

# AMSER Case of the Month: January 2025

A 44 yo asymptomatic female patient newly diagnosed with breast cancer presents for follow up breast MRI

Shivani Kothari, MS4, Ohio University Heritage College of Osteopathic Medicine

Ashkon Bahrami, DO, R4/PGY-5, Cleveland Clinic Imaging Institute

Ruchi Yadav, MD, Cleveland Clinic Imaging Institute



# Patient Presentation

- Patient is a 44-year-old female with PMHx of essential HTN and hereditary pheochromocytoma paraganglioma syndrome
- Patient denies any symptoms including chest pain, shortness of breath, cough, fever/chills, and unintentional weight loss.
- No family history of cancer
- Patient advised to undergo annual mammogram screening

# Patient Presentation

- Mammogram showed calcifications in the upper outer quadrant along the 1:00 o'clock axis of the left breast. Breasts are noted to be heterogeneously dense.
  - A stereotactic breast biopsy was performed
  - Confirmed high grade ductal carcinoma in situ (DCIS) with central necrosis and associated microcalcifications, ER >90%

# Pertinent Labs

- HEENT & Neck: Normal
- Cardiovascular: RRR, no murmur, normal perfusion, no edema
- Respiratory: No vesicular breath sounds, no wheezing rales, rhonchi, or accessory muscle use
- SpO2 100%, RR 14, BP 188/110, HR 81
- ER +, HER -, PR -
- **Monoallelic mutation of SDHB gene**
- Normal methacholine and catecholamines
- WBC:  $14.97 \times 10^9$  /L
- RBC:  $3.27 \times 10^{12}$  /L
- Hemoglobin: 9.8

What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

**Variant 1:**

**Newly diagnosed. Clinical stage I-IIA (early stage) breast cancer at presentation. Evaluation for locoregional disease (includes invasive ductal carcinoma [IDC], or invasive lobular carcinoma [ILC], or not otherwise specified [NOS]).**

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	○
Digital breast tomosynthesis diagnostic	Usually Appropriate	☼☼
Mammography diagnostic	Usually Appropriate	☼☼
<b>MRI breast without and with IV contrast</b>	Usually Appropriate	○
US axilla	May Be Appropriate	○
Mammography with IV contrast	May Be Appropriate	☼☼
MRI breast without IV contrast	Usually Not Appropriate	○
Bone scan whole body	Usually Not Appropriate	☼☼☼
CT chest abdomen pelvis with IV contrast	Usually Not Appropriate	☼☼☼☼
CT chest abdomen pelvis without and with IV contrast	Usually Not Appropriate	☼☼☼☼
CT chest abdomen pelvis without IV contrast	Usually Not Appropriate	☼☼☼☼
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☼☼☼☼

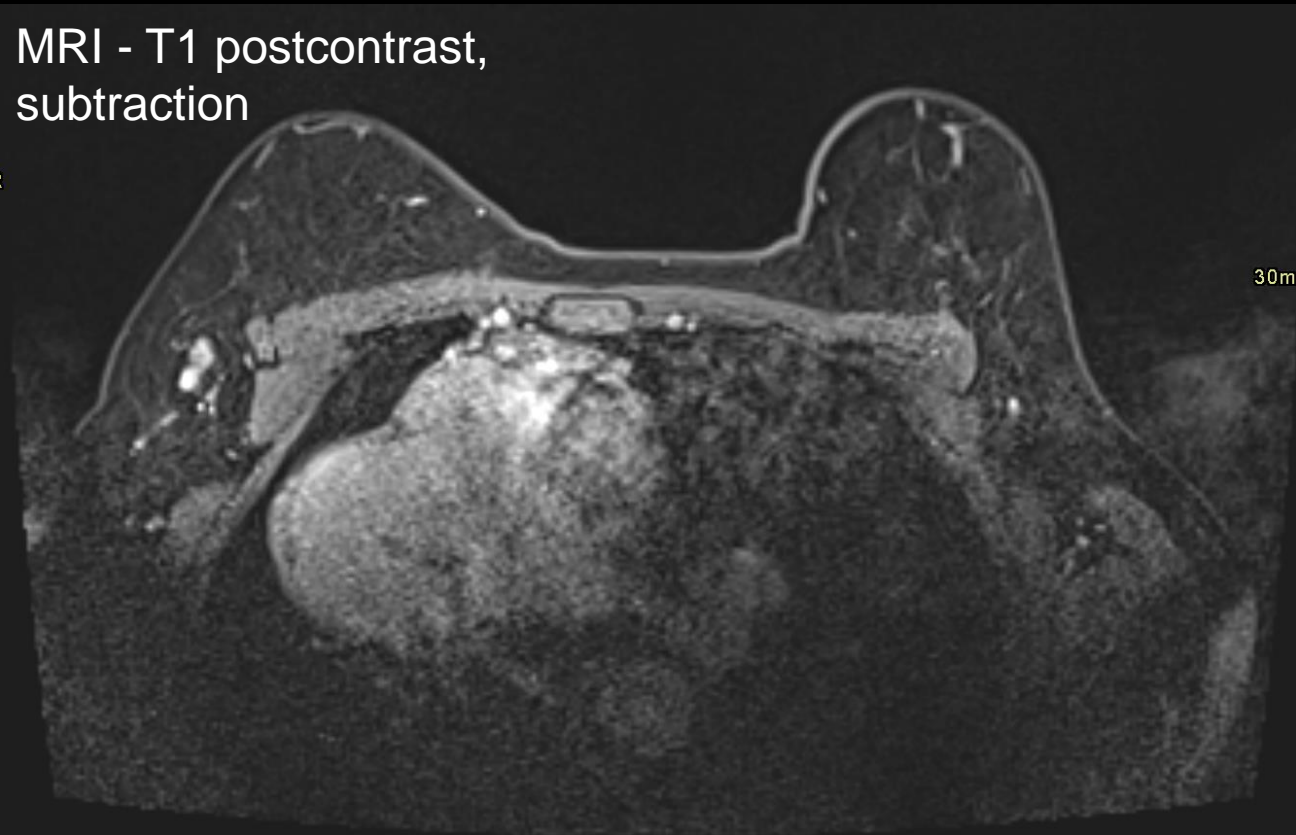
This imaging modality was ordered by the physician



