AMSER Rad Path Case of the Month: Large Chest Mass

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Patient Presentation

Clinical history

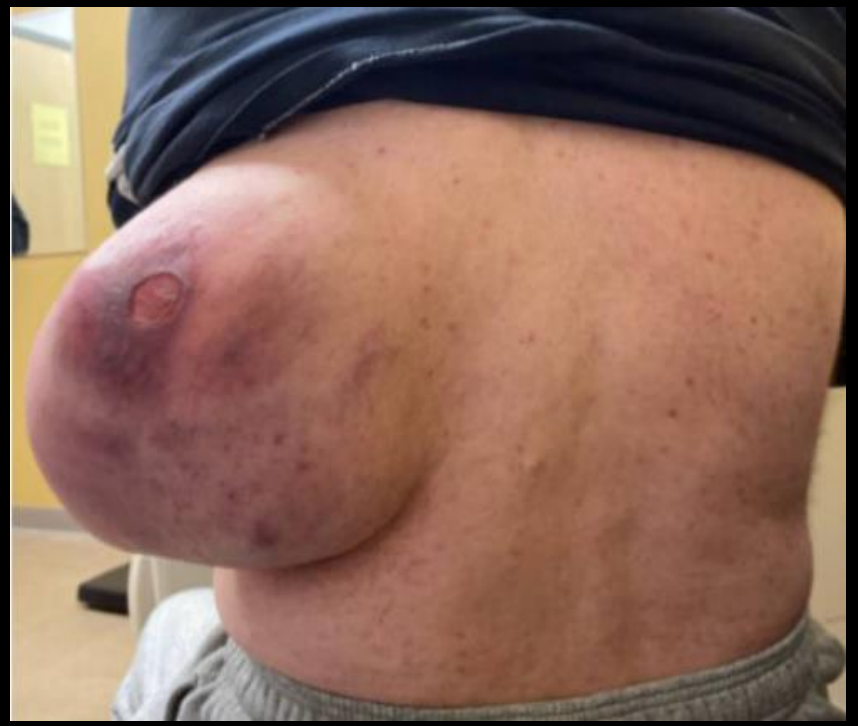
- Patient presented with referral to hematology-oncology imaging showed presence of left-sided chest wall mass present for 2 years . On initial identification, mass examined was the size of a baseball, diagnosed as a probable lipoma, and told to get follow-up imaging. Patient did not follow-up. Over the past 2 years, the mass reportedly increased in size, and recently ruptured with resultant drainage.
- Denies night sweats, weight loss, low grade fever, and endorses no change in appetite

Pertinent social history

- No history of tobacco use, alcohol use, or illicit drug use

Pertinent physical exam findings

- Normal ROM
- Presence of large pedunculated chest wall mass. Thumb-sized opening with seepage ranging from clear to bloody drainage. Mass is nontender and moves freely.
- Presence of axillary lymphadenopathy measuring 2 x 1.1 cm



ACR Appropriateness Criteria

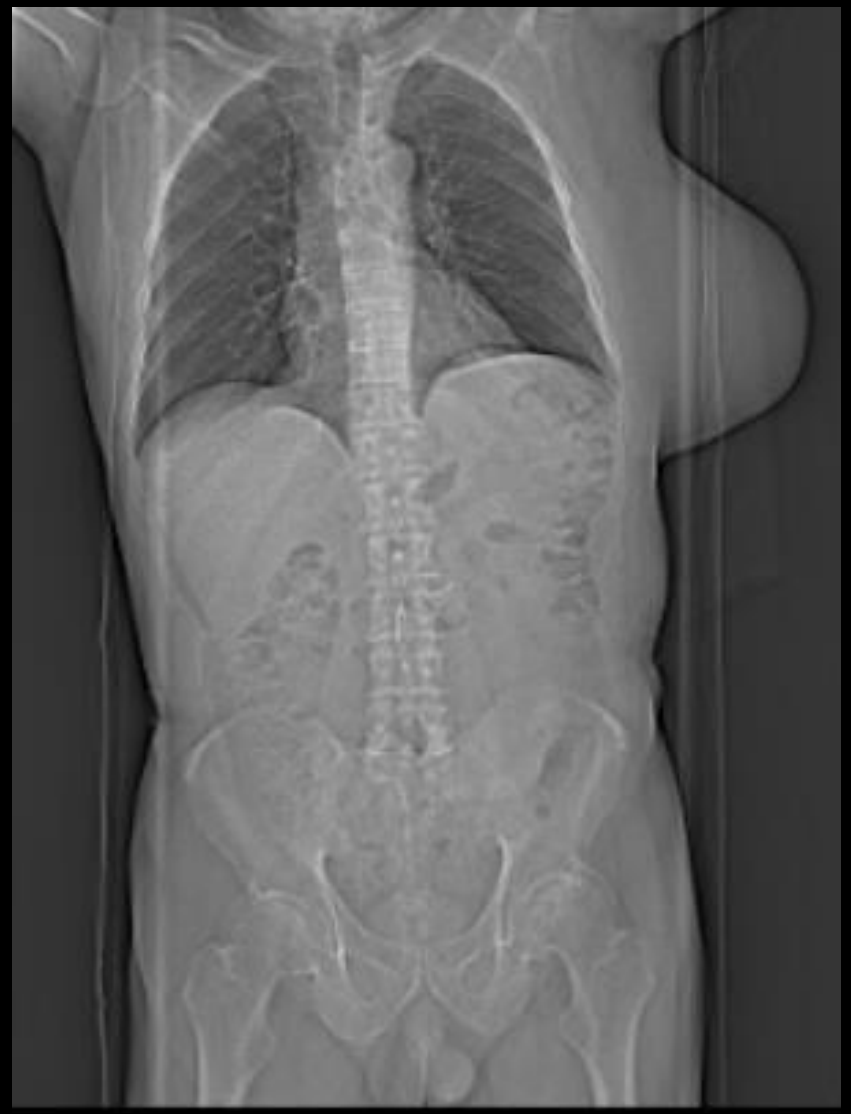
Variant 2: **Nonsuperficial (deep) soft tissue mass. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
Radiography area of interest	Usually Appropriate	Varies
US area of interest	May Be Appropriate	O
CT area of interest with IV contrast	May Be Appropriate	Varies
CT area of interest without and with IV contrast	May Be Appropriate	Varies
CT area of interest without IV contrast	May Be Appropriate	Varies
US area of interest with IV contrast	Usually Not Appropriate	O
Image-guided biopsy area of interest	Usually Not Appropriate	Varies
Image-guided fine needle aspiration area of interest	Usually Not Appropriate	Varies
MRI area of interest without and with IV contrast	Usually Not Appropriate	O
MRI area of interest without IV contrast	Usually Not Appropriate	O
FDG-PET/CT area of interest	Usually Not Appropriate	☢☢☢☢

