

# AMSER Case of the Month January 2024

25 y/o M with 3-month history of facial and neck swelling

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# Patient Presentation

- **HPI:** 25 y/o M patient with 3-month history of facial/ neck swelling, **new headache, dizziness**
- **PMHx:** obesity, asthma, OSA, GERD, recent wisdom tooth extraction
- **PSHx:** remote inguinal hernia repair + tonsillectomy/ adenectomy
- **Physical Exam:**
  - Diffuse facial/ neck edema, tachycardia
  - No upper extremity edema
- **Vitals:**
  - HR 102
  - BP 173/101
  - T: 97.9F
  - Resp 20
  - SpO2 97%
- **Recent Labs (Outpatient):**
  - Positive ANA
  - Elevated CRP + ESR
  - 3+ proteinuria and hematuria

# What Imaging Should be Ordered?

- Concern for SVC syndrome / thrombophlebitis

POCUS internal jugular vein performed in ED

**American College of Radiology  
ACR Appropriateness Criteria®  
Suspected Upper-Extremity Deep Vein Thrombosis**

**Variant 1:** Suspected upper-extremity deep vein thrombosis. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US duplex Doppler upper extremity	Usually Appropriate	○
CTV upper extremity with IV contrast	May Be Appropriate	☢☢☢☢
MRV upper extremity without and with IV contrast	May Be Appropriate	○
MRV upper extremity without IV contrast	May Be Appropriate	○
Catheter venography upper extremity	Usually Not Appropriate	☢☢☢
Nuclear medicine venography upper extremity	Usually Not Appropriate	☢☢☢
Radiography chest	Usually Not Appropriate	☢

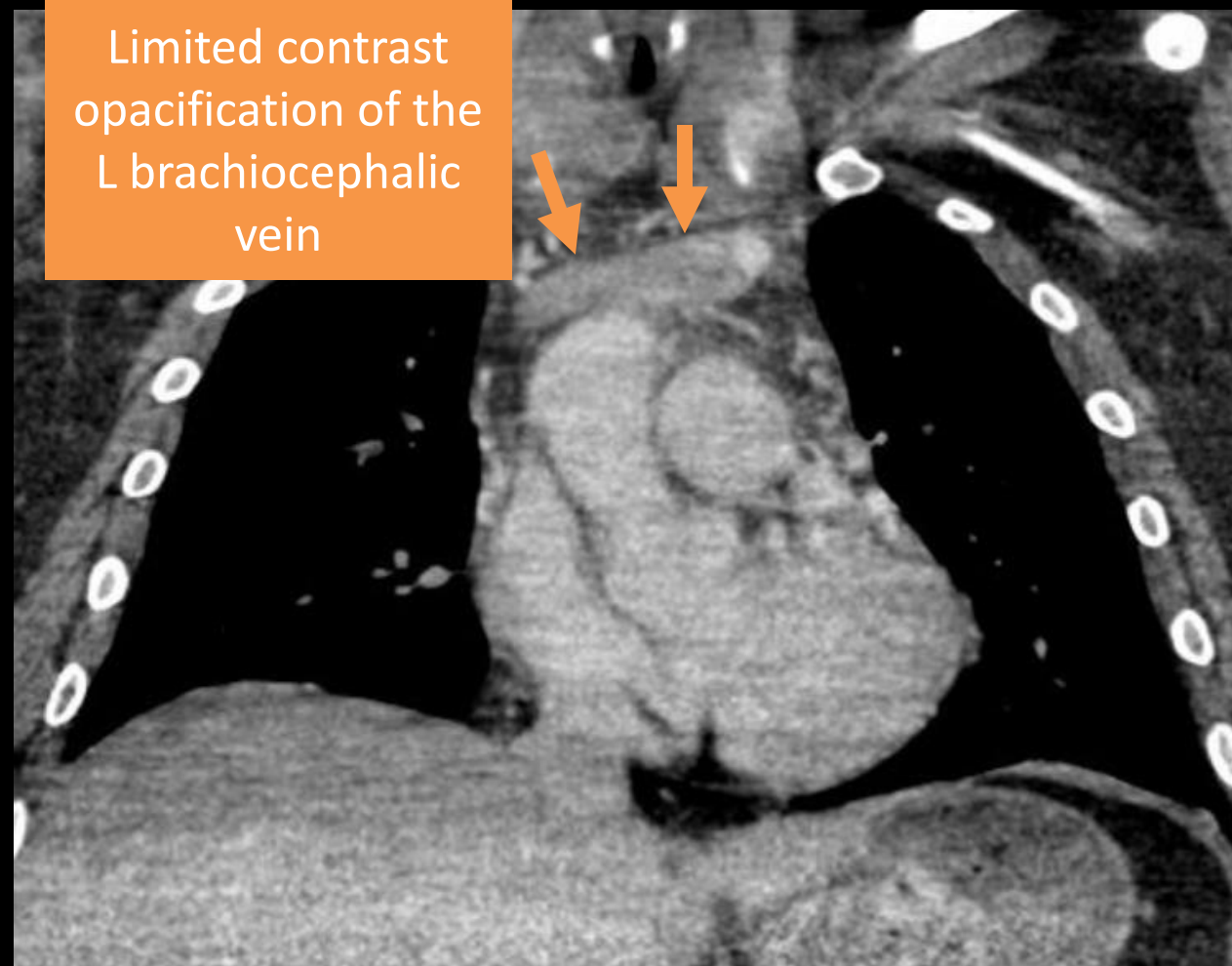
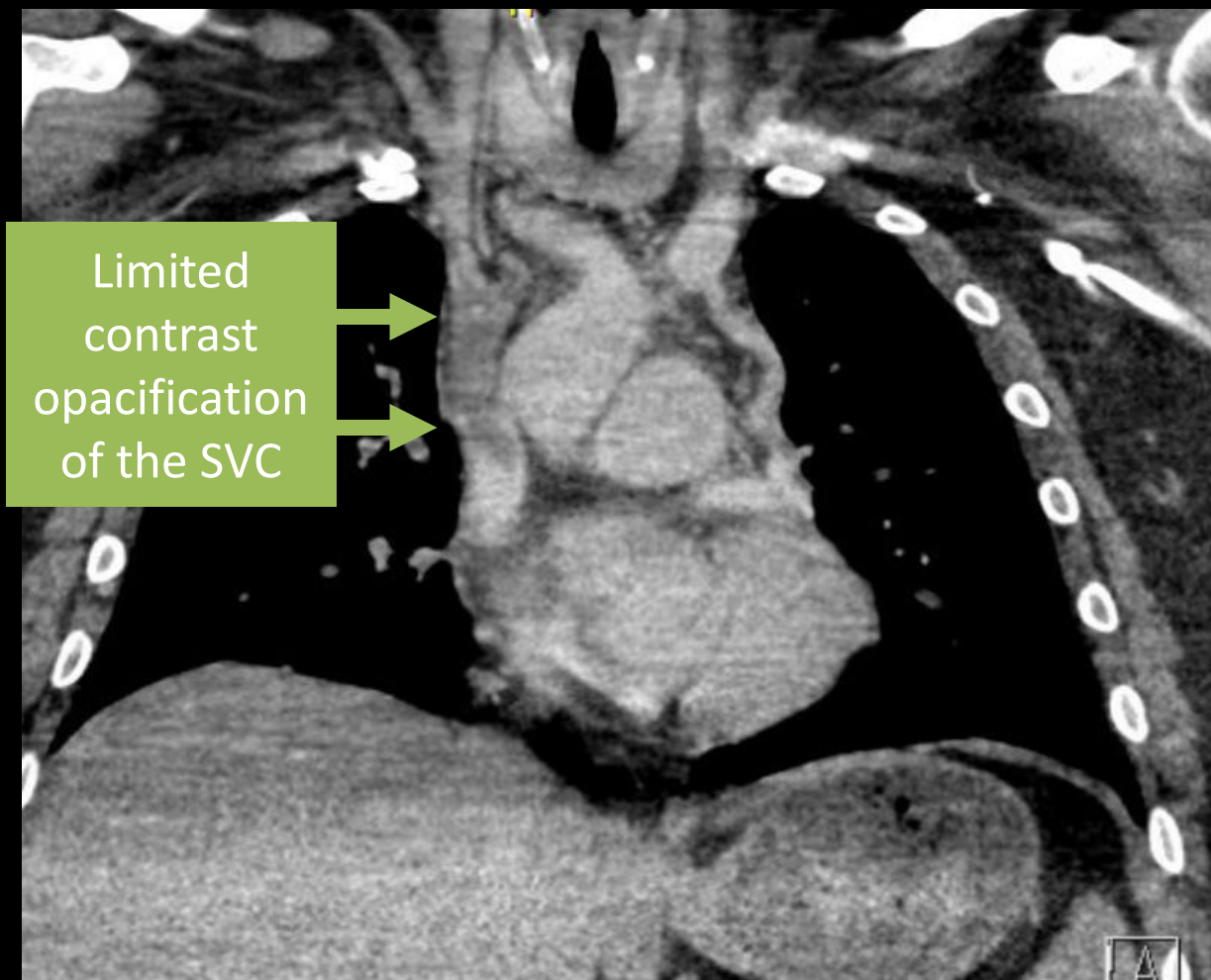
“Delayed imaging to 90 to 120s can permit evaluation of the central veins. Used to assess the jugular veins, brachiocephalic veins, and the superior vena cava”