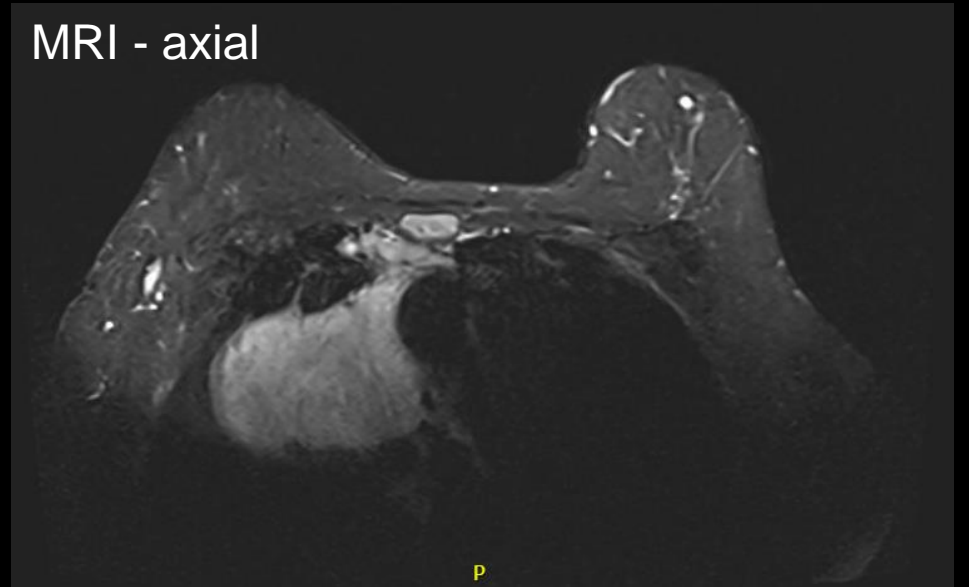
MRI ordered to aid in surgical planning to evaluate for occult/extent of disease, though controversial in DCIS