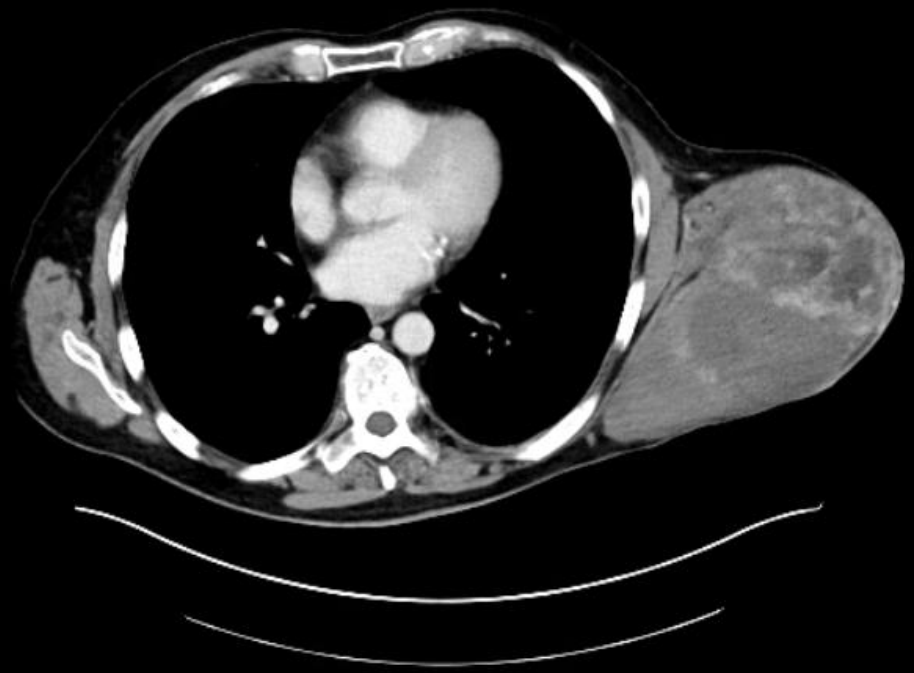
Modality chosen

Radiology Images (not labeled)

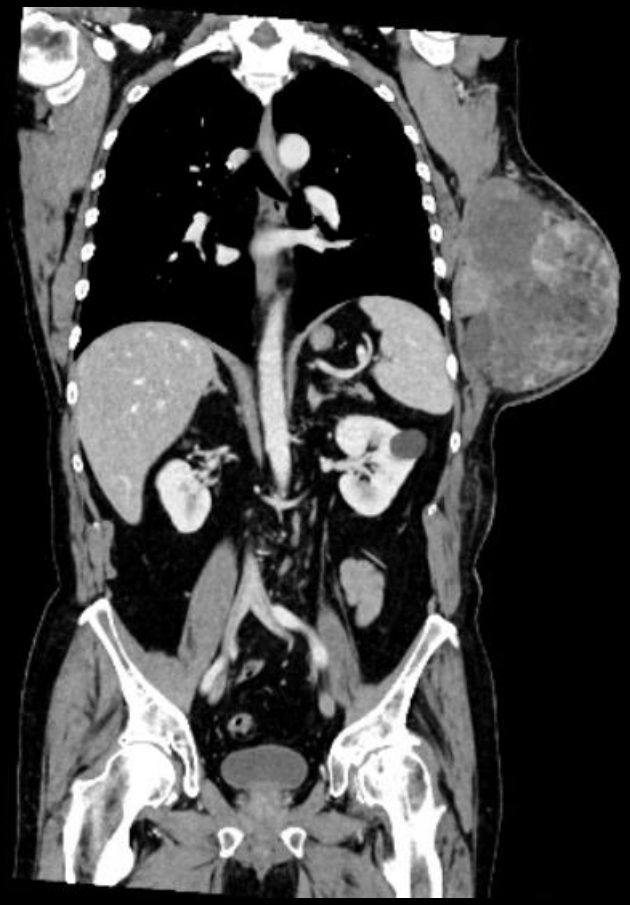
CT Scout Topogram



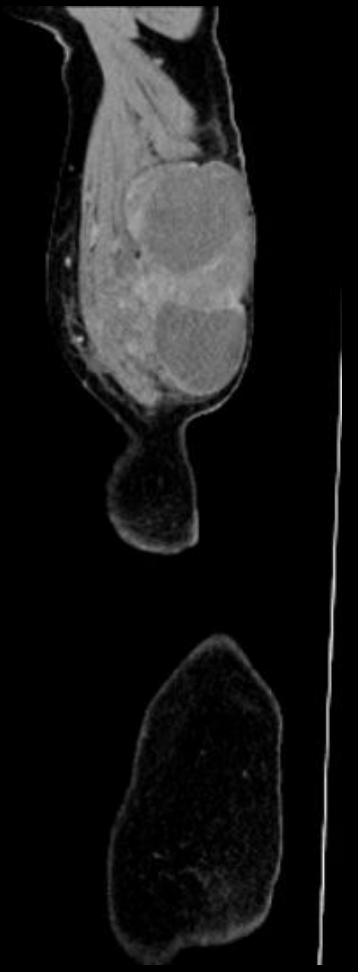
CT Chest, Abdomen, Pelvis with IV contrast