# Findings (Unlabeled)



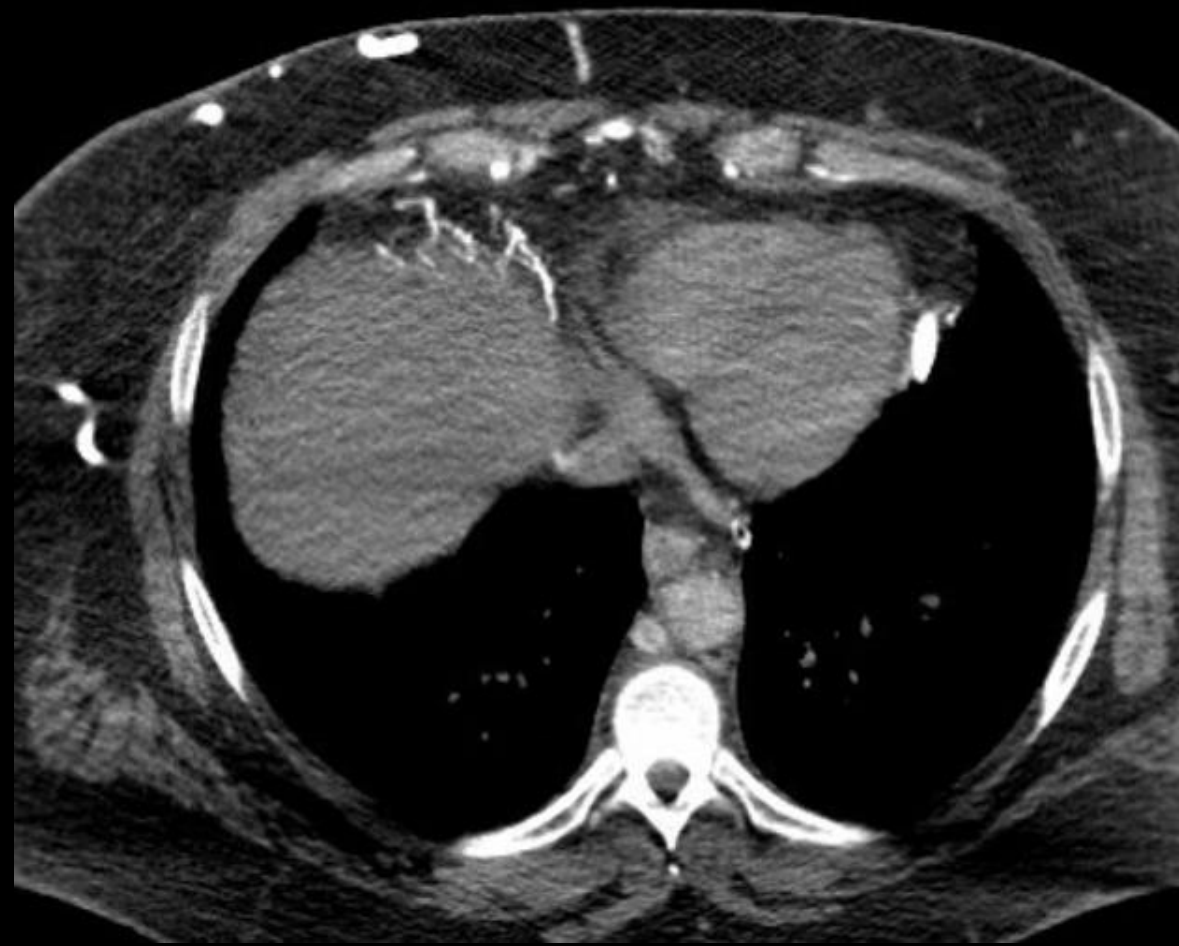
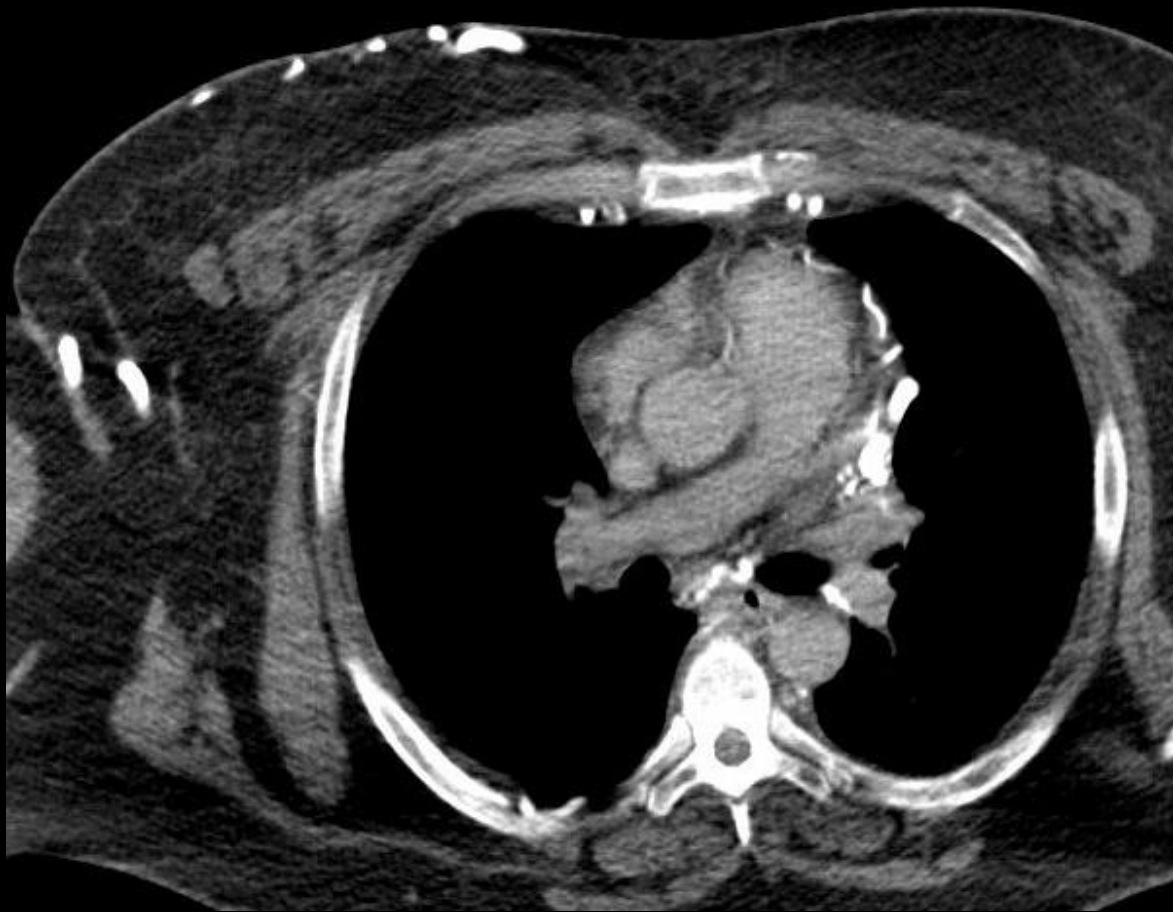
CT chest with IV contrast : 90 s delay