# Findings (unlabeled)

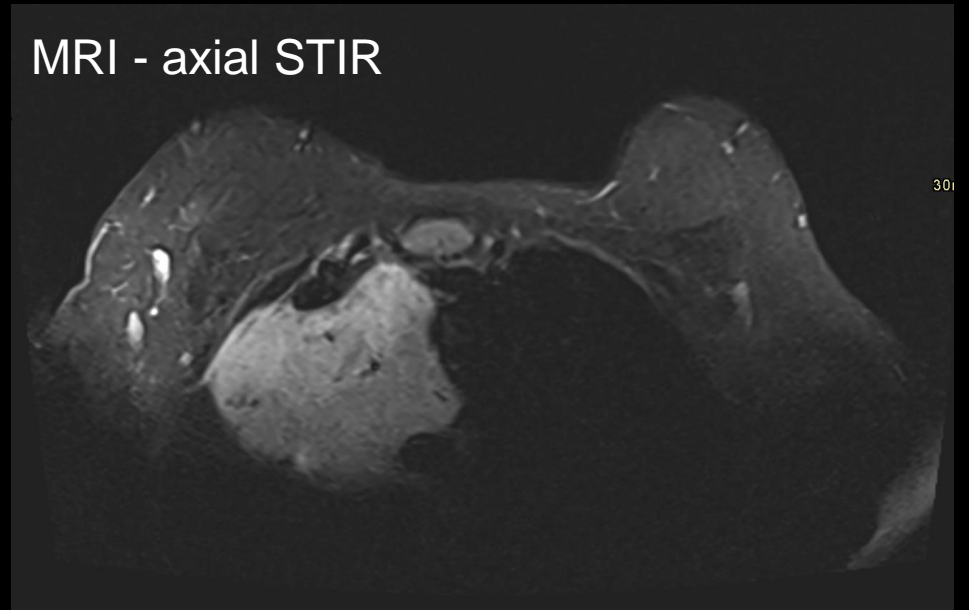
MRI - T1 postcontrast, subtraction



MRI - axial

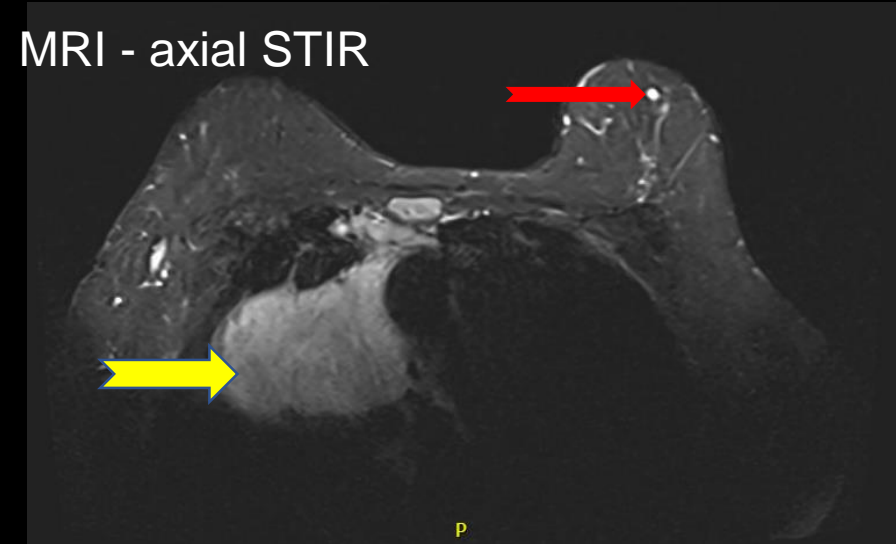


MRI - axial STIR

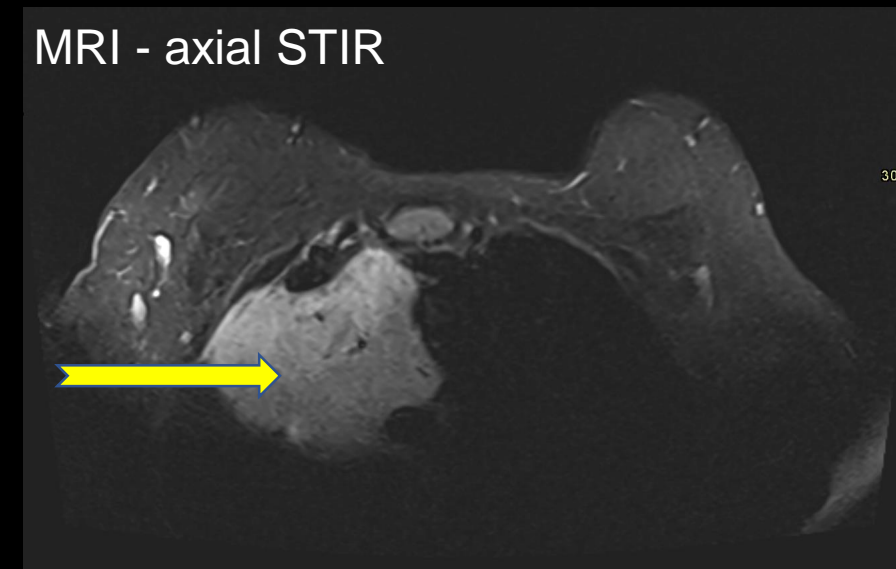
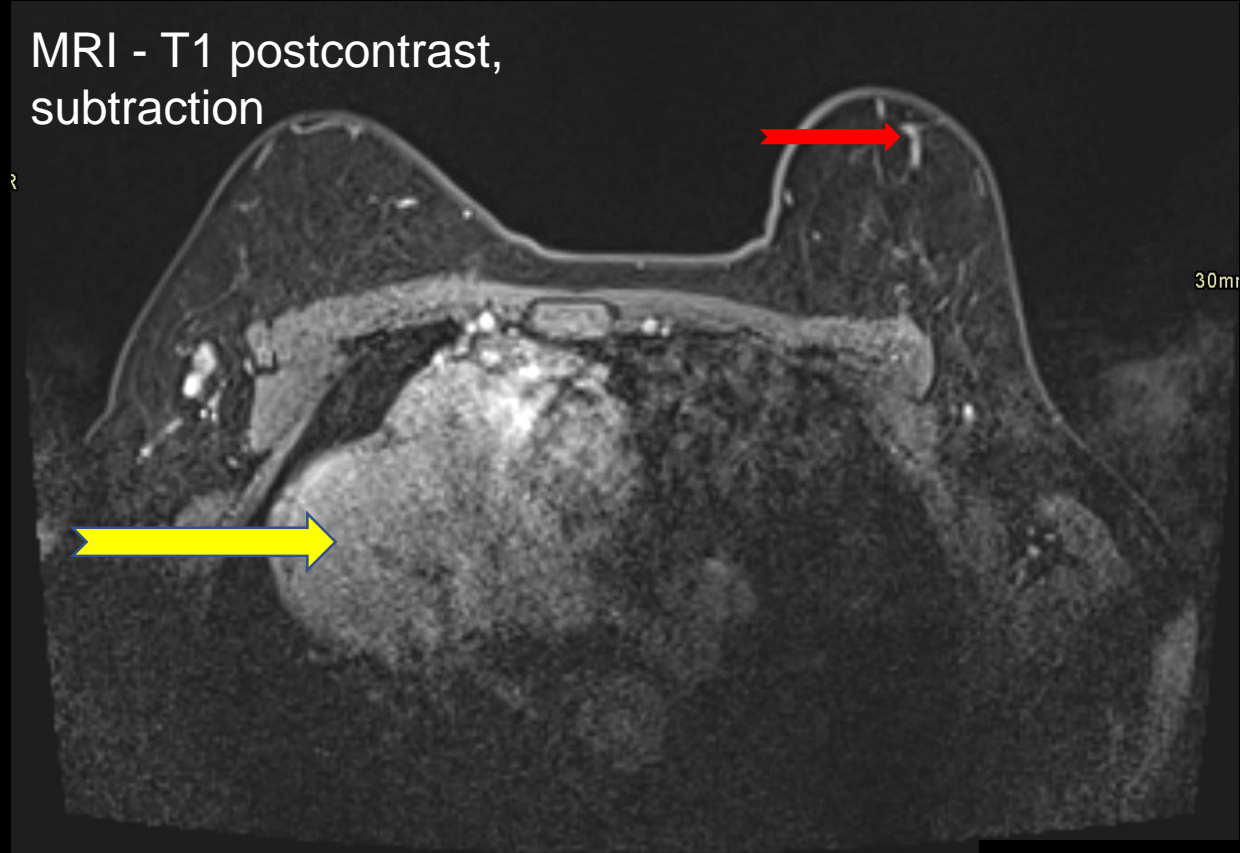


# Findings (labeled)

- A 5.2 mm region of NME in the upper outer quadrant of the left breast correlates with the newly diagnosed DCIS
- Involving the right upper hemothorax, there is a large (10cm) indeterminate hyperintense mediastinal mass with heterogenous enhancement and T2 hyperintensity



MRI - T1 postcontrast, subtraction





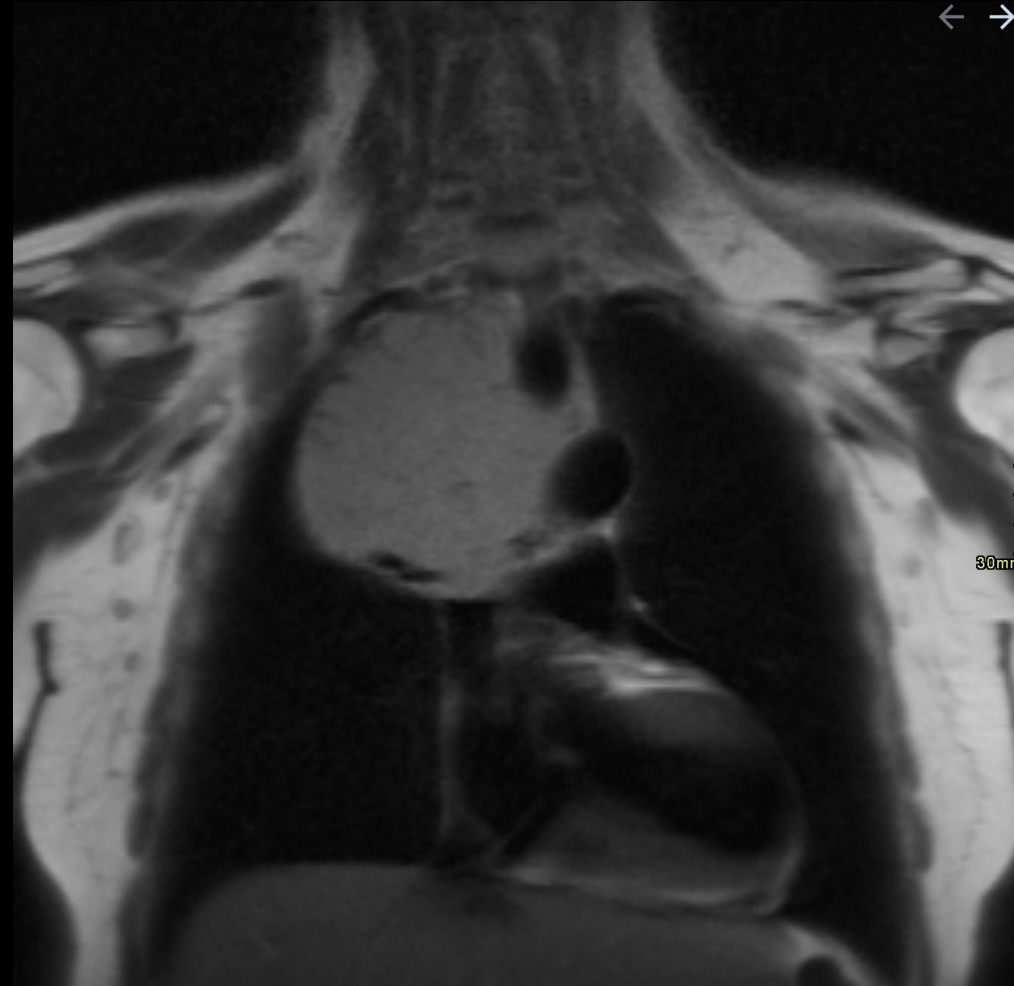
# Select the applicable ACR Appropriateness Criteria

