

AMSER Rad Path Case of the Month

64-year-old with COPD.

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Patient Presentation

HPI: 53-year-old with history of COPD presents in November of 2011 for c/o flank pain. A CT of the abdomen and pelvis revealed a recently passed renal calculus, in addition to an incidental 1.7 cm pulmonary nodule in the left lower lobe of the lung.

Social Hx:

50 pack year smoking history.

What additional imaging should we order?

Select the applicable ACR Appropriateness Criteria

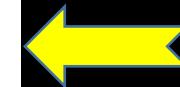
Variant 1:

Solid nodule ≥ 1 cm, low clinical suspicion for cancer.

Radiologic Procedure	Rating	Comments	RRL*
CT chest without IV contrast	8	To detect occult calcifications, fat, bronchus sign, etc.	⊕⊕⊕
FDG-PET/CT whole body	8	If nodule is indeterminate on HRCT.	⊕⊕⊕⊕
Transthoracic needle biopsy	8	If nodule shows contrast enhancement or PET scan is positive.	Varies
CT chest with IV contrast	6	Probably not indicated if PET is performed.	⊕⊕⊕
CT chest without and with IV contrast	6	Can look at washout.	⊕⊕⊕
Watchful waiting with CT follow-up	4	Reasonable at short interval.	Varies
MRI chest without IV contrast	2	Limited data.	0
MRI chest without and with IV contrast	2	Limited data.	0