Axial

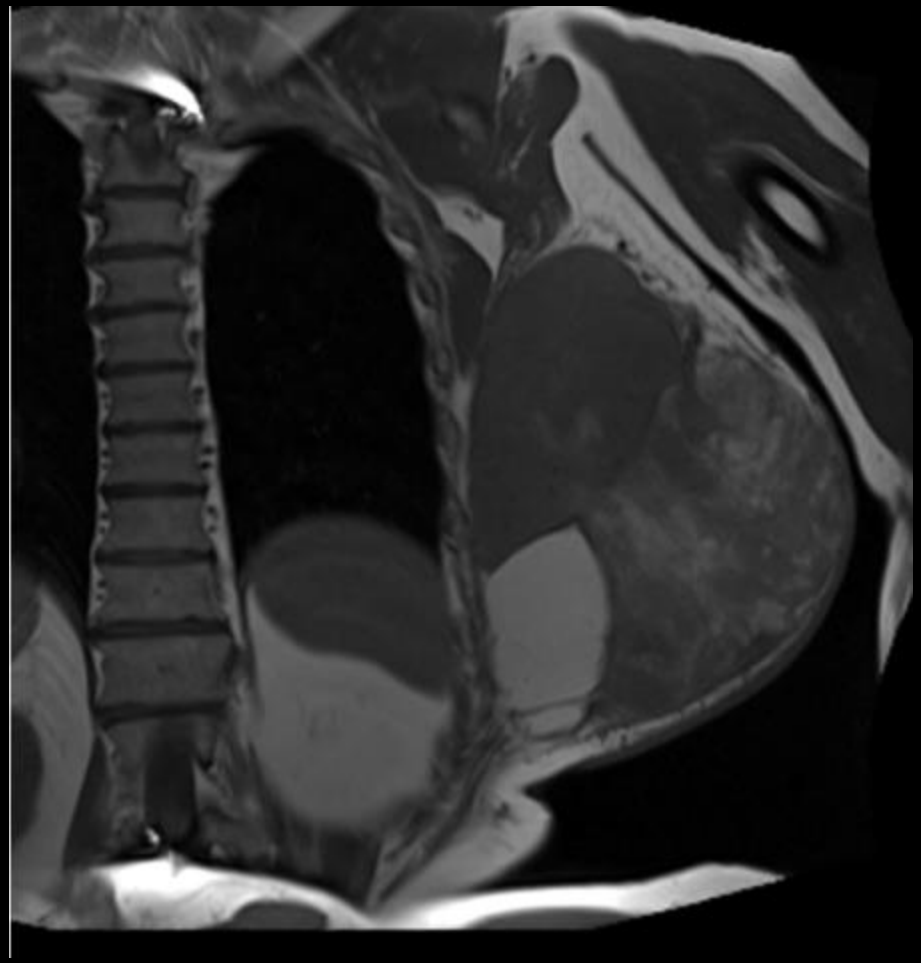


Coronal

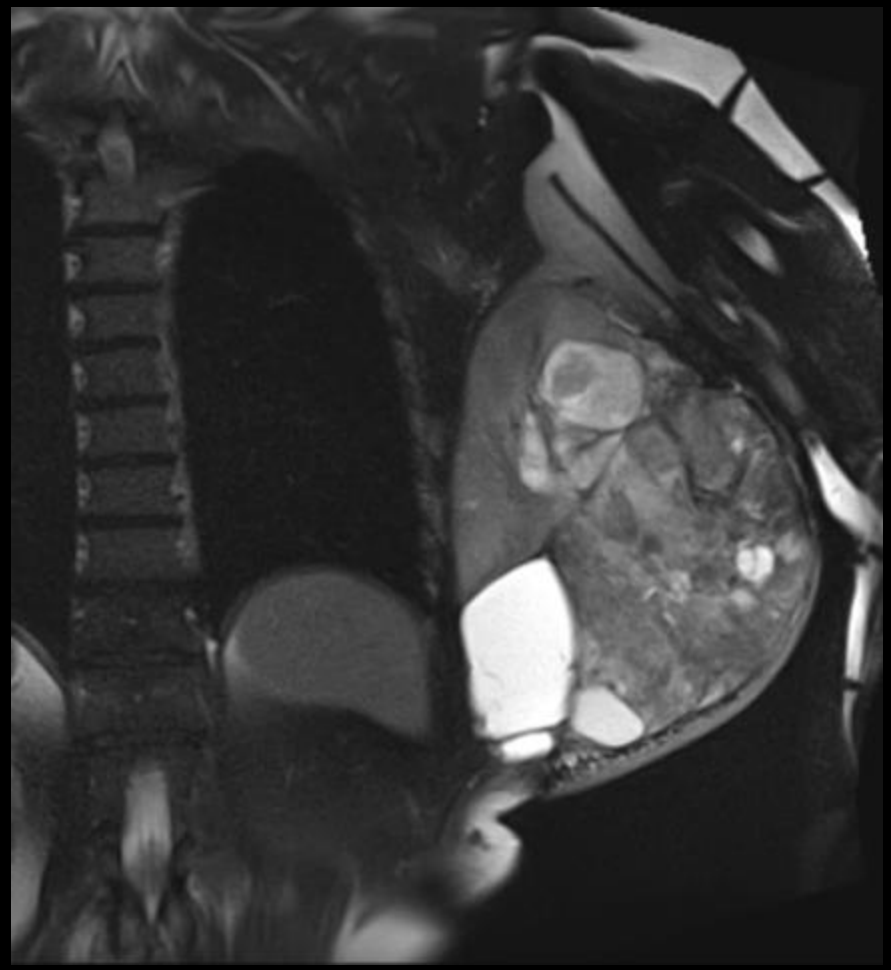


Sagittal

MRI of the Chest wall without and with IV contrast

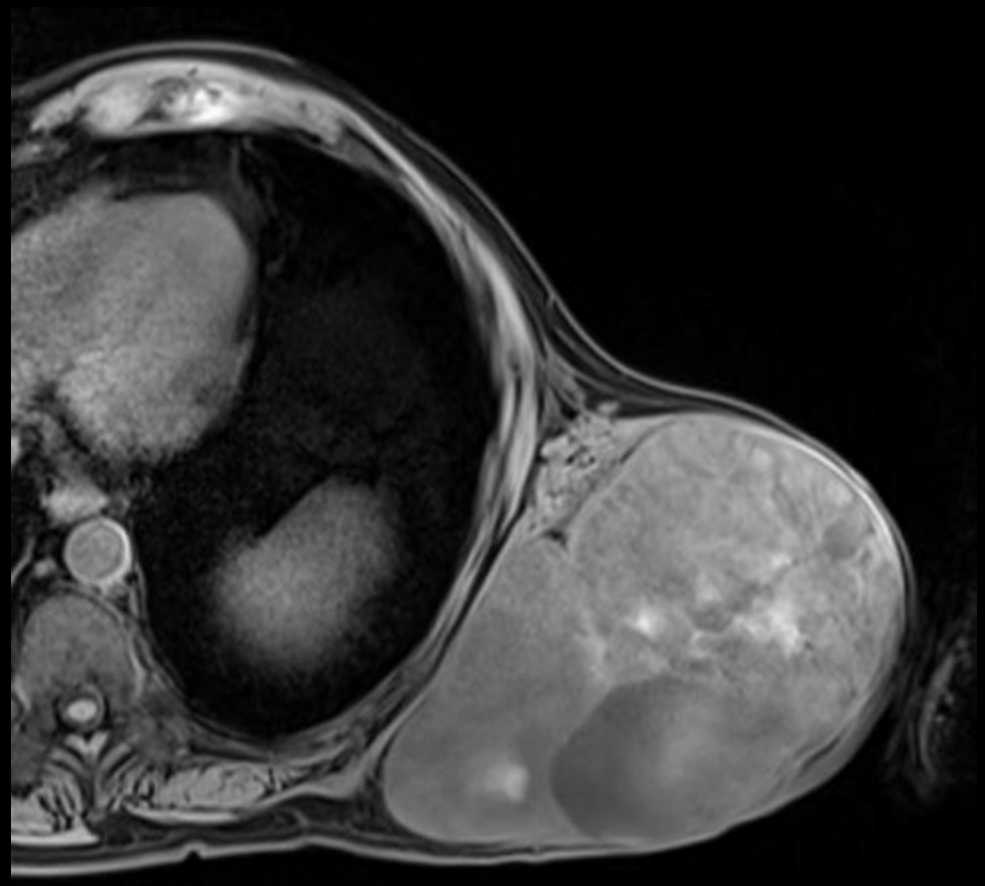


Coronal T1 non-Fat Saturated