**Variant 5:** Indeterminate mediastinal mass on MRI. Next imaging study or surveillance.

Procedure	Appropriateness Category	Relative Radiation Level
Image-guided transthoracic needle biopsy	Usually Appropriate	Varies
<b>MRI chest without and with IV contrast</b>	Usually Appropriate	0
MRI chest without IV contrast	May Be Appropriate	0
CT chest with IV contrast	May Be Appropriate	☢☢☢
CT chest without IV contrast	May Be Appropriate	☢☢☢
FDG-PET/CT skull base to mid-thigh	May Be Appropriate	☢☢☢☢
US chest	Usually Not Appropriate	0
Radiography chest	Usually Not Appropriate	☢
CT chest without and with IV contrast	Usually Not Appropriate	☢☢☢

This imaging modality was ordered by the physician

# Findings (unlabeled)



MRI - coronal T2 haste

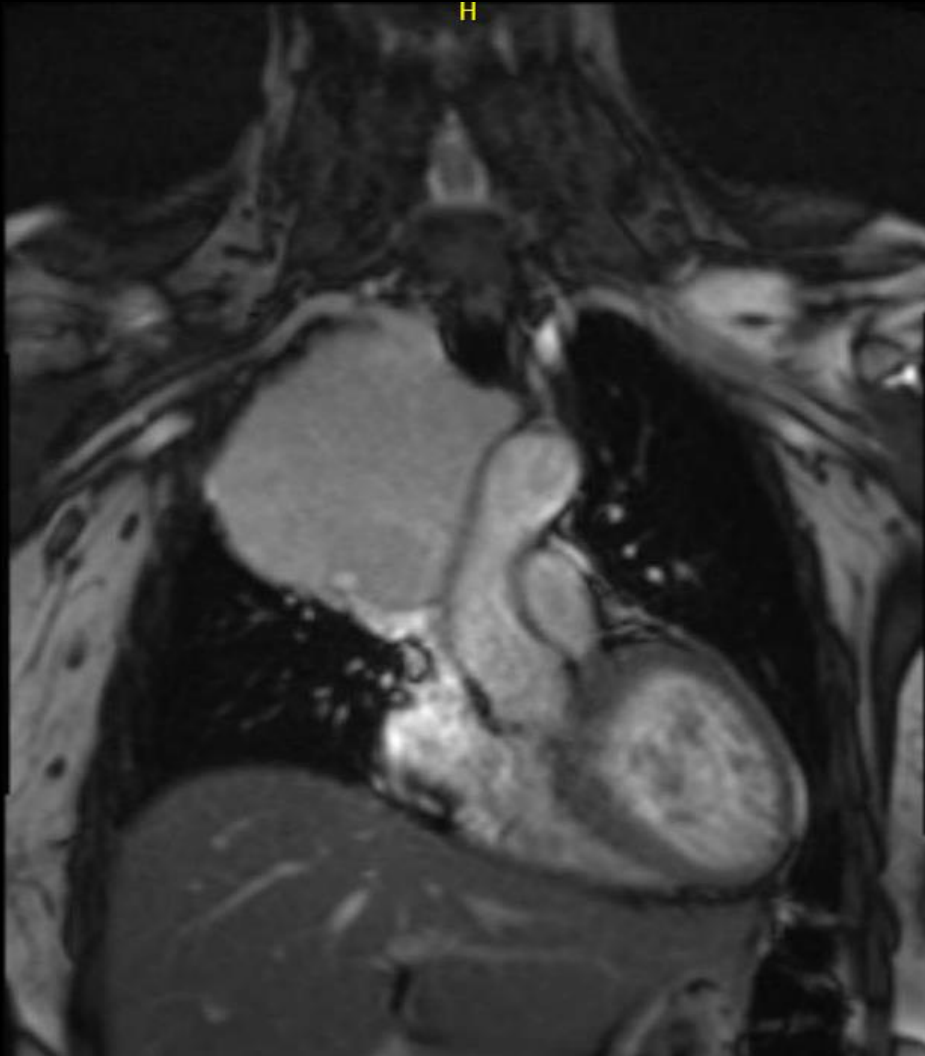