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

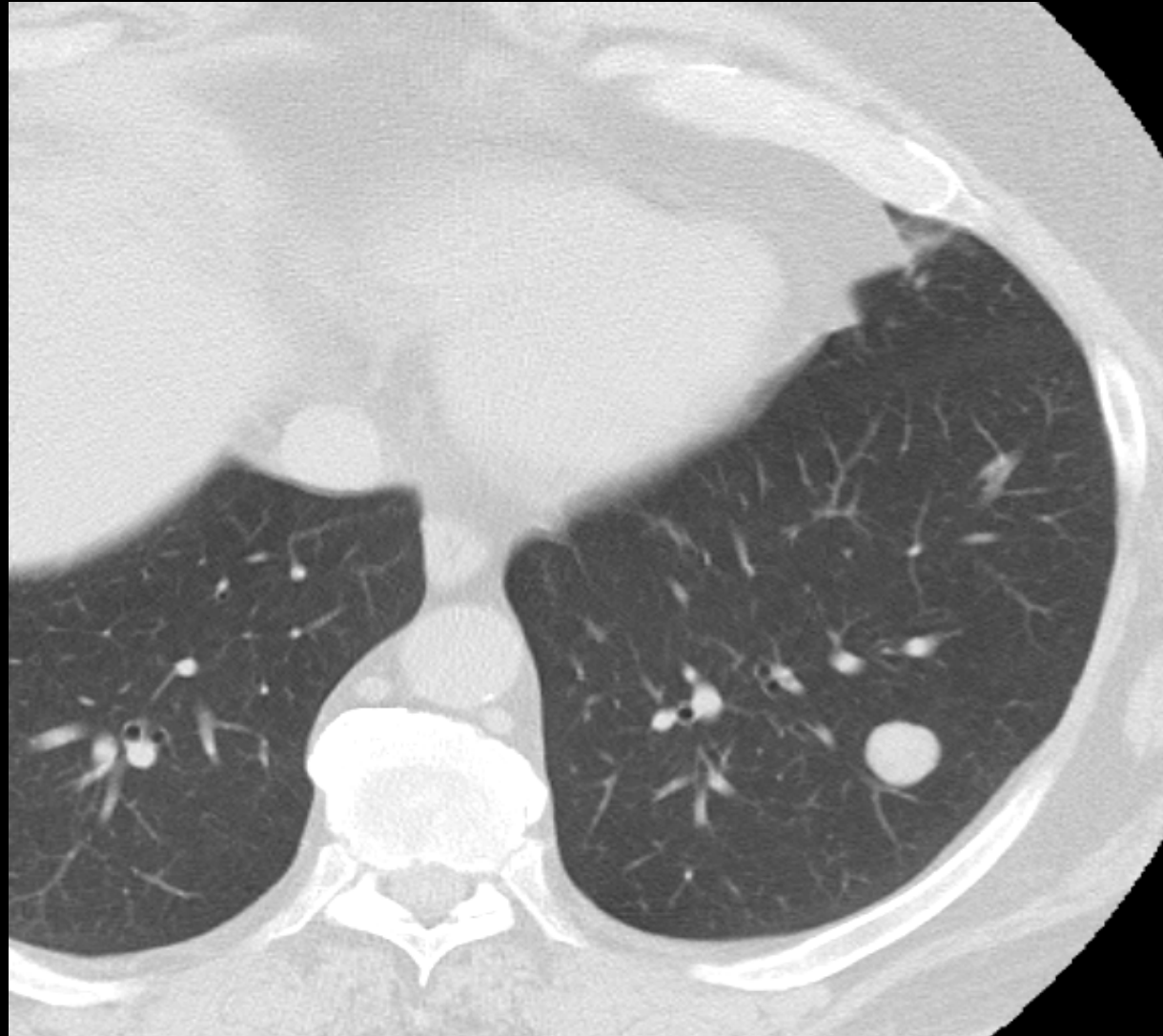


Variant 1 of the ACR Appropriateness Criteria for solid lung nodules applies to nodules ≥ 1 cm **detected on radiograph**. It does not apply to this case but was included for reference.