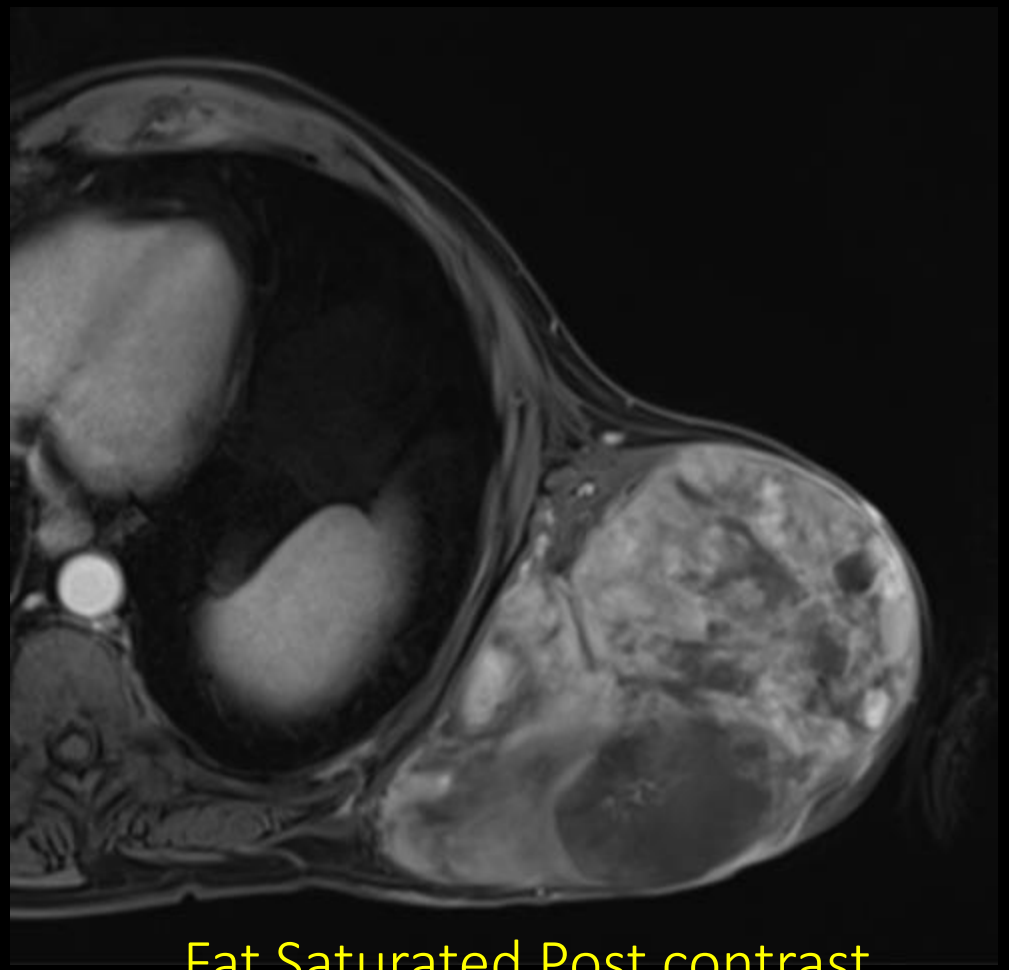


Coronal T2 Fat Saturated

MRI of the chest wall Axial T1



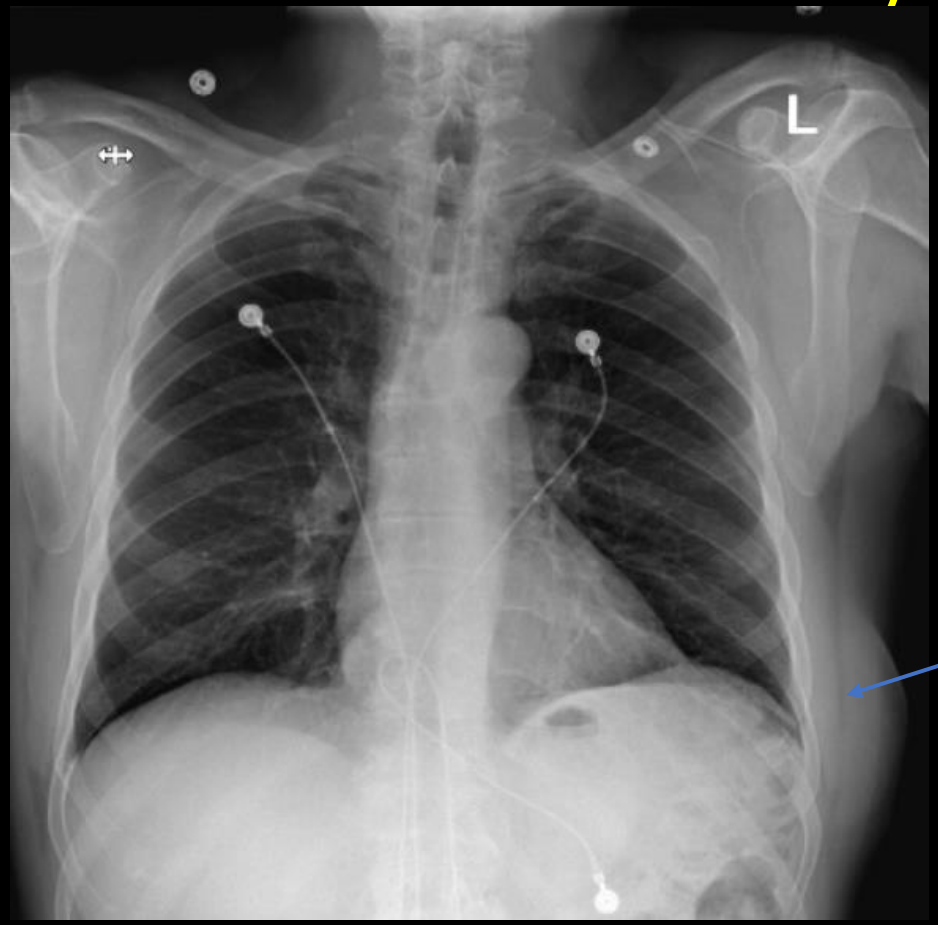
Fat Saturated Pre-contrast



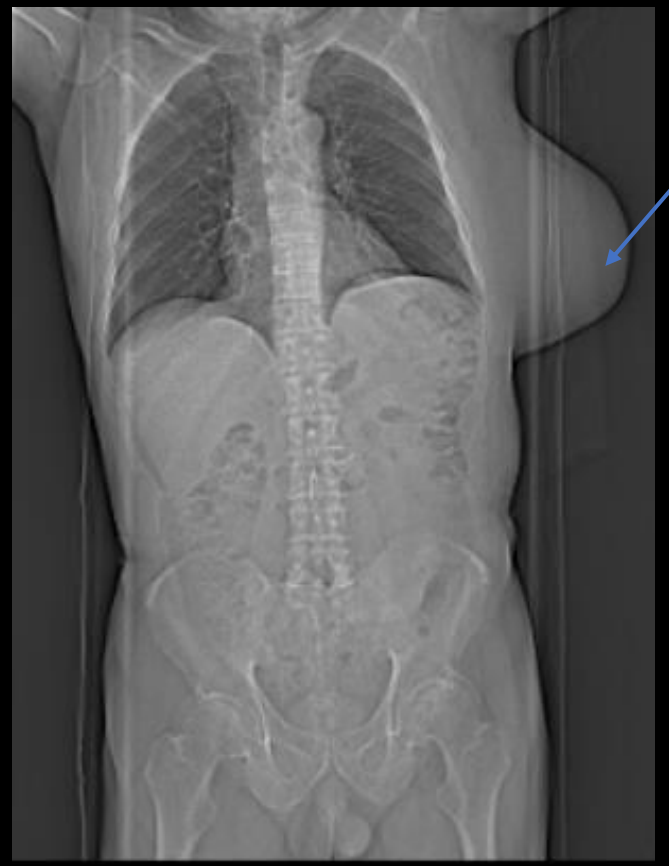
Fat Saturated Post contrast

Radiology Images (labeled)

