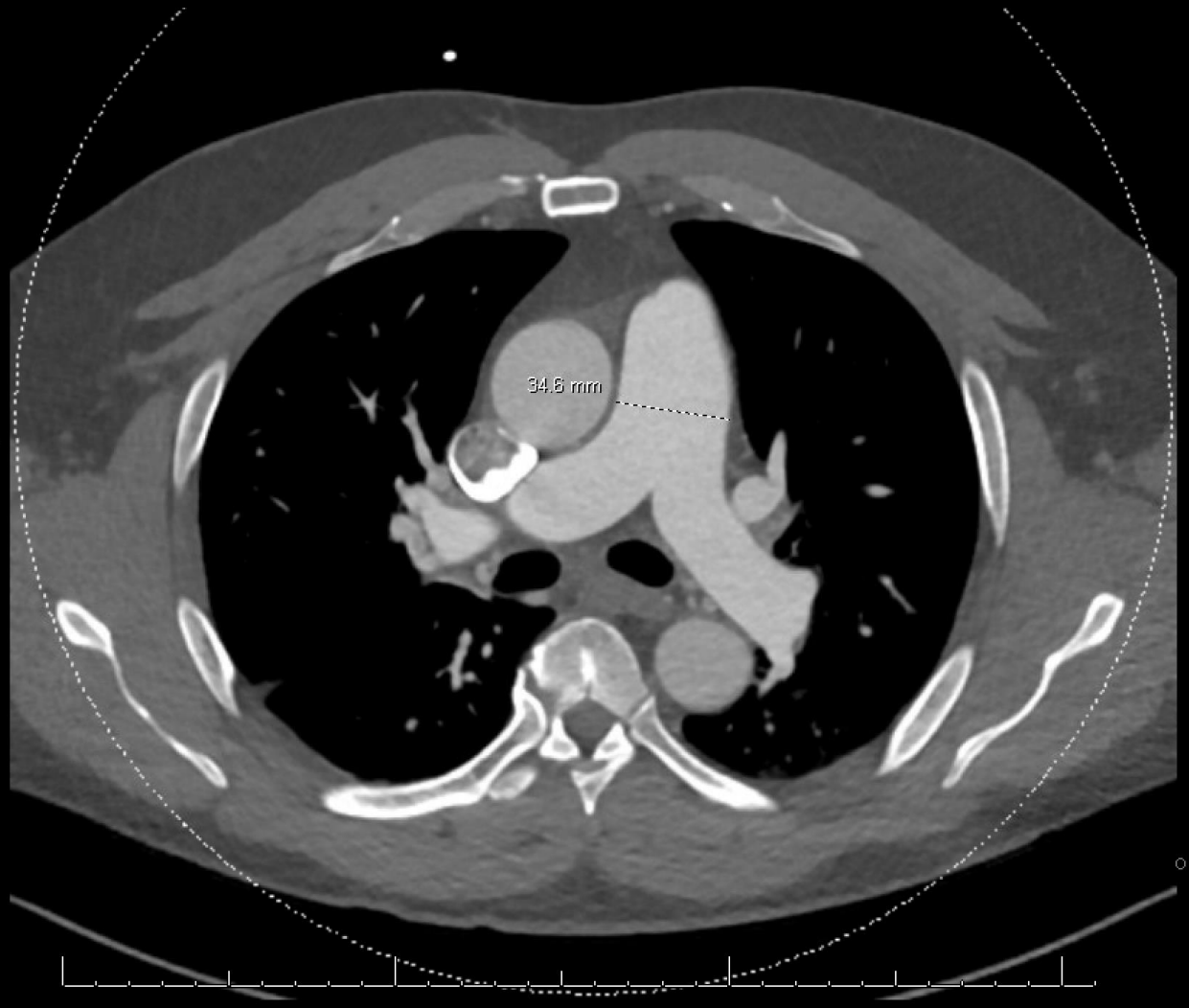


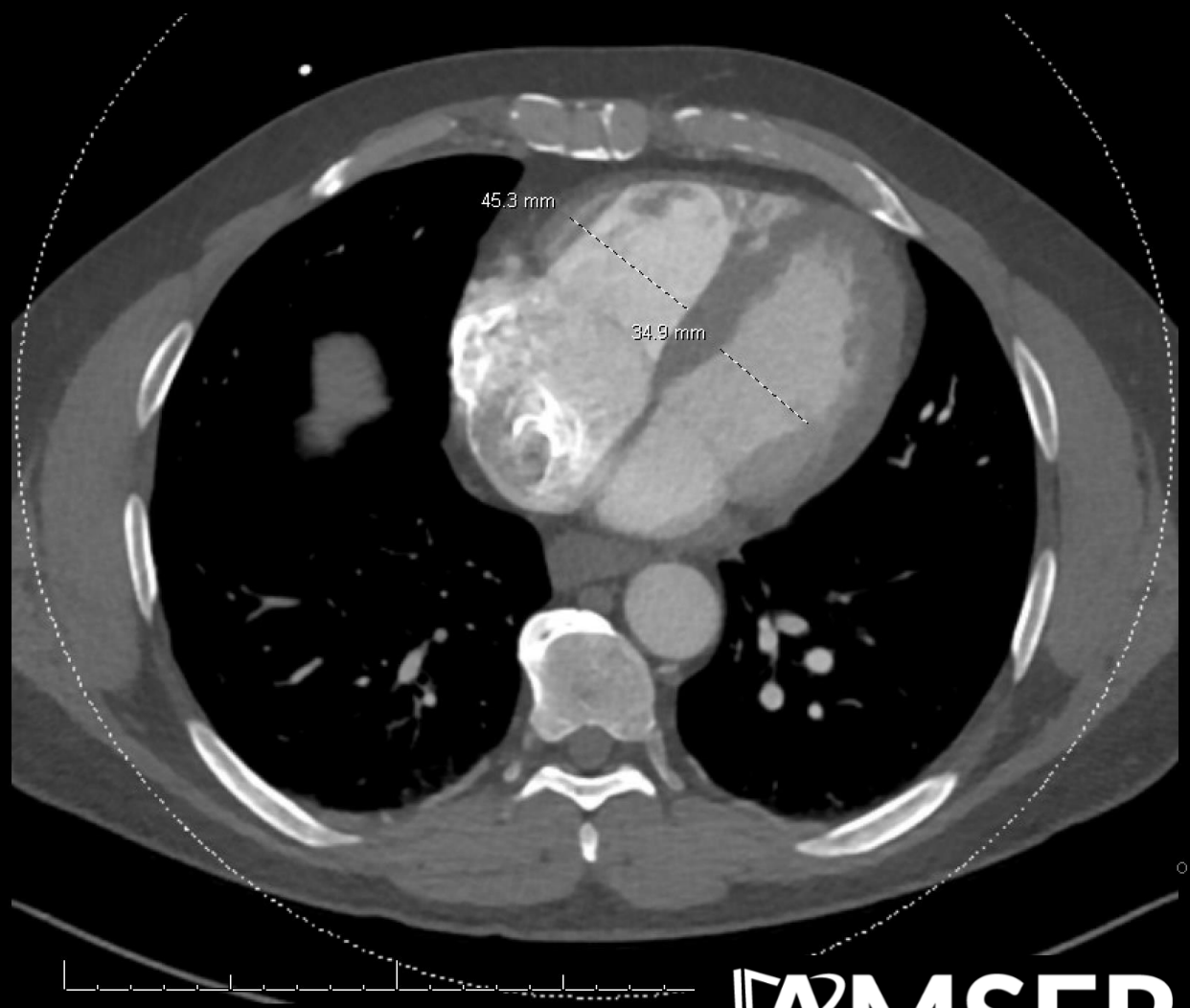
Wedge-shaped area of mixed ground-glass and consolidative opacity possibly representing resolving pulmonary infarct