# Findings (Labeled)



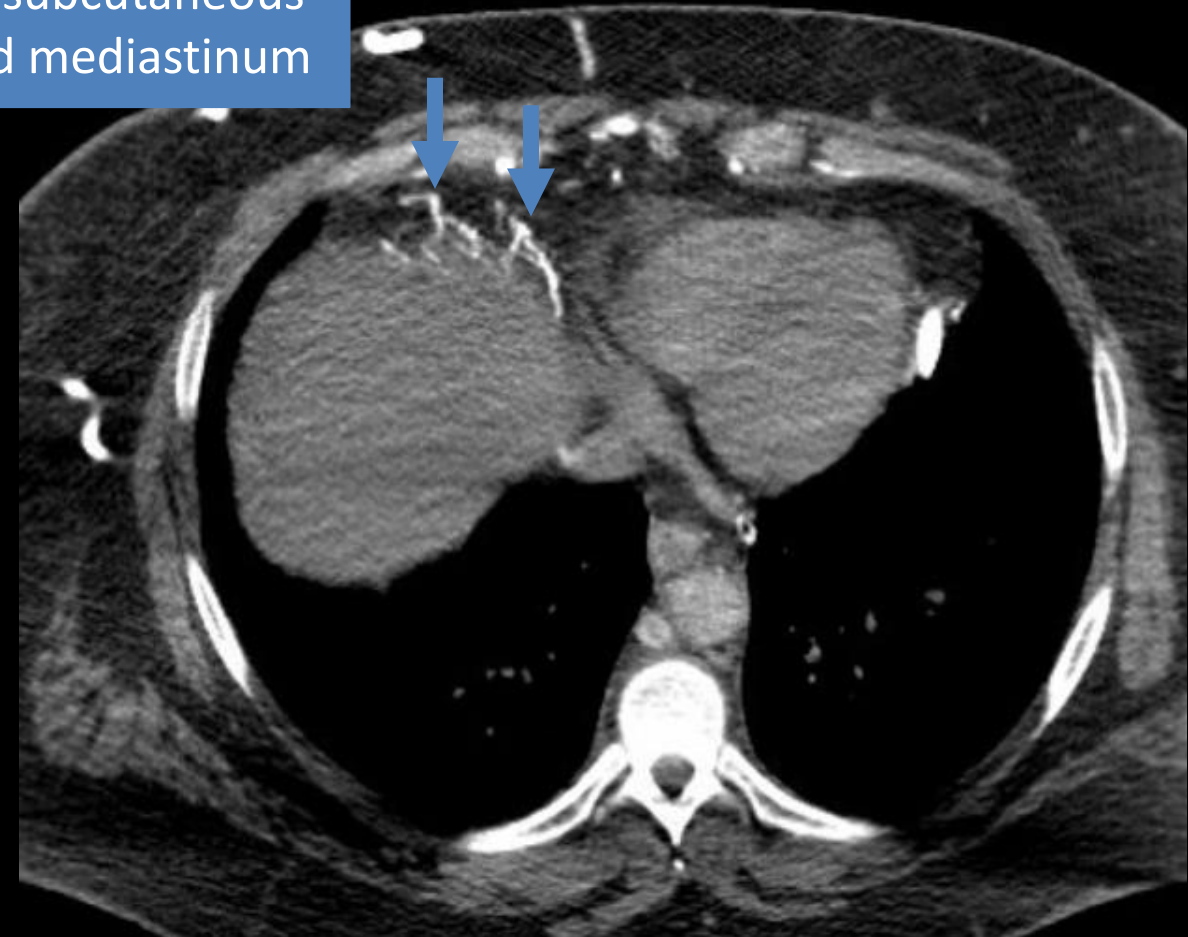
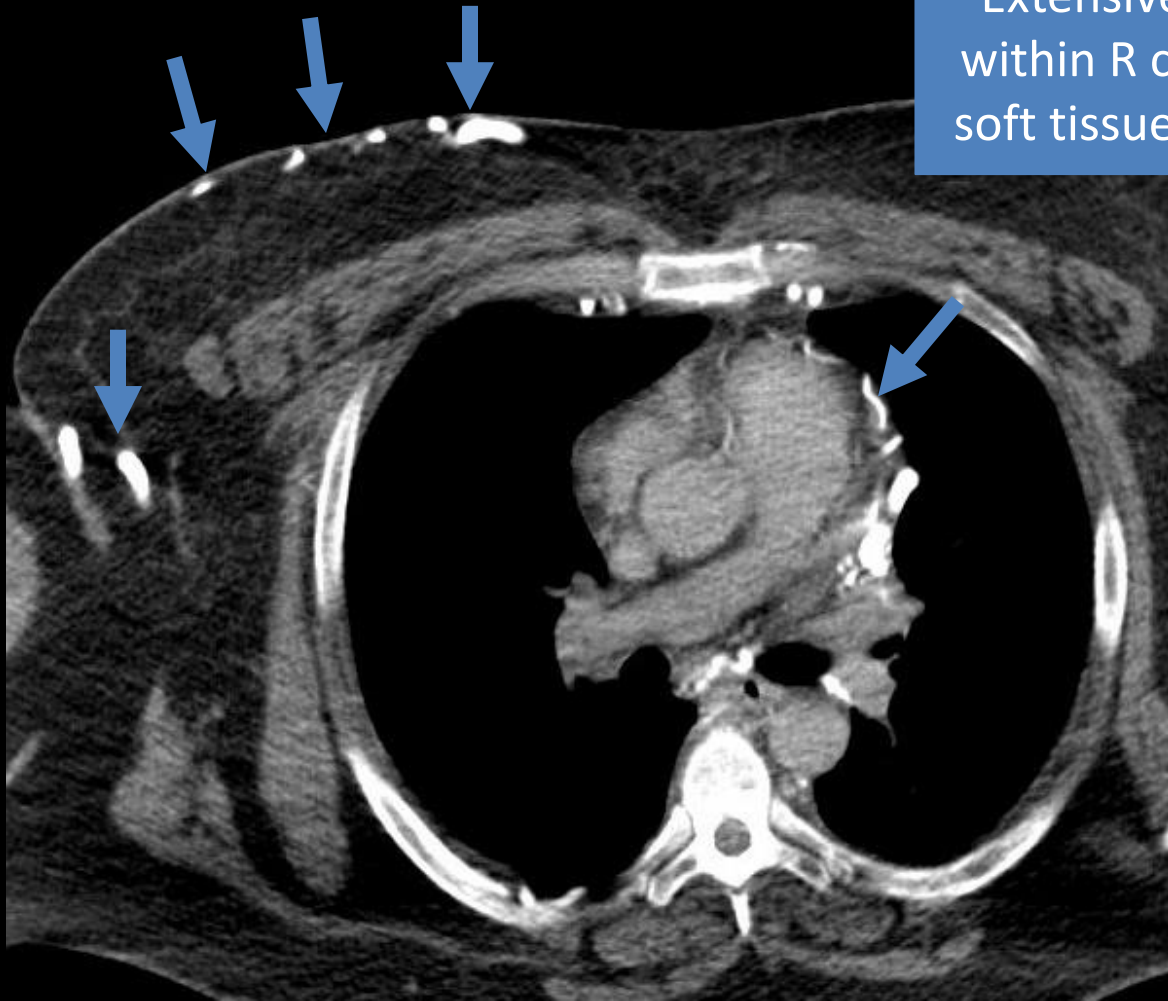
CT chest with IV contrast : 90s delay

# Findings (Unlabeled)



# Findings (Labeled)

Extensive collateral vessels  
within R chest subcutaneous  
soft tissues and mediastinum



# SVC Obstruction: Pathophysiology

- **Pathophysiology:** extrinsic compression, intrinsic stenosis, or thrombosis of the SVC
  - Most commonly related to malignancy (70%)
  - Central venous catheters (25%)