MRI - axial T1 postcontrast

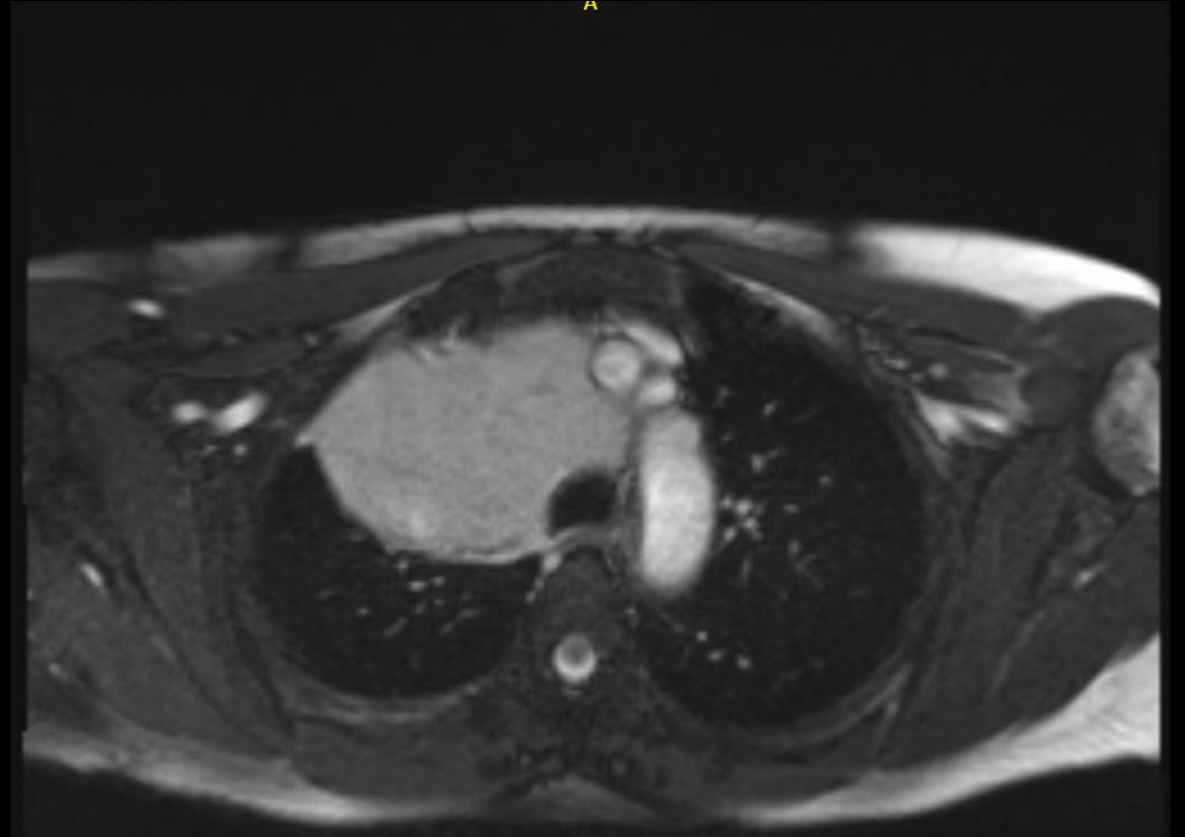


MRI - axial STIR

# Findings: (unlabeled)



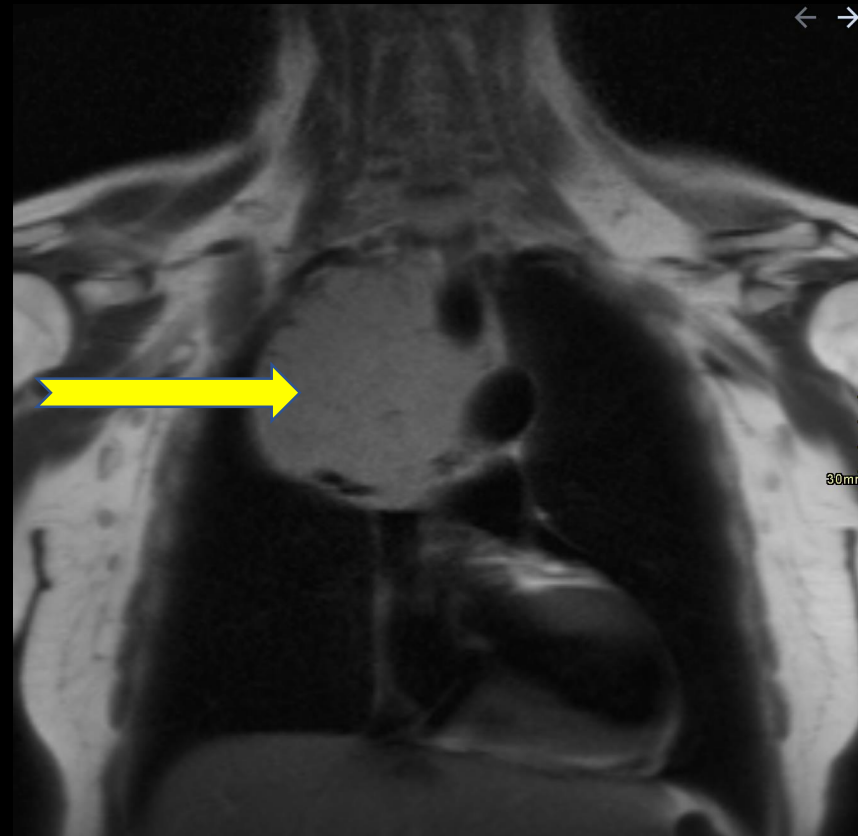
MRI coronal



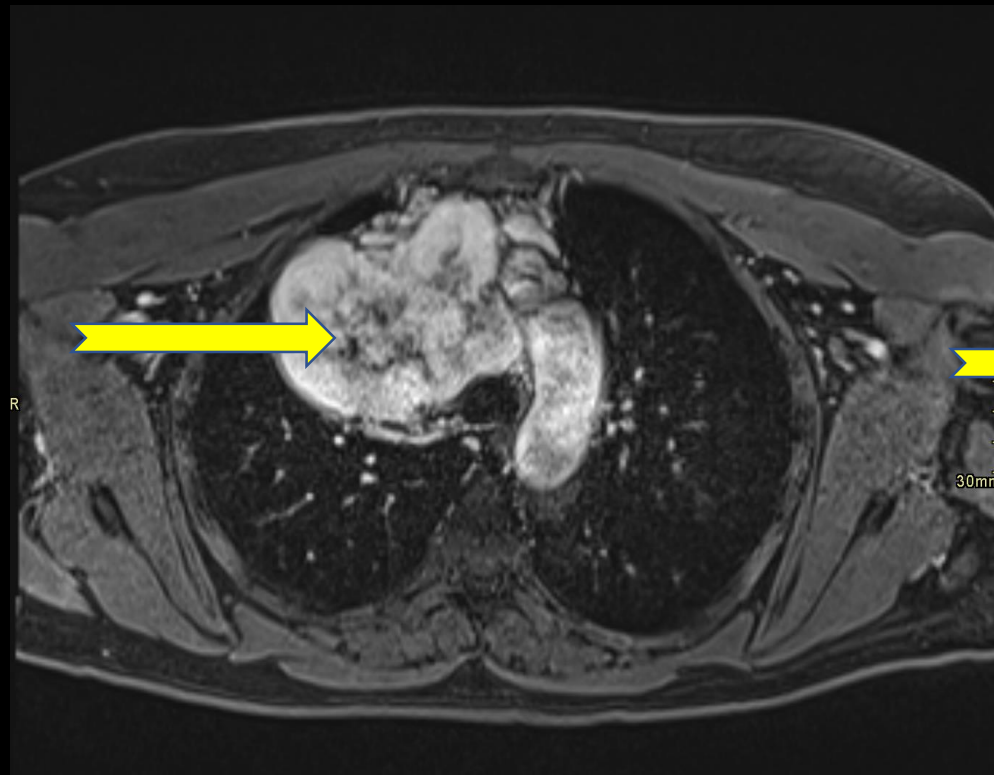
MRI Axial

# Findings (labeled)

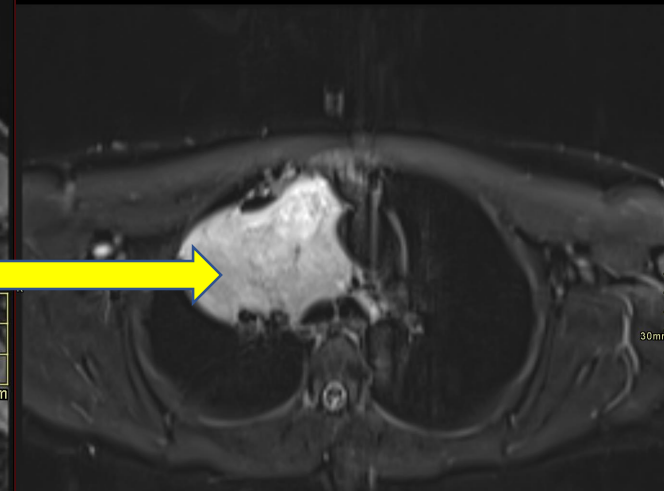
- Soft tissue 7.5 x 8.6 x 9.2 cm mass is centered in the right aspect of the middle mediastinum.
- The mass displays intermediate T1 signal, bright on STIR sequence and enhances avidly.
- The superior vena cava passes anterior to the mass and is compressed and narrowed by the mass.
- Medially the mass abuts the ascending portion of the aorta and posteriorly it abuts the trachea and right hilum, and superiorly extends to the thoracic inlet.
- The trachea is slightly displaced to the left but is not narrowed.