Hypertrophied bronchial arteries, representing collateral circulation

Findings





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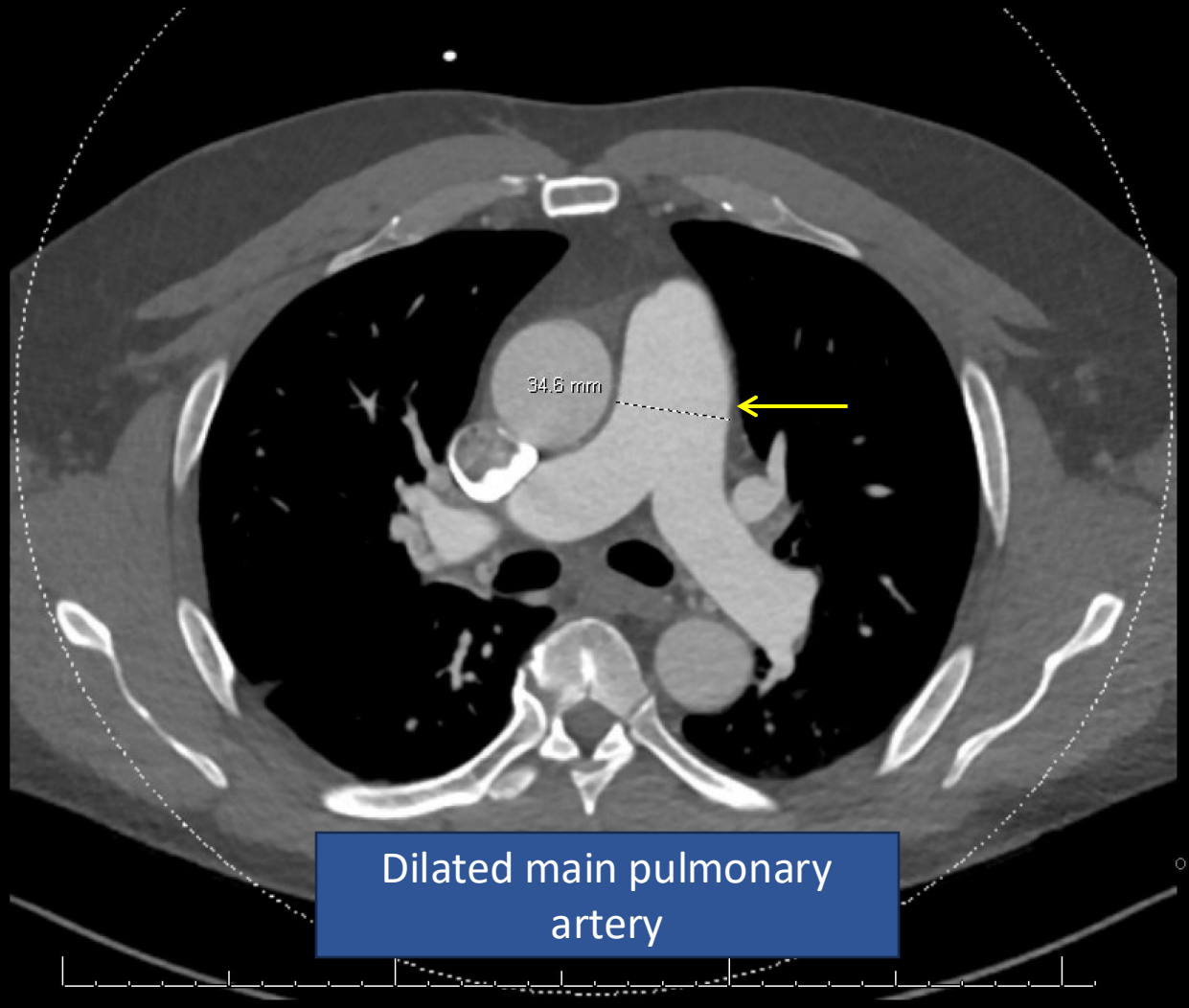