## Our Patient:

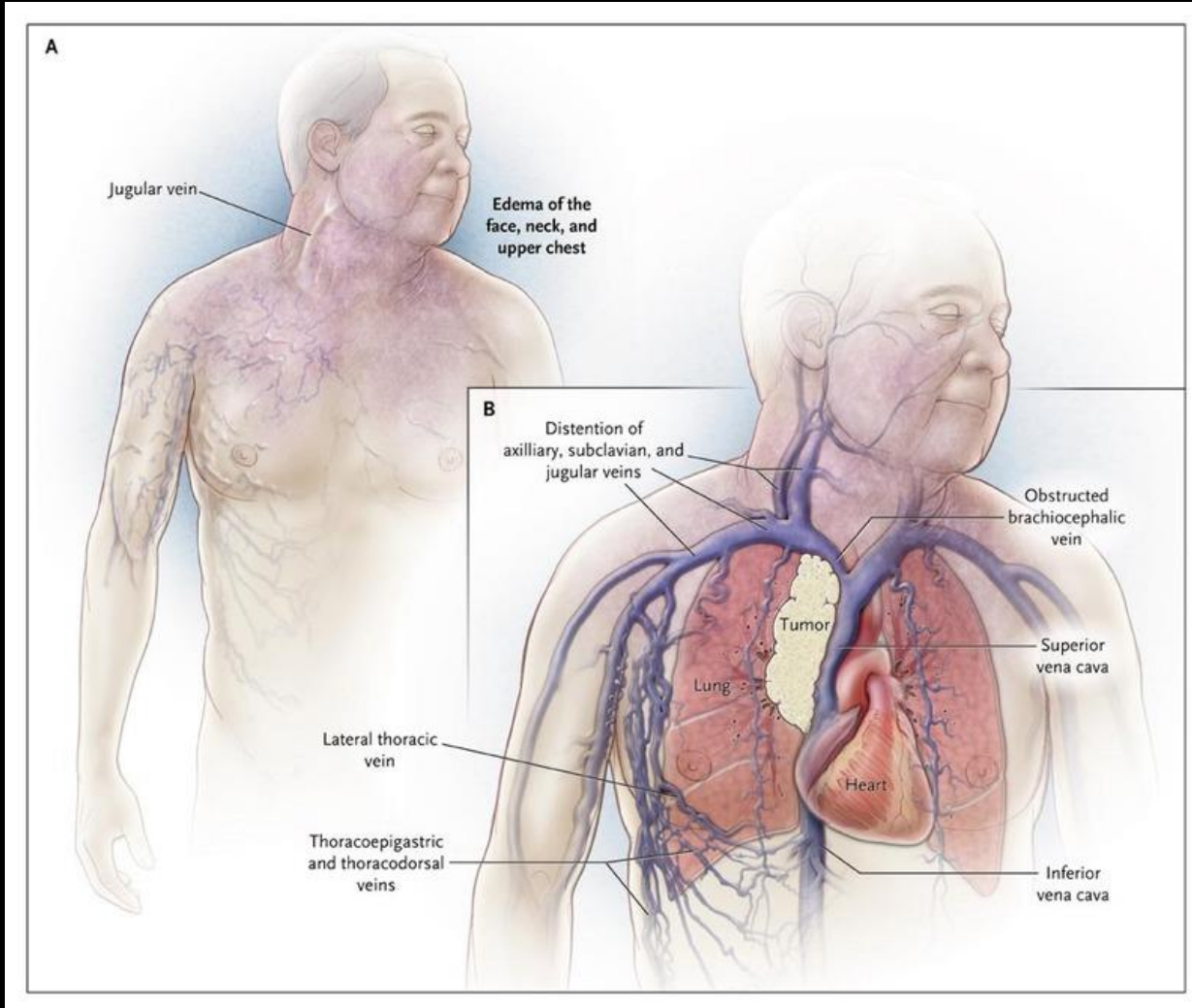
- 25 y/o
- no known malignancy
- no central line



# SVC Obstruction: Clinical Presentation

- **Clinical Presentation** depends on **speed, severity, and location** of the obstruction
  - Typical symptoms include facial and neck swelling, facial flushing, bilateral upper extremity swelling, neurological signs, dyspnea, headache, and cough
    - Can be life-threatening (cerebral/ laryngeal edema, diminished cardiac reserve)
  - Collateral channels formed to restore venous return if **chronic**

# SVC Obstruction: Pathophysiology



- There is venous congestion proximal to the obstruction distending the veins of the neck, upper extremity, and face
- Causes engorgement of collateral vessels in the wall of the thorax/ mediastinum which redirect bloodflow to the IVC