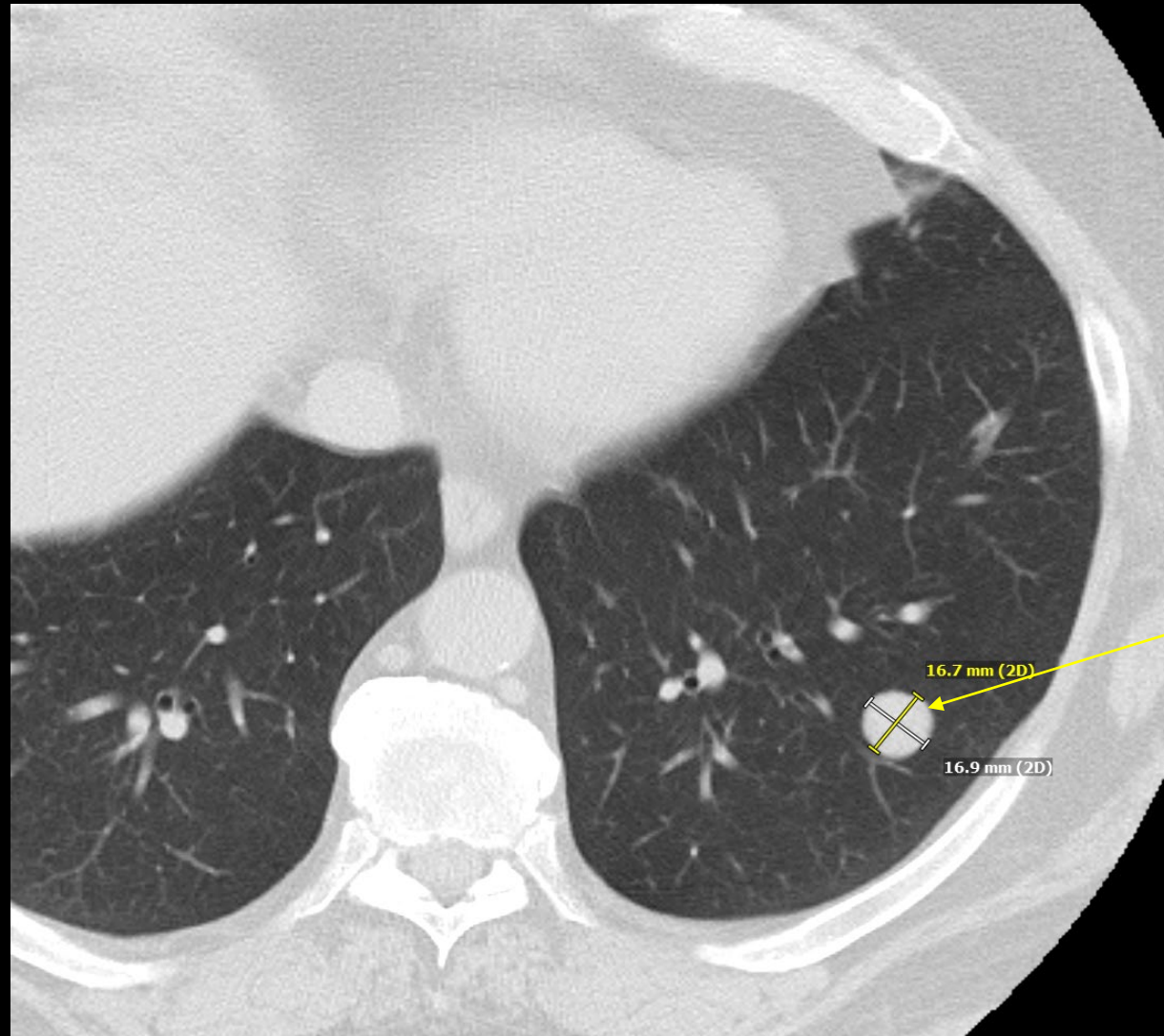
Fleischner Guidelines

- The Fleischner Society defines the most current guidelines for the management of incidental pulmonary nodules.
 - The guidelines should not be applied to patients who are younger than 35 years old, have a history of cancer, or are immunocompromised.
 - These guidelines should also not be used for lung cancer screening examinations. For these studies, the current American College of Radiology Lung CT Screening Reporting and Data System (Lung-RADS) guidelines should be followed instead.
- In the case of an incomplete chest CT demonstrating an incidental pulmonary nodule > 8 mm or with suspicious features, the guidelines recommend further evaluation with a **complete chest CT**.

Noncontrast Chest CT Findings (Unlabeled)



Noncontrast Chest CT Findings (Labeled)