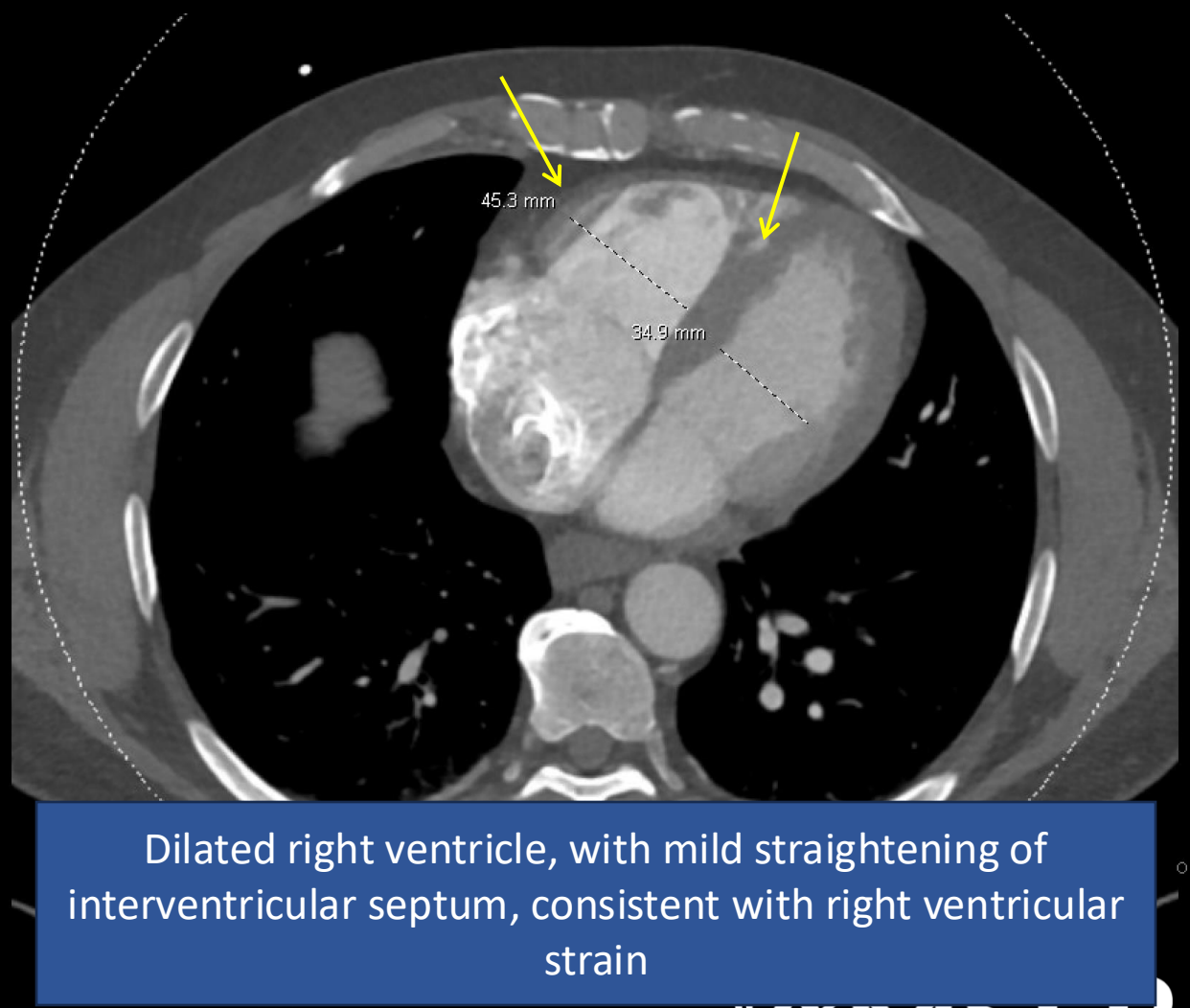
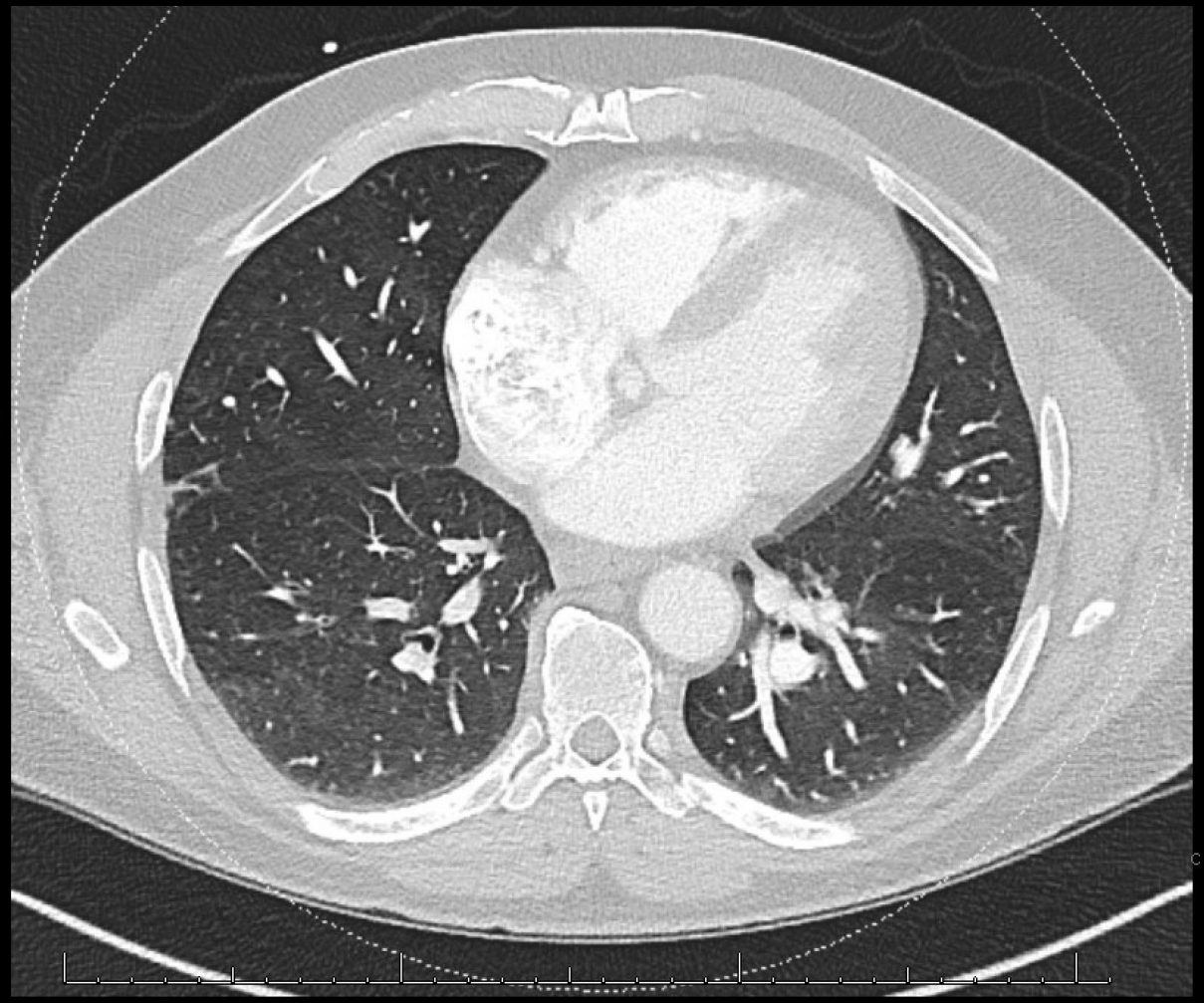