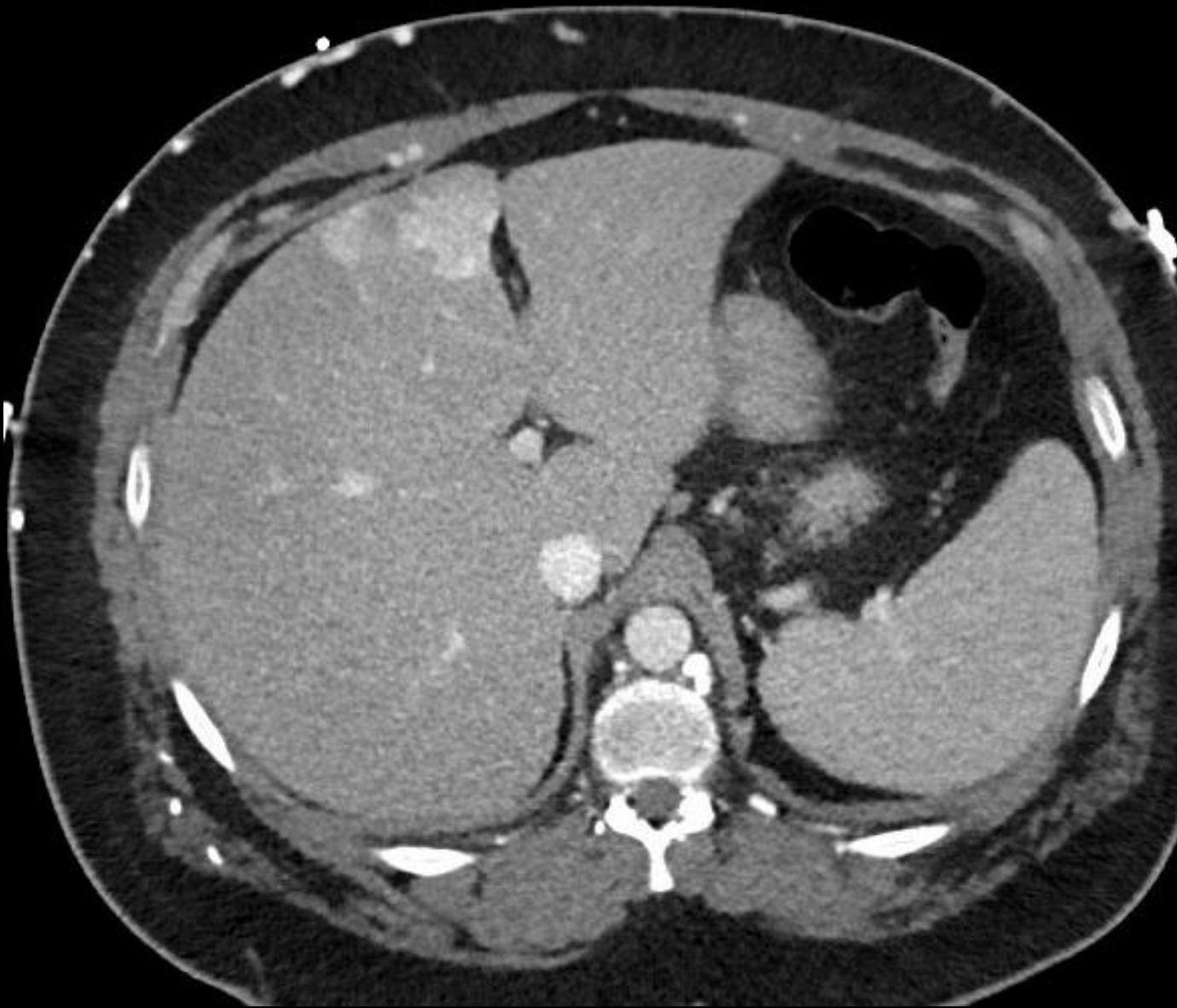
# SVC Obstruction: Consider hypercoagulability, underlying malignancy, auto-immune

- Our patient was found to have **catastrophic antiphospholipid syndrome**
- Shortly after diagnosis, they developed severe abdominal pain
- Concern for acute mesenteric ischemia
- Additional imaging was obtained

**Variant 1:** Suspected acute mesenteric ischemia. Initial imaging.

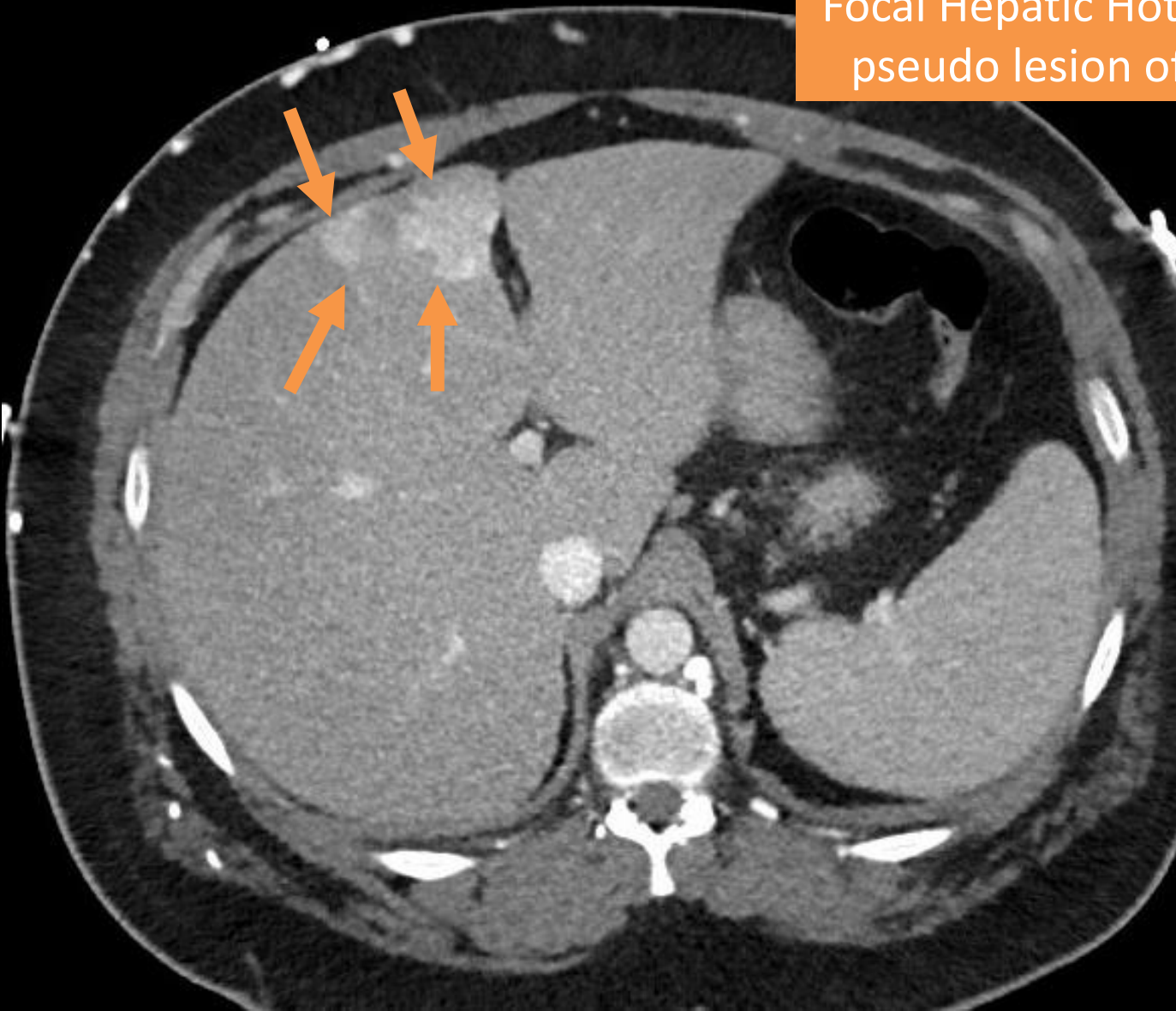
Procedure	Appropriateness Category	Relative Radiation Level
CTA abdomen and pelvis with IV contrast	Usually Appropriate	⊗⊗⊗⊗
CT abdomen and pelvis with IV contrast	May Be Appropriate	⊗⊗⊗
Arteriography abdomen	May Be Appropriate (Disagreement)	⊗⊗⊗
MRA abdomen and pelvis without and with IV contrast	May Be Appropriate (Disagreement)	○
Radiography abdomen	May Be Appropriate	⊗⊗
US duplex Doppler abdomen	May Be Appropriate	○
CT abdomen and pelvis without and with IV contrast	Usually Not Appropriate	⊗⊗⊗⊗
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	⊗⊗⊗
MRA abdomen and pelvis without IV contrast	Usually Not Appropriate	○