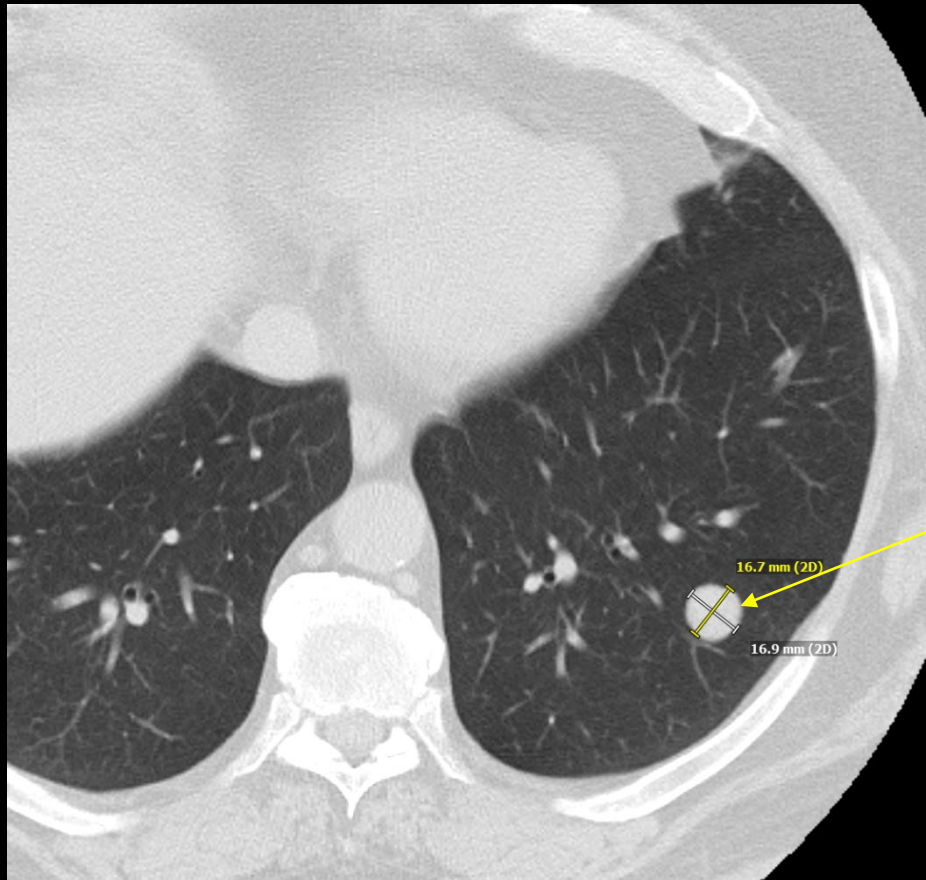


An axial image of the chest CT performed in December 2011 reveals a solid 17 x 17 mm nodule in the left lower lobe of the lung.

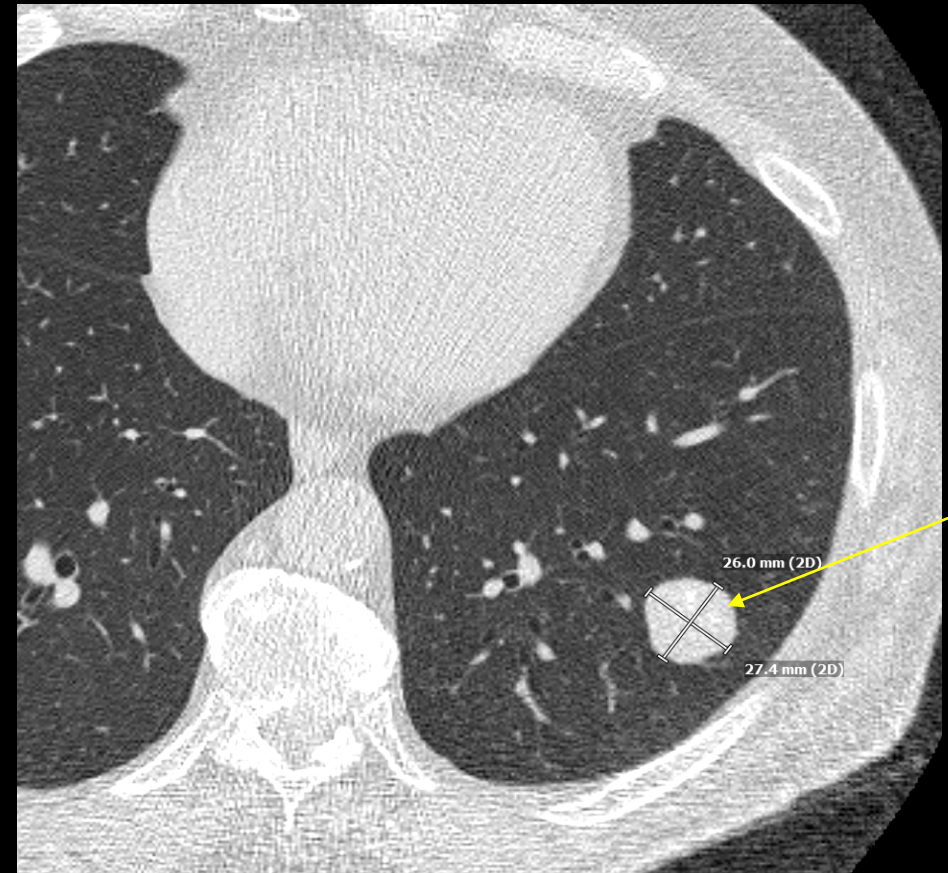
Interval History

- Patient refused further evaluation of the nodule until June 2022 (11 years from initial finding).
- A repeat low dose lung screening CT was ordered.