MRI - coronal T2 HASTE

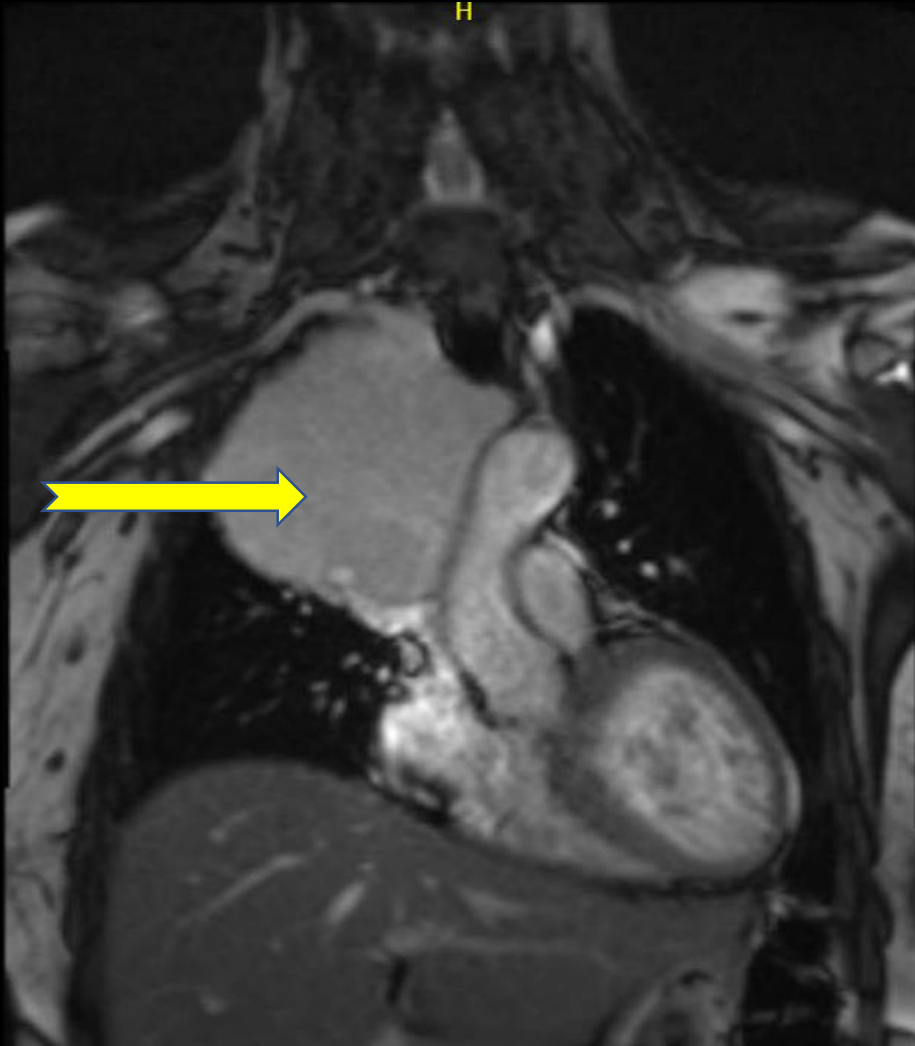


MRI - axial T1 postcontrast

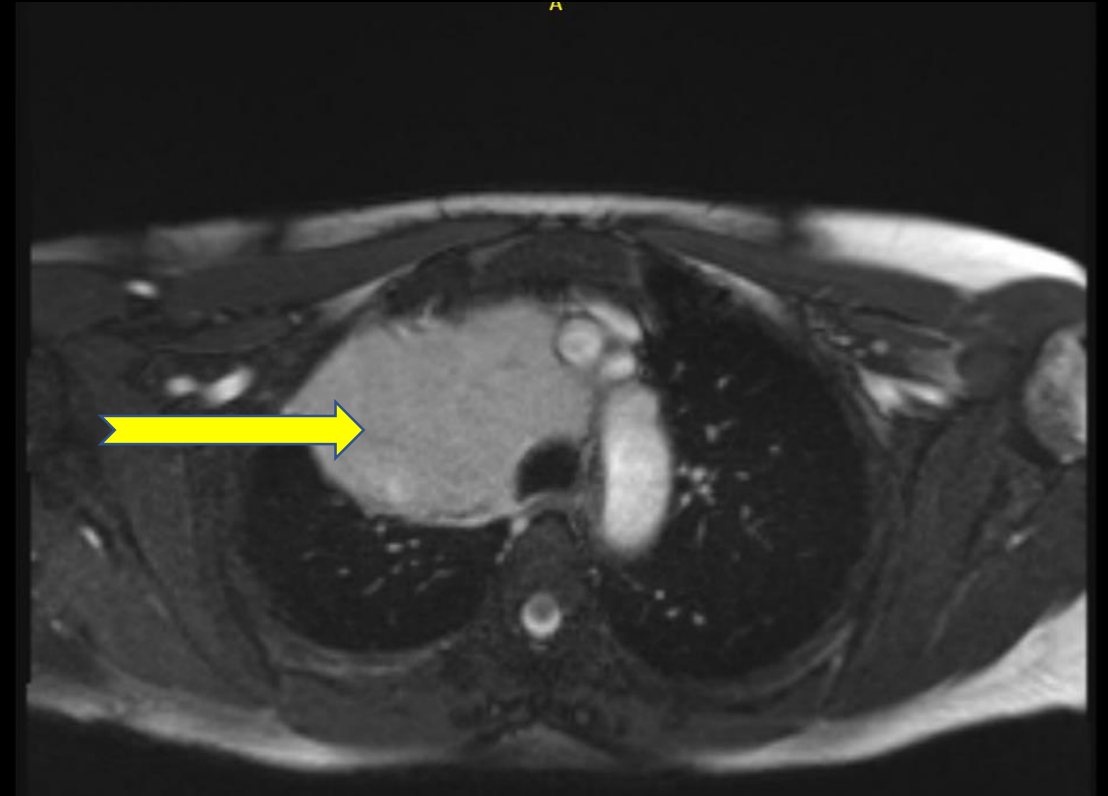


MRI - axial STIR

# Findings: (labeled)



MRI coronal



MRI Axial

Final Dx:

Solitary Fibrous Tumor

# Case Discussion

**Definition:** A solitary fibrous tumor (SFT) is a rare neoplasm

- Predominantly arises from mesenchymal tissues, often in the pleura
- Also, in extrapleural sites such as the skin, soft tissues, and other internal organs
- Incidence of 1 new case/million people/year

# Case Discussion

## Etiology:

- Believed to originate from fibroblasts or other mesenchymal cells
- Tumor cells exhibit characteristics typical of fibroblasts, including their spindle-shaped morphology and collagen-rich stroma