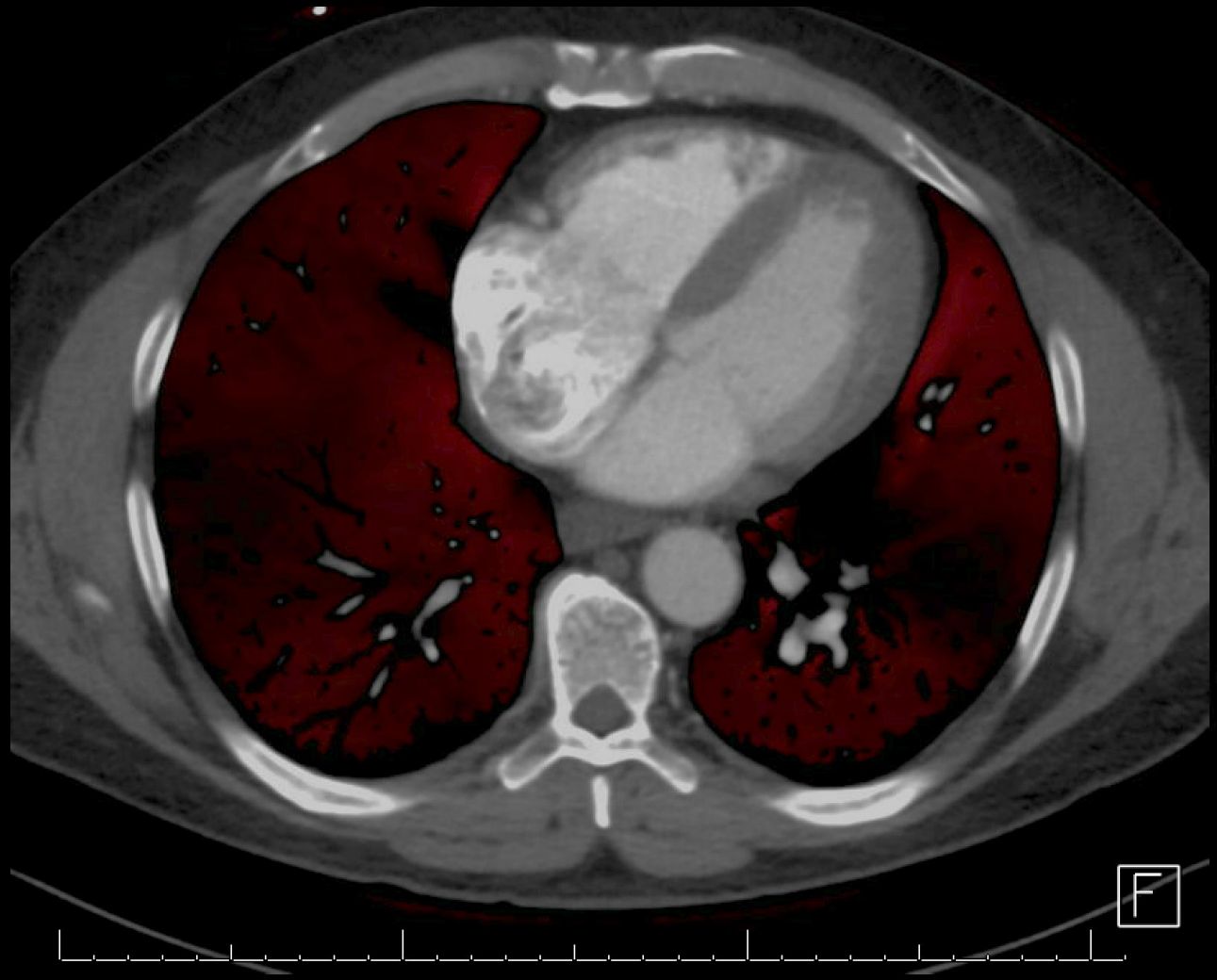
Dilated main pulmonary artery



Dilated right ventricle, with mild straightening of interventricular