Comparison Imaging

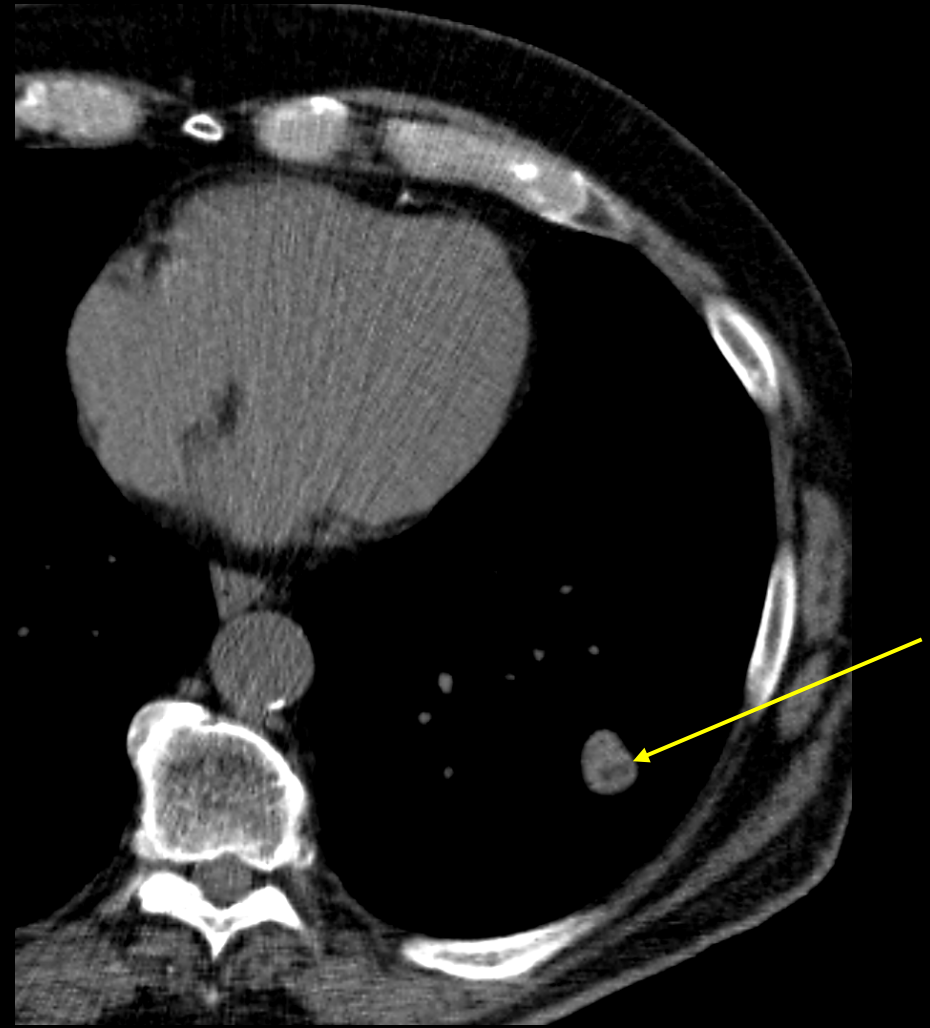


Initial noncontrast CT, axial cut (2011)



Follow up noncontrast CT, axial cut (2022)

The left lower lobe pulmonary nodule increased in size from 17 x 17 mm to 27 x 26 mm.