# Findings (Unlabeled)



# Findings (Labeled)

Focal Hepatic Hot Spot Sign:  
pseudo lesion of the liver

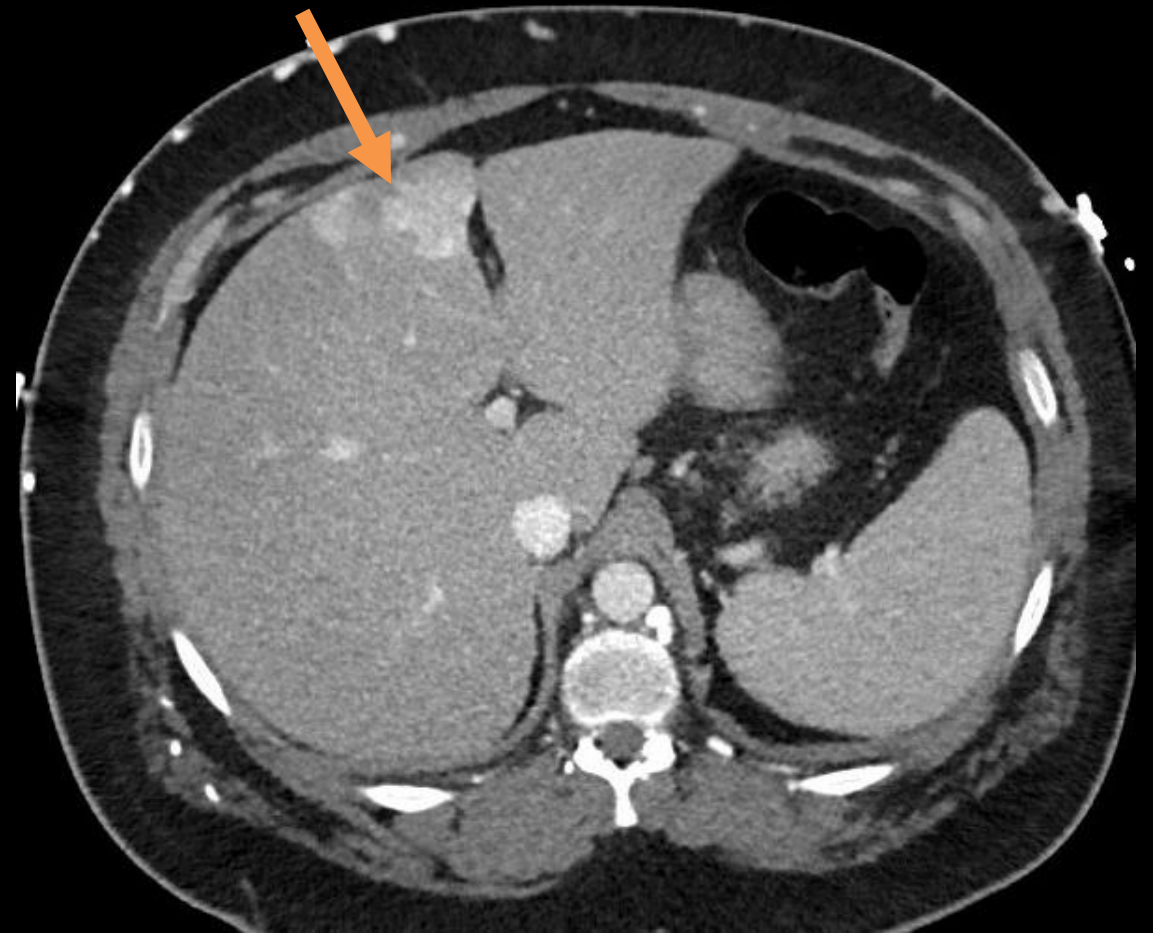
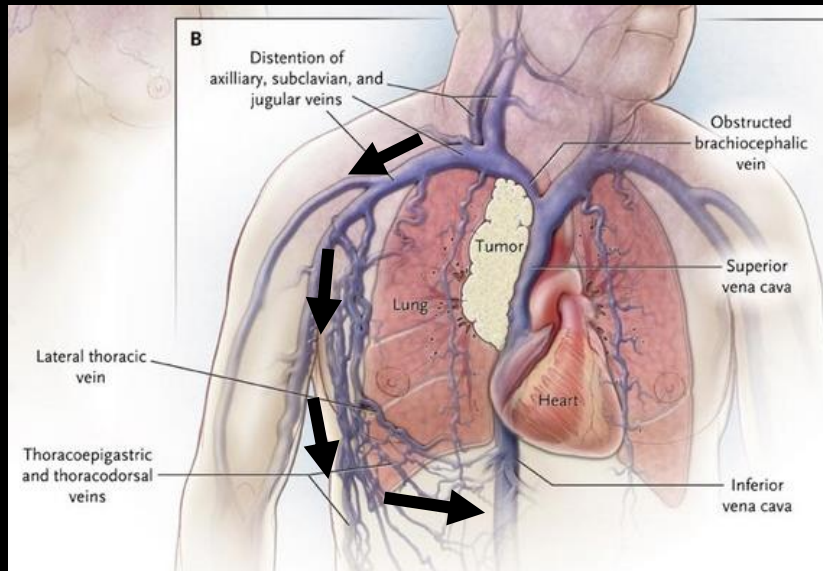