septum, consistent with right ventricular strain

Findings





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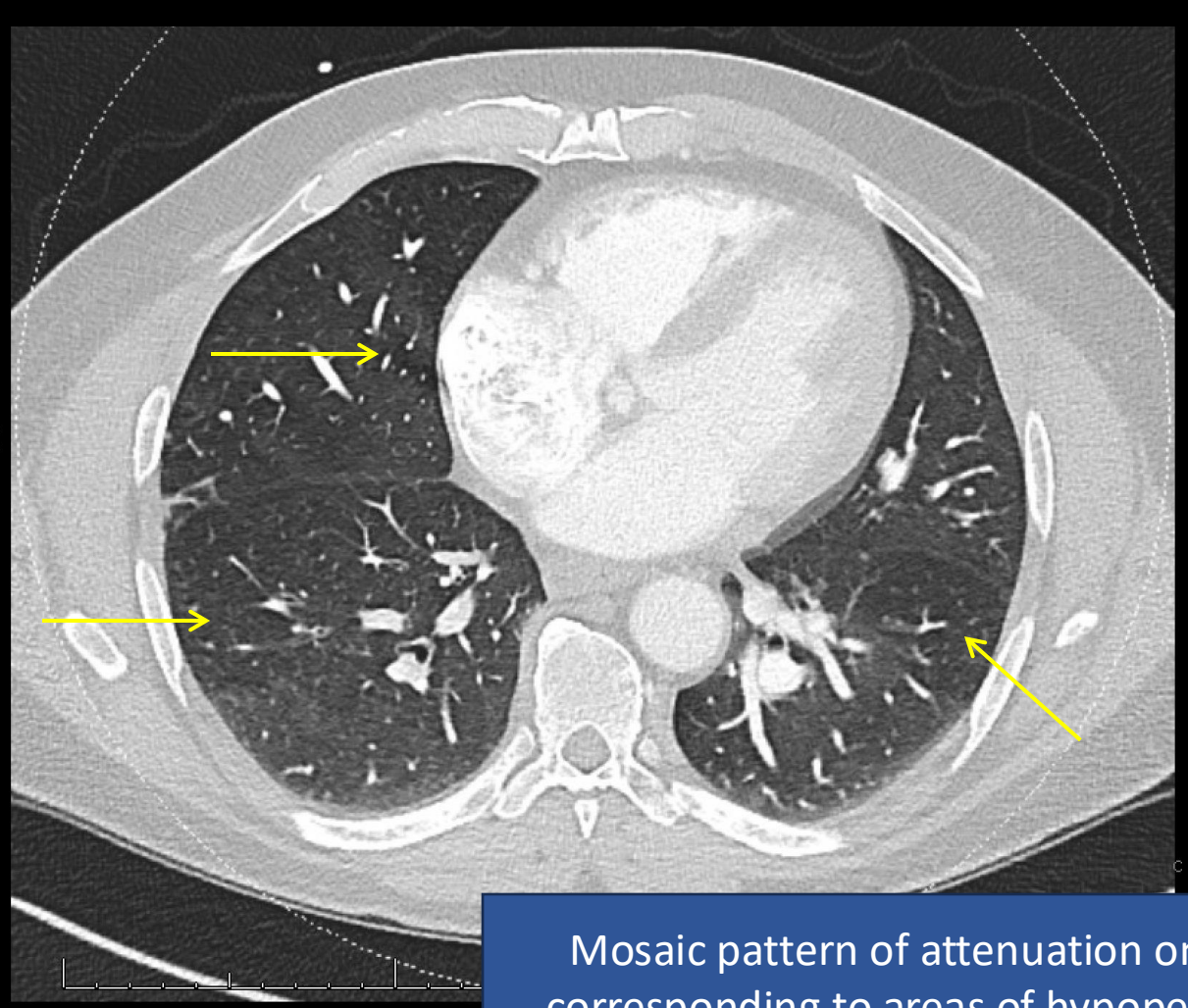