- STAT6 nuclear protein expression and the NAB2–STAT6 fusion gene are associated with SFT



# Case Discussion Continued

**Radiographic Features:** SFTs present as circumscribed, lobulated masses. SFTs are highly vascular, often showing strong contrast enhancement

## Computed Tomography:

- On unenhanced CT, SFTs show intermediate to high attenuation due to dense collagen and a rich blood supply, with heterogeneous attenuation in 88% of cases. Low attenuation areas may indicate necrosis, hemorrhage, or cystic changes
- Strong enhancement on post contrast images

# Case Discussion Continued

## Radiographic Features:

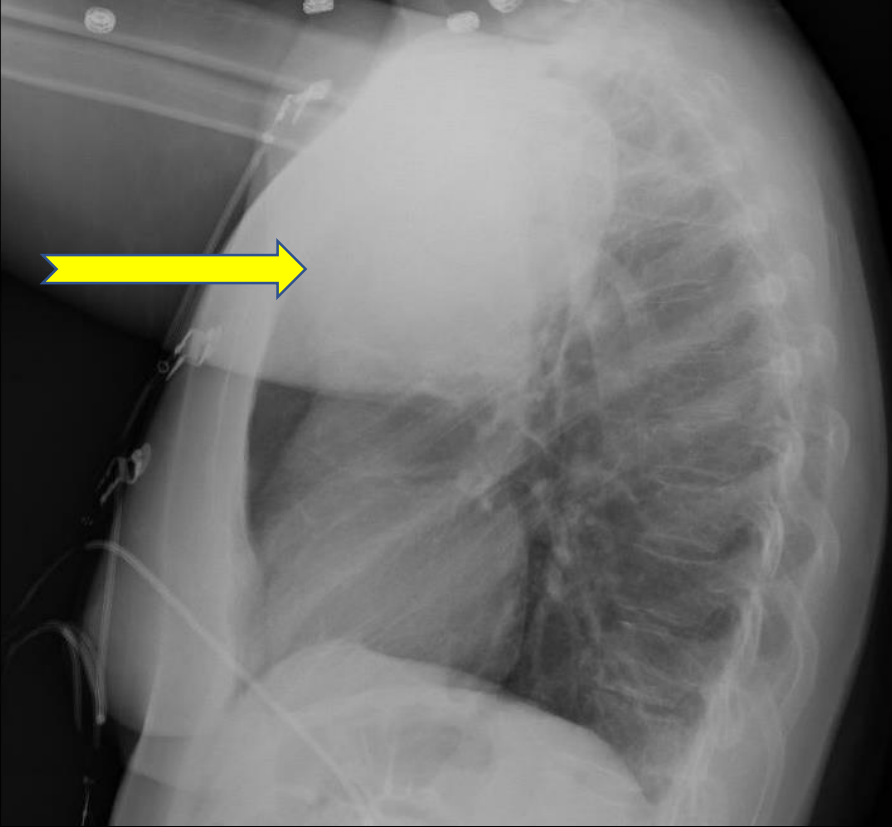
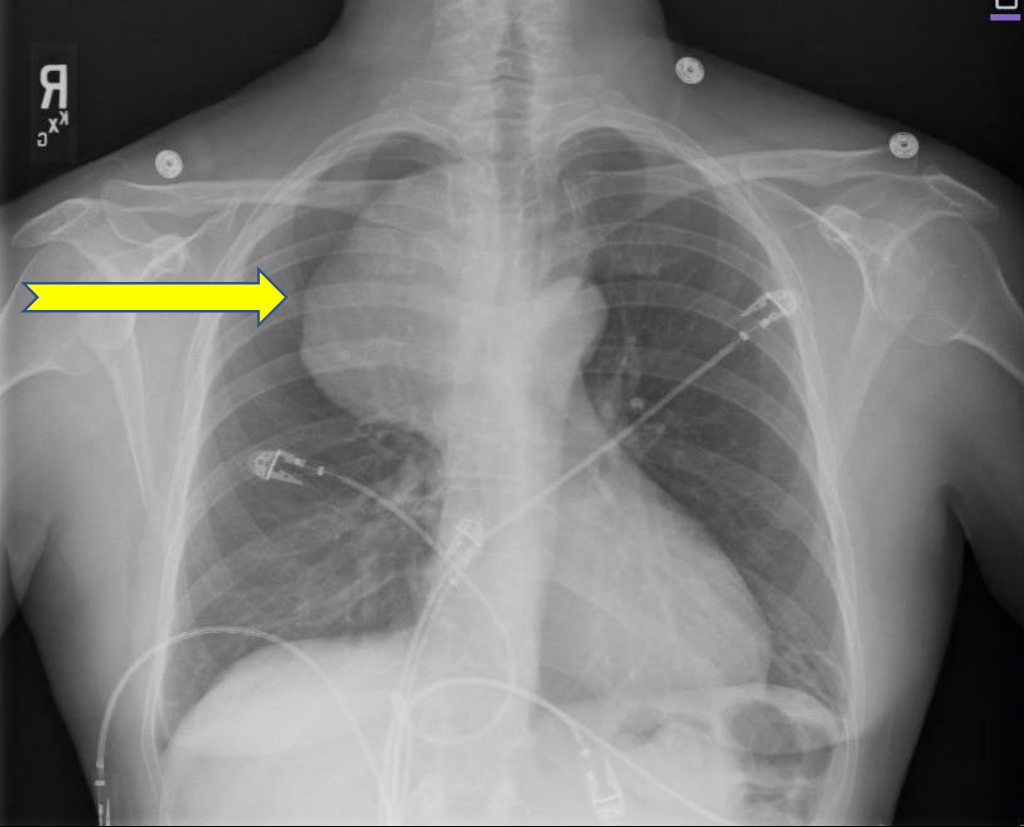
### MR:

- SFTs are isointense on T1-weighted MRI images and show variable signal intensity on T2-weighted images
- Areas of low intensity are often due to high collagen content and low cellularity
- Strong gadolinium enhancement is typical due to the tumor's vascular nature

# Case Discussion Continued

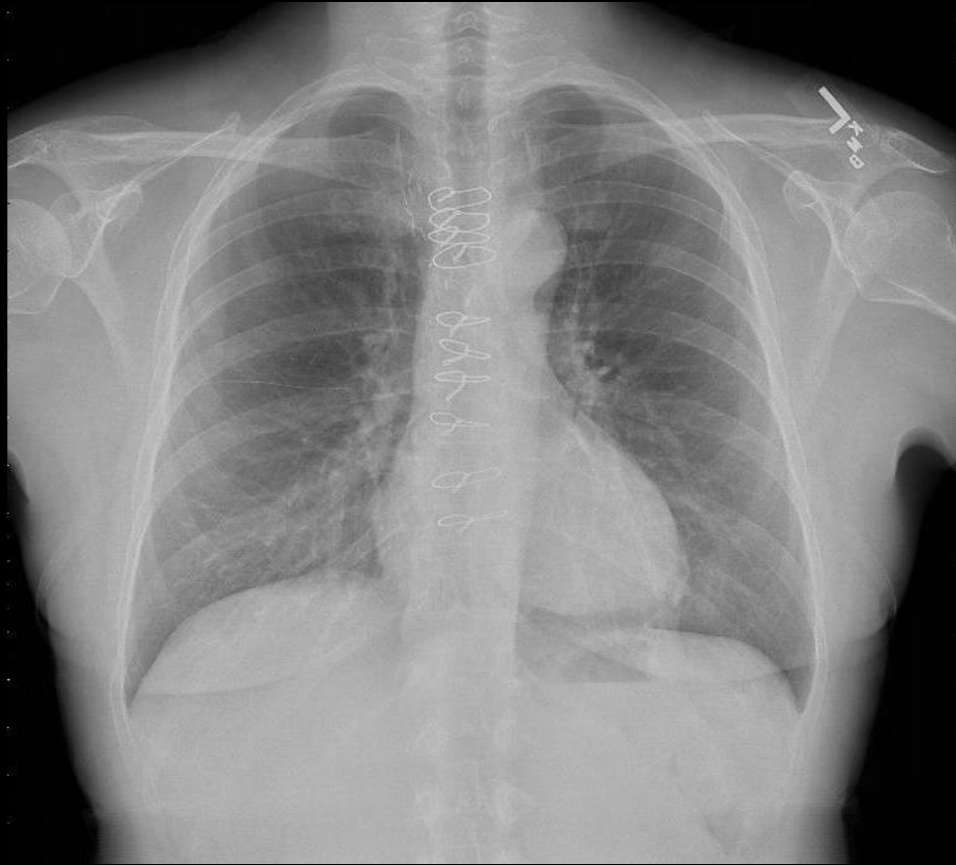
- **Clinical Features:** 50-80% of cases are asymptomatic. Nonspecific symptoms include chest pain, dyspnea, and cough.
- **Treatment:** Mainstay treatment includes surgery with wide resection margins. With low incidence of the disease, limited studies show effectiveness of chemotherapy and radiation.
- **Prognosis:** 5-year survival rates between 59–100% and 10-year survival rates between 40% to 89%. Most tumors are benign in activity; however, they may demonstrate malignant behaviors.

# Pre-Transsternal Resection



Right anterior superior mediastinal mass

# Post-Transsternal Resection



# References:

- Davanzo, B., Emerson, R. E., Lisy, M., Koniaris, L. G., & Kays, J. K. (2018). Solitary fibrous tumor. *Translational gastroenterology and hepatology*, 3, 94. <https://doi.org/10.21037/tgh.2018.11.02>
- Martin-Broto, J., Mondaza-Hernandez, J. L., Moura, D. S., & Hindi, N. (2021). A Comprehensive Review on Solitary Fibrous Tumor: New Insights for New Horizons. *Cancers*, 13(12), 2913. <https://doi.org/10.3390/cancers13122913>
- American College of Radiology. ACR Appropriateness Criteria®. Available at <https://acsearch.acr.org/list>. Accessed September 2024.