\*No mesenteric ischemia\*

# SVC Syndrome: Other Findings

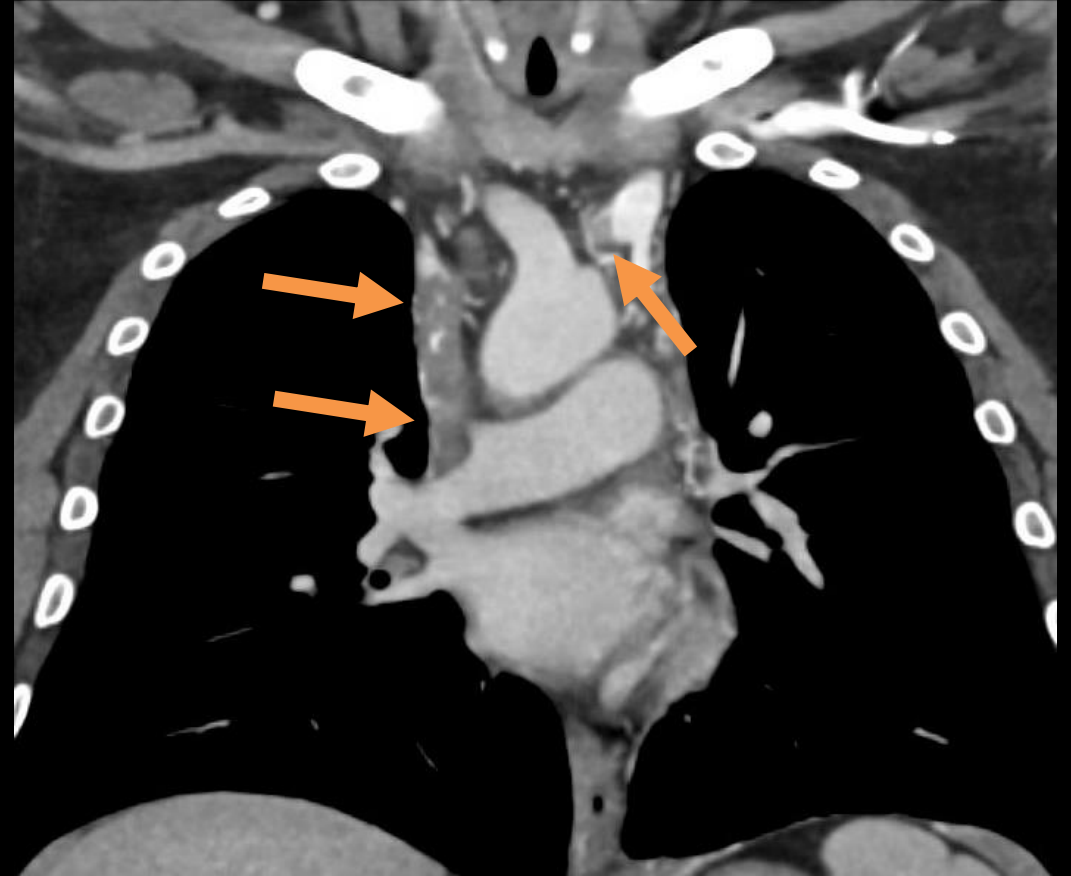
## Focal Hepatic Hot Spot Sign:

- Abnormal contrast accumulation in the liver (segment IV) from contrast being injected into upper limb vein, diverted into collateral pathways to be directed to the IVC



# SVC Syndrome: Management

- Treat underlying etiology: malignancy, central line
- Endovascular: angioplasty, thrombolysis, stenting
- Surgical: bypass grafting and reconstruction



SVC and L brachiocephalic thrombus on subsequent CTA

# Summary: Imaging Superior Vena Cava Obstruction

- **Pathophysiology:** compression, stenosis, or thrombosis
  - Most often caused by malignancy or central venous catheters
  - Can be an emergency
- **Venous filling defect of the superior vena cava on CT with IV contrast**
- Chronic SVC obstruction can lead to collateral vessels in the subcutaneous tissues and mediastinum
- Focal hepatic hot spot sign in segment 4



# References:

1. Expert Panel on Vascular Imaging; Desjardins B, Hanley M, Steigner ML, Aghayev A, Azene EM, Bennett SJ, Chandra A, Hedgire SS, Lo BM, Mauro DM, Ptak T, Singh-Bhinder N, Suranyi PS, Verma N, Dill KE. ACR Appropriateness Criteria<sup>®</sup> Suspected Upper Extremity Deep Vein Thrombosis. *J Am Coll Radiol*. 2020 May;17(5S):S315-S322. doi: 10.1016/j.jacr.2020.01.020. PMID: 32370975.
2. Sheth S, Ebert MD, Fishman EK. Superior vena cava obstruction evaluation with MDCT. *AJR Am J Roentgenol*. 2010 Apr;194(4):W336-46. doi: 10.2214/AJR.09.2894. PMID: 20308479.
3. Azizi AH, Shafi I, Shah N, Rosenfield K, Schainfeld R, Sista A, Bashir R. Superior Vena Cava Syndrome. *JACC Cardiovasc Interv*. 2020 Dec 28;13(24):2896-2910. doi: 10.1016/j.jcin.2020.08.038. PMID: 33357528.
4. Wilson LD, Detterbeck FC, Yahalom J. Clinical practice. Superior vena cava syndrome with malignant causes. *N Engl J Med*. 2007 May 3;356(18):1862-9. doi: 10.1056/NEJMcp067190. Erratum in: *N Engl J Med*. 2008 Mar 6;358(10):1083. PMID: 17476012.
5. Oliva IB, Davarpanah AH, Rybicki FJ, Desjardins B, Flamm SD, Francois CJ, Gerhard-Herman MD, Kalva SP, Ashraf Mansour M, Mohler ER 3rd, Schenker MP, Weiss C, Dill KE. ACR Appropriateness Criteria<sup>®</sup> imaging of mesenteric ischemia. *Abdom Imaging*. 2013 Aug;38(4):714-9. doi: 10.1007/s00261-012-9975-2. Erratum in: *Abdom Imaging*. 2014 Aug;39(4):937-9. PMID: 23296712.