Chest X-ray and CT Scout Topogram

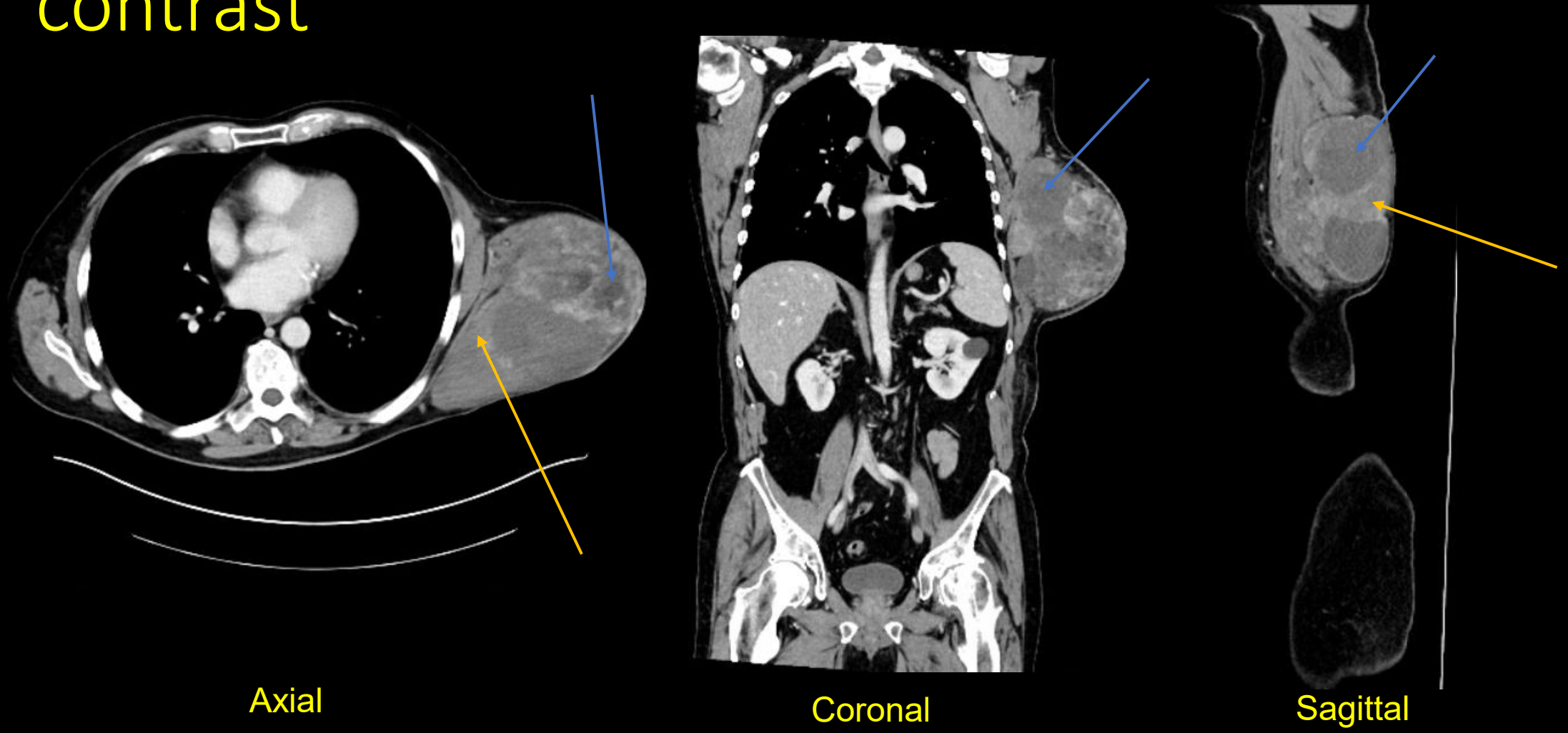


Taken 7/31/2022: Asymmetric contour of left chest wall.



4/24/2025: Asymmetric, mass-like enlargement of the left chest wall soft tissues

CT Chest, Abdomen, and Pelvis with IV contrast



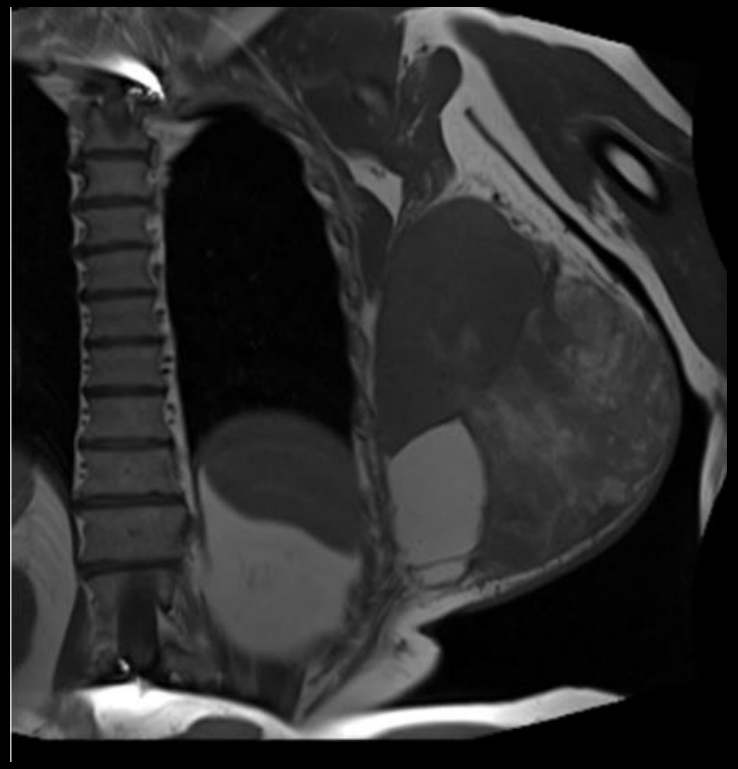
Axial

Coronal

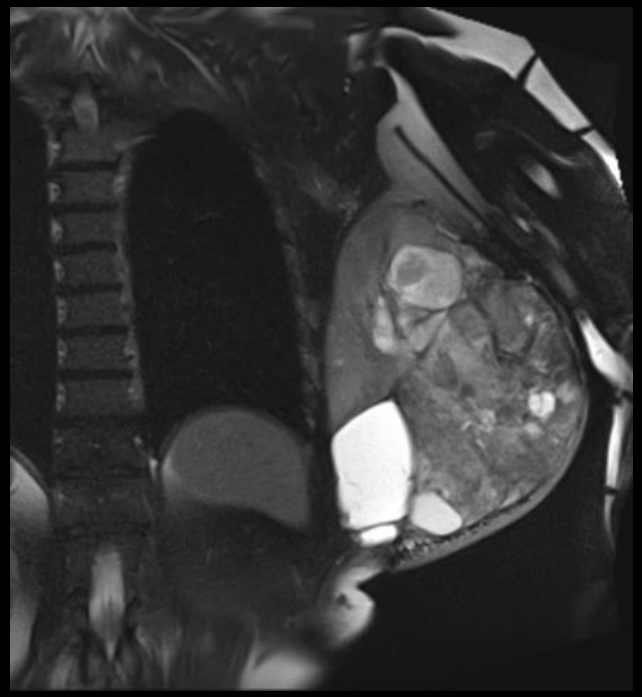
Sagittal

Heterogeneously attenuating mass positioned just lateral to the serratus anterior muscle. Blue arrow denotes a site of hypoattenuation of 10 HU, while the yellow arrow represents 55HU. In addition, there are more avidly enhancing foci within the mass