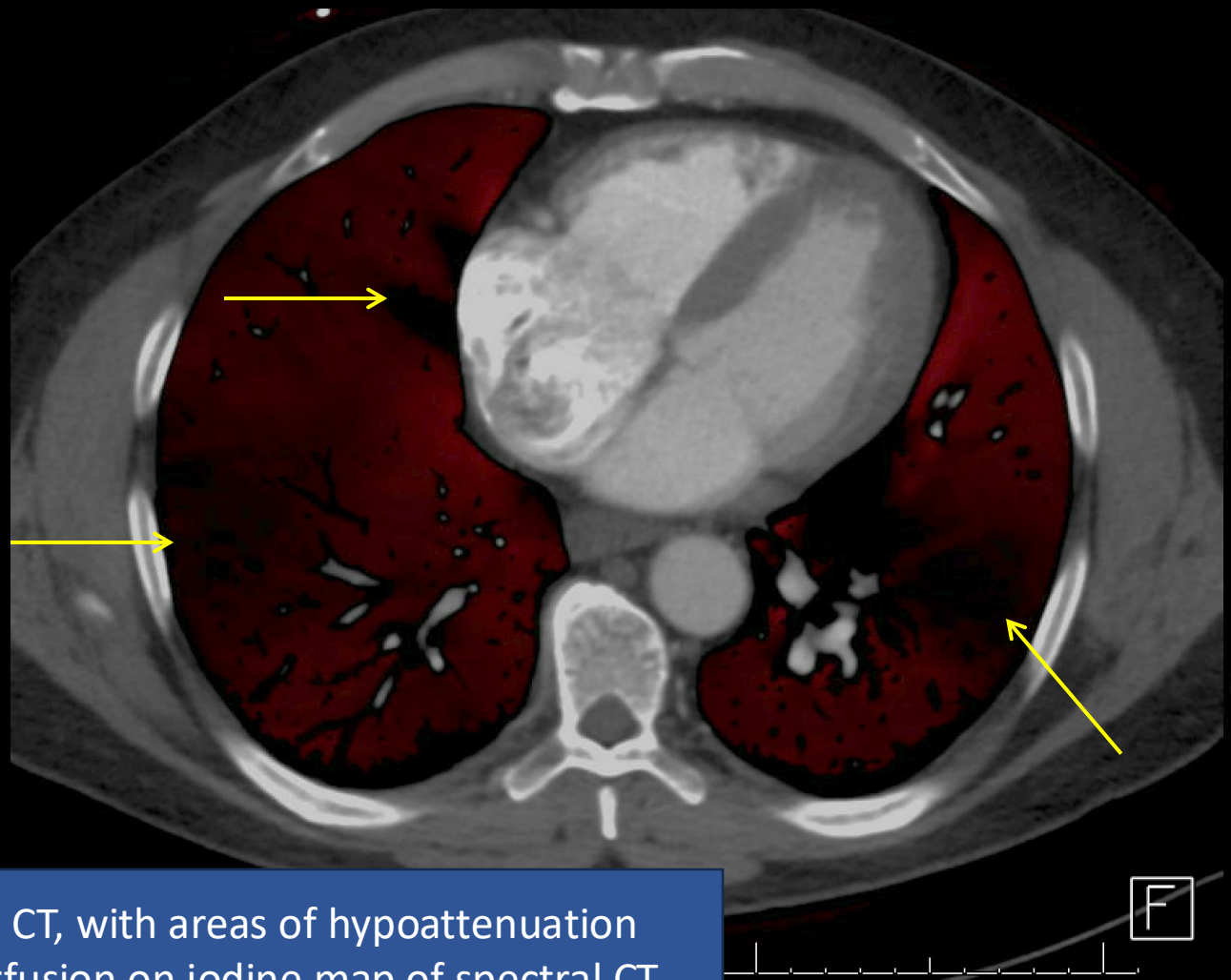

Mosaic pattern of attenuation on CT, with areas of hypoattenuation corresponding to areas of hypoperfusion on iodine map of spectral CT

Findings

Findings (labeled)

Pulmonary blood volume reconstruction on Spectral CT showing peripheral perfusion defects

Final Diagnosis:

Chronic thromboembolic pulmonary hypertension (CTEPH)

Case Discussion

- Etiology and Pathophysiology[3,4]
  - Pulmonary hypertension: increased pulmonary arterial pressure (>20mmHg mean PA pressure at rest as measured by right heart catheterization)
  - Grouped by underlying etiology: group 4 (which includes CTEPH) is secondary to pulmonary artery obstruction
  - CTEPH: recurrent thromboembolic deposition leads to vascular remodeling that increases pulmonary artery resistance and eventually causes obliteration
  - This causes right heart strain secondary to persistently elevated pulmonary arterial pressures, and ultimately may progress to right heart failure
- Epidemiology[4,5]
  - CTEPH occurs in < 5% of patients who have a history of acute PE and may be higher in those with recurrent VTE history, but true incidence is uncertain
  - 10% of cases do involve patients without known PE history

Case Discussion

- Clinical Presentation[1,2,4]
  - Nonspecific clinical findings or asymptomatic initially
  - Late disease progression: signs and symptoms of right ventricular failure, with associated pulmonary edema, hypoxemia, and systemic fluid overload
- Diagnosis and Imaging[1,2,4,6]
  - Characterize with CTPA, V/Q scan (or SPECT-CT), and echocardiogram
    - Dilation of proximal pulmonary artery, with eccentric thrombi and intraluminal filling defects and bands/webs, and contraction/obliteration distally
    - Lungs show mosaic hypoattenuation in areas of low perfusion, with signs of chronic hypoperfusion (bronchial artery collateralization, infarcts)
    - Heart shows right ventricular strain (dilation, thick walls)
  - Ultimately, right heart catheterization for definitive confirmation of pressures
  - Imaging differential: in situ thrombosis, pulmonary artery sarcoma, fibrosing mediastinitis, pulmonary vasculitis, sarcoidosis

Case Discussion

- Management[2,4,5]
  - Lifelong anticoagulation to prevent continued thromboembolism and halt disease progression
  - Followed preferably by pulmonary thromboendarterectomy if operable
    - Technically complex procedure, 30% are not candidates
  - Alternative option is balloon pulmonary angioplasty
  - Adjuvant medication management with pulmonary hypertension agents such as riociguat (guanylate cyclase stimulator causing vasodilation)
- Prognosis[5]
  - Endarterectomy may be curative (up to 90% of cases) as long as underlying thromboembolic disease is addressed to prevent recurrence
  - If untreated, poor prognosis with inevitable progression to right heart failure in most cases and poor 3-year mortality

Case Resolution

- This patient
  - Patient underwent right heart catheterization with cardiology, which did confirm elevated pulmonary arterial pressures consistent with pulmonary hypertension
  - Additionally, pulmonary arterial angiography confirmed bilateral chronic thromboembolic disease consistent with CTEPH
- Next steps
  - Patient will be assessed for candidacy for thromboendarterectomy versus pulmonary angioplasty
  - Will proceed with anticoagulation and riociguat in the meantime

References:

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