MRI of the Chest wall without and with IV contrast



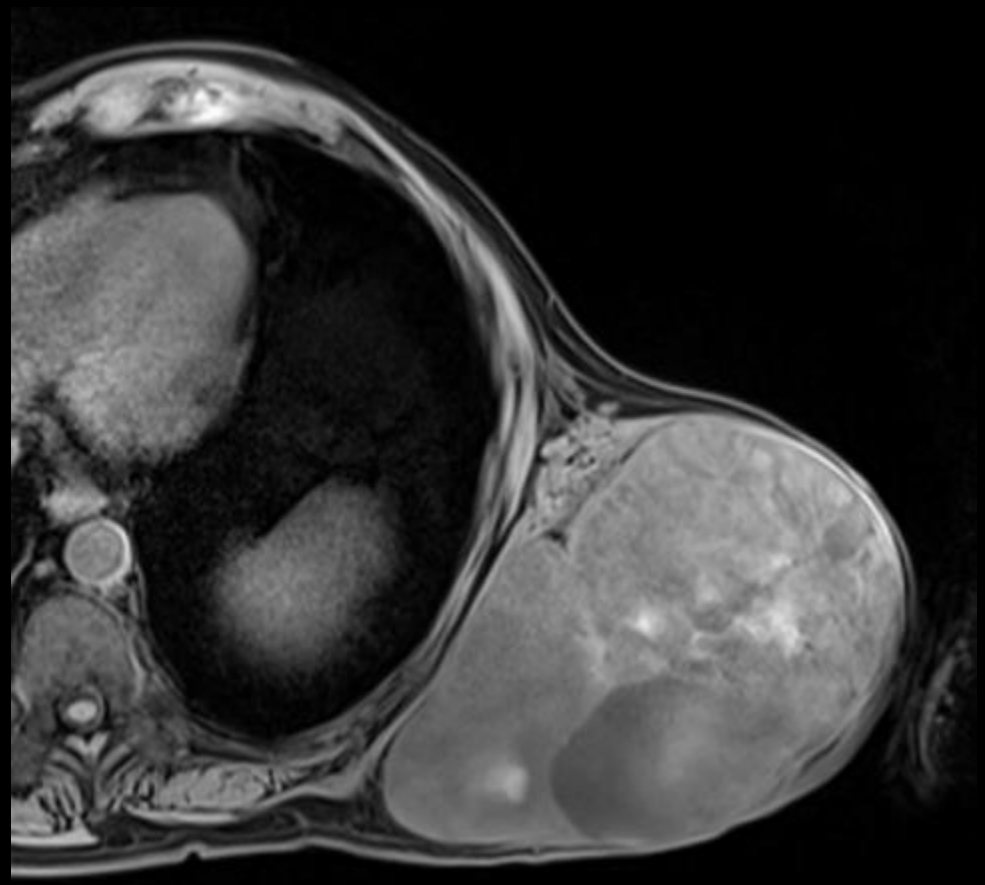
Coronal T1 non-fat Saturated



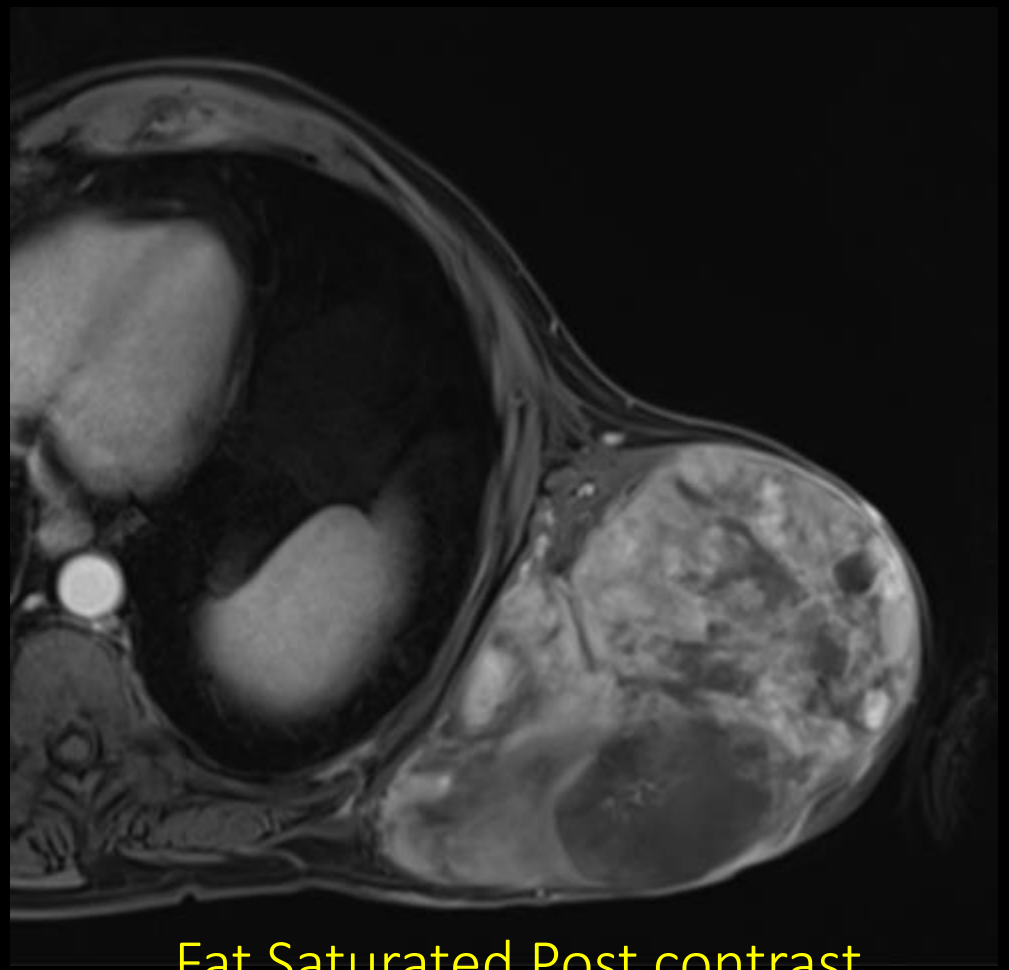
Coronal T2 Fat Saturated

Heterogenous mass with a T1 hyperintense component along the inferior aspect that remains hyperintense on the T2 Fat Saturated sequence, which is incompatible with fat and may represent blood products. There is a relative paucity of the lesions following fat signal characteristics.

MRI of the chest wall Axial T1



Fat Saturated Pre-contrast



Fat Saturated Post contrast

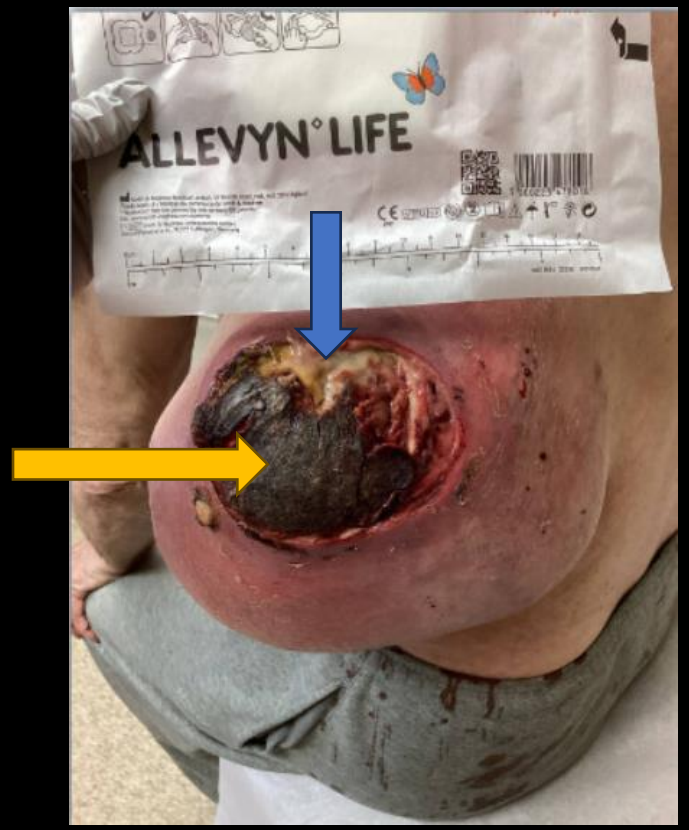
Heterogeneously enhancing mass with areas of non-enhancement concerning for areas of necrosis or hemorrhage.

DDX (based on imaging)

- Undifferentiated pleomorphic sarcoma
  - Presents as a painless mass, weakness, swelling. No distinct imaging findings, but may present with calcifications, heterogenous soft-tissue masses, or homogenous soft-tissue masses.
- Pleomorphic Liposarcoma
  - Least common form of liposarcoma. High incidence of recurrence and metastasis. Characteristic imaging appearance if a well-circumscribed mass that has little to no fat present. MRI may show evidence of internal hemorrhage and necrosis.
- Lymphoma
  - Presents with lymphadenopathy and constitutional symptoms of fever, night sweats, chills
- Metastases
  - Can arise from primary malignancies. Examples include melanoma, Merkel cell carcinoma, H&N carcinomas.
    - Melanoma typically invades the lungs but can spread to the chest wall. MRI would reveal increased T1 intensity due to the elevated levels of melanin present.
    - Merkel Cell carcinoma would present as hypo- to isointense on T1 imaging. On T2 weighted or fat saturated, metastasis would appear iso- to hyperintense
- Malignant peripheral nerve sheath tumor
  - Association with NF1 and present in 3rd decade. Sporadic tumors present in the 4th and 5th decades of life. Presents as a progressive lump, pain or tingling in the affected area, changes in sensation i.e. touch, temperature, or pain. Imaging characteristics include fusiform, hypodense mass. There may also be presence of a rum of fat circumscribing the tumor aka “split fat” sign

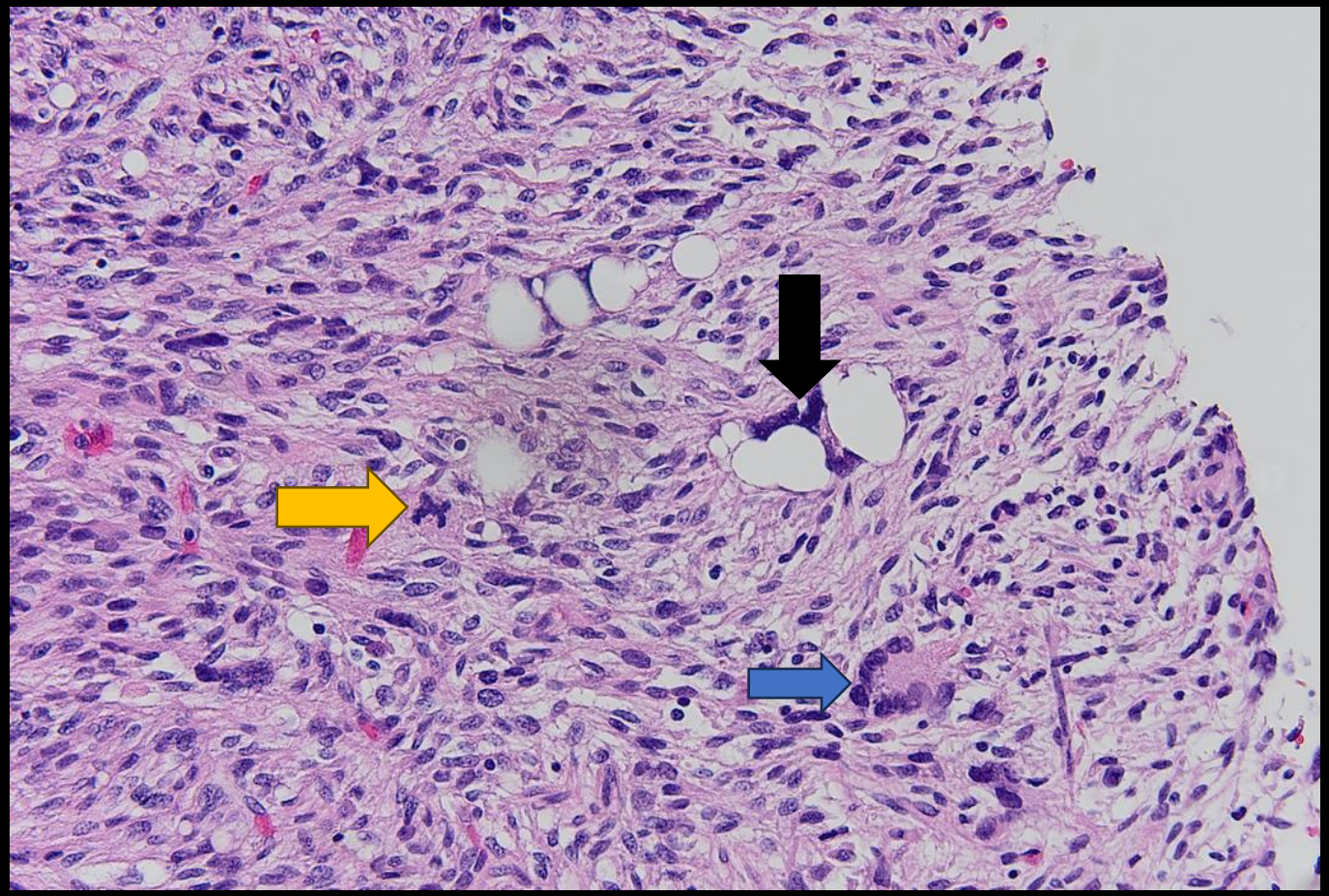
Gross Path (labeled)

View of the chest wall mass
-Mass is ulcerated with black eschar formation (yellow arrow)
-Presence of purulent exudate (blue arrow)



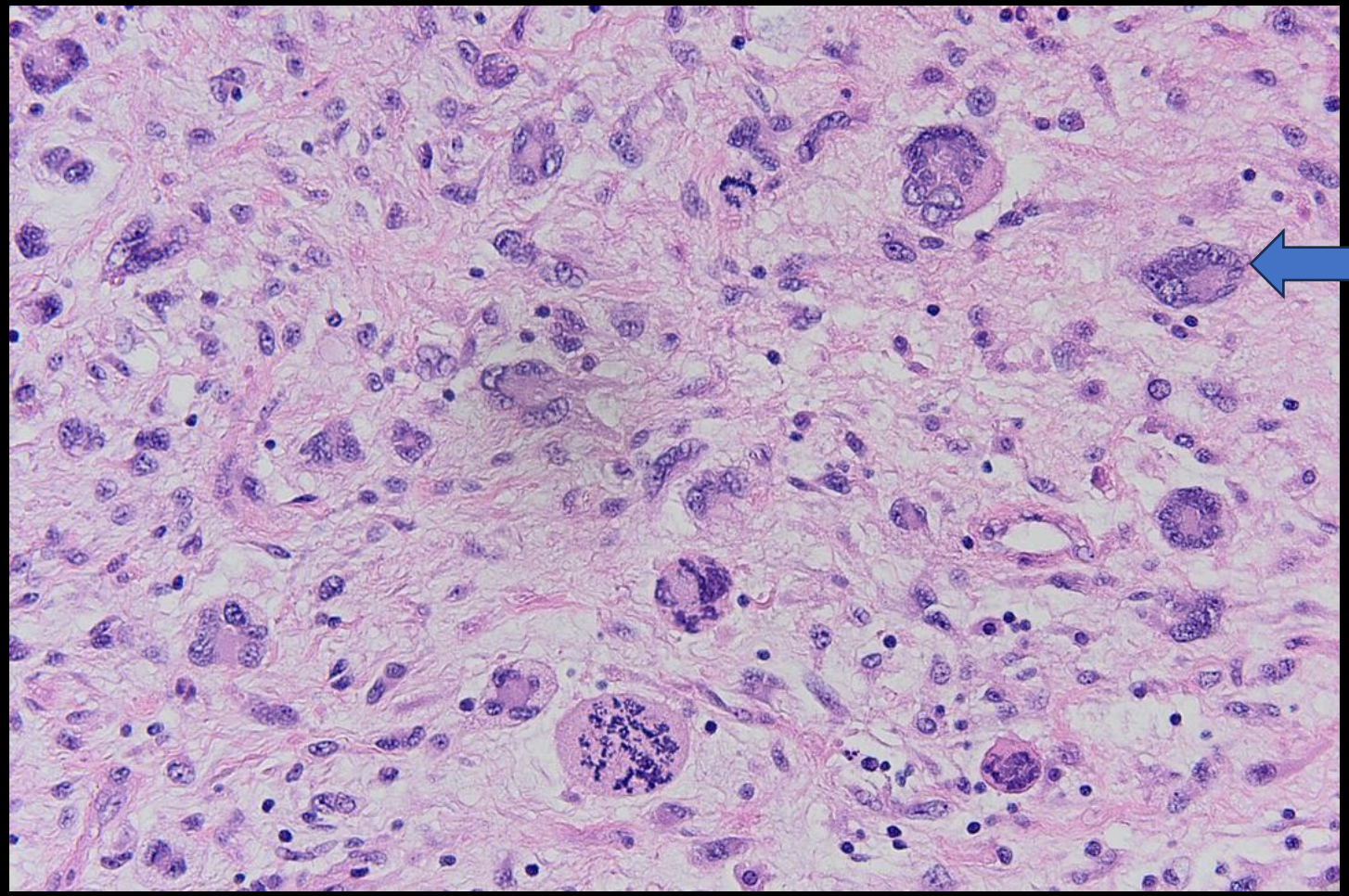
Micro Path (labeled)

Pathology (labeled)



H&E 20x: Spindle cell neoplasm with lipoblasts (black arrow), a multinucleated giant cell (blue arrow) and an atypical mitosis (yellow head)

Pathology (labeled)



H&E 20x: Pleomorphic multinucleated tumor cells

Final Dx:

Pleomorphic Liposarcoma

Case Discussion

- Pathology
  - Types of liposarcomas: well-differentiated dedifferentiated, myxoid, and pleomorphic liposarcoma
  - Unique features of pleomorphic liposarcomas: Variation in the amount of pleomorphic lipoblasts with presence of pleomorphic spindle/epithelioid cell sarcoma, may or may not have presence of necrosis
  - Pleomorphic sarcomas are the least common subtype but considered the most aggressive
  - Due to high recurrence rates, pleomorphic liposarcomas have a poor prognosis. Based on cross-sectional analysis of the Surveillance Epidemiology and End Results database, patients have a 54% and 40% survival rate at 5 and 10 years, respectively

Case Discussion

- Epidemiology
  - Common locations: thigh, button, groin (46%); upper extremity (13%); torso (18%); retroperitoneum (13%); head and neck (9%)
  - Metastases most common to the lungs
- Common symptoms
  - Gradually enlarging, painless mass
  - Can develop secondary paresthesia or edema
  - Rarely presents with constitutional symptoms of fever and/or weight loss or with hypoglycemia
- Associations with genetic conditions and mutations
  - Li Fraumeni, Retinoblastoma
  - TP-53, NF1, RB1

Case Discussion

- Prognostic Factors
  - Most important factors of prognosis are histologic grade, tumor size, and pathologic state at time of diagnosis.
  - 5 year urvival rates for Stage I, II, III were 86, 72, 52, respectively, according to 2010 TMN stage groupings.
- Prognostic Tools
  - Sarculator Nomogram
    - Created by Instituto Nazionale Tumori, Mount Sinai Hospital of Toronto, Royal Marsden Hospital NHS Foundation Trust and Institute Gutave Roussy
    - Tool is found inline and utilizes externally validated nomograms to calculate overall survival and the risk of metastases after removal of primary extremity soft tissue sarcoma
    - Calculation for this patient: 30-45%
  - Memorial Sloan Kettering Cancer Center Nomogram
    - Calculator used after resection and provides a 12 year sarcoma-specific for all anatomic sites.
    - Calculation for this patient: 35-45%
  - Helsinki University Sarcoma nomogram
    - Used for extremity and abdominal wall sarcoma to predict 10 year survival rate
    - Calculation for this patient: 40-50%

References:

Akaike, G., Akaike, T., Fadl, S. A., Lachance, K., Nghiem, P., & Behnia, F. (2019). Imaging of Merkel cell carcinoma: What imaging experts should know. *Radiographics, 39*(7), 2069–2084. https://doi.org/10.1148/rg.2019190102

Anderson, W. J., & Jo, V. Y. (2019). Pleomorphic liposarcoma: Updates and current differential diagnosis. *Seminars in diagnostic pathology*, *36*(2), 122–128. https://doi.org/10.1053/j.semdp.2019.02.007

•Baheti, A. D., O'Malley, R. B., Kim, S., Keraliya, A. R., Tirumani, S. H., Ramaiya, N. H., & Wang, C. L. (2016). Soft-Tissue Sarcomas: An Update for Radiologists Based on the Revised 2013 World Health Organization Classification. *AJR. American journal of roentgenology*, *206*(5), 924–932. https://doi.org/10.2214/AJR.15.15498

Clinical presentation, diagnostic evaluation, and staging of soft tissue sarcoma. (2025). *UpToDate*. Retrieved July 12, 2025, from https://www-uptodate-com.lecom.idm.oclc.org/contents/clinical-presentation-diagnostic-evaluation-and-staging-of-soft-tissue-sarcoma?search=pleomorphic%20liposarcoma&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2#H1390919852

Downes, K. A., Goldblum, J. R., Montgomery, E. A., & Fisher, C. (2001). Pleomorphic liposarcoma: A clinicopathologic analysis of 19 cases. *Modern Pathology, 14*(3), 179–184. https://doi.org/10.1038/modpathol.3880280

Miwa, S., Kobayashi, H., Hirai, T., Okajima, K., Ishibashi, Y., Tsuda, Y., Zhang, L., Ando, T., Shinozaki-Ushiku, A., & Tanaka, S. (2025). *MS-stable/TMB-high pleomorphic liposarcoma successfully treated with pembrolizumab: A case report*. *Frontiers in Oncology, 15*, 1552411. https://doi.org/10.3389/fonc.2025.1552411

Mayo Clinic Staff. (2023, December 30). *Undifferentiated pleomorphic sarcoma: Symptoms & causes*. Mayo Clinic. Retrieved August 6, 2025, from https://www.mayoclinic.org/diseases-conditions/undifferentiated-pleomorphic-sarcoma/symptoms-causes/syc-20389554

O'Regan, K. N., Jagannathan, J., Krajewski, K., Zukotynski, K., Souza, F., Wagner, A. J., & Ramaiya, N. (2011). Imaging of liposarcoma: classification, patterns of tumor recurrence, and response to treatment. *AJR. American journal of roentgenology*, *197*(1), W37–W43. https://doi.org/10.2214/AJR.10.5824

Sarcoma UK. (n.d.). Liposarcoma. In What is sarcoma? → Types of sarcoma. Retrieved July 16, 2025, from https://sarcoma.org.uk/about-sarcoma/what-is-sarcoma/types-of-sarcoma/liposarcoma/

Patnana, M., Bronstein, Y., Szklaruk, J., Bedi, D. G., Hwu, W.-J., Gershenwald, J. E., Prieto, V. G., & Ng, C. S. (2011). *Multimethod imaging, staging, and spectrum of manifestations of metastatic melanoma.* Clinical Radiology, 66(3), 224–236. https://doi.org/10.1016/j.crad.2010.10.014

Pathology Outlines. (n.d.). *Pleomorphic liposarcoma*. In *Soft tissue/adipose: Pleomorphic liposarcoma*. Retrieved July 16, 2025, from https://www.pathologyoutlines.com/topic/softtissueadiposepleomorphiclipo.html

Penn Medicine. (2025). *Malignant peripheral nerve sheath tumor: Symptoms*. Penn Medicine. Retrieved August 6, 2025, from https://www.pennmedicine.org/conditions/malignant-peripheral-nerve-sheath-tumor#Symptoms pennmedicine.org+1en.wikipedia.org+3pennmedicine.org+3en.wikipedia.org+3

UpToDate. (2024). *Clinical presentation, diagnostic evaluation, and staging of soft tissue sarcoma*. In *UpToDate*. Retrieved July 13, 2025, from https://www.uptodate.com/contents/clinical-presentation-diagnostic-evaluation-and-staging-of-soft-tissue-sarcoma

Wan, L., Tu, C., Qi, L., & Li, Z. (2021). Survivorship and prognostic factors for pleomorphic liposarcoma: a population-based study. *Journal of orthopaedic surgery and research, 16*(1), 175. https://doi.org/10.1186/s13018-021-02327-3

Wang, L., Ren, W., & Zhou, X. (2018). Pleomorphic liposarcoma: An analysis of 6 case reports and literature review. *Medicine*, *97*(8), e9986 https://doi.org/10.1097/MD.0000000000009986