The nodule demonstrated internal calcifications (left image). There were potential areas of intralesional fat (right image), though differentiation from image noise was limited due to low dose technique and the relatively thick slices (5 mm) of the soft tissue kernel images.

Differential Diagnosis

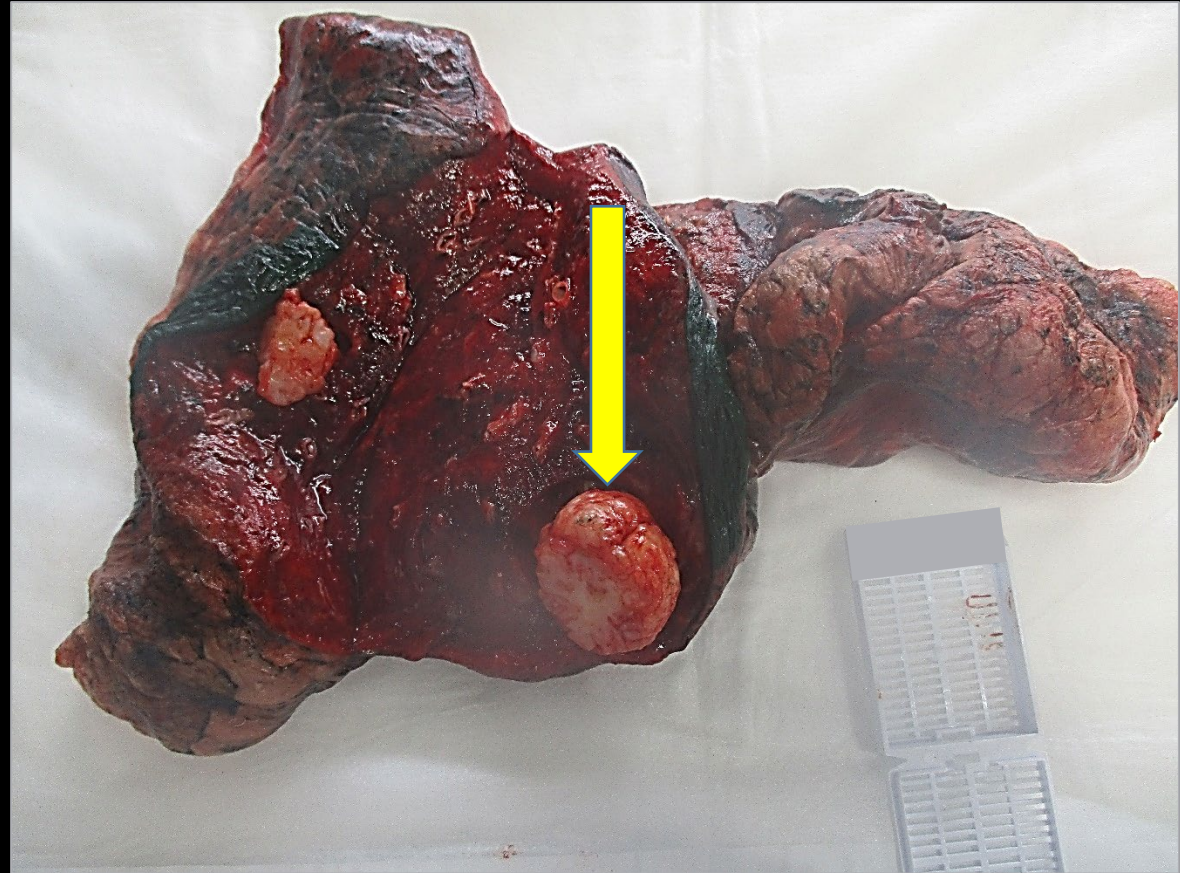
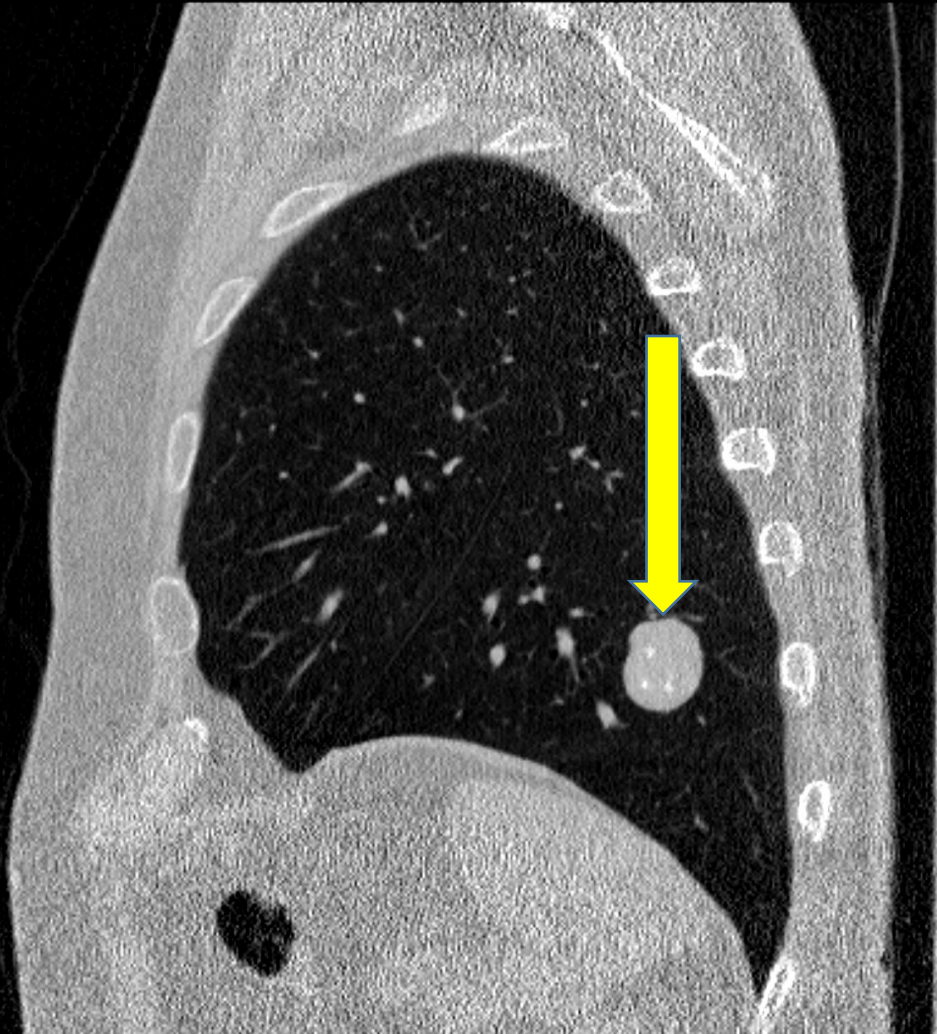
- A stable, well-circumscribed pulmonary lesion that demonstrates fat (-40 to -120 Hounsfield units) is virtually pathognomonic for a pulmonary hamartoma. However, only about 60% of pulmonary hamartomas demonstrate fat on CT.
- The differential for fat-containing pulmonary lesions is narrow:
 - Pulmonary hamartoma
 - Lipoma
 - Myelolipoma
 - Lipoid pneumonia
 - Fat-containing metastases
- When intralesional fat cannot be definitively identified, a broader differential of **solitary pulmonary nodules with internal calcifications** is required:
 - Granuloma
 - Pulmonary hamartoma
 - Pulmonary carcinoid
 - Bronchogenic carcinoma
 - Pulmonary metastases

Surgical Consult

- Patient seen by thoracic oncology for discussion of options.
 - Option 1: Bronchoscopy with biopsy.
 - Option 2: VATS wedge resection of left lower lobe.
- Patient chose to undergo wedge resection of the left lower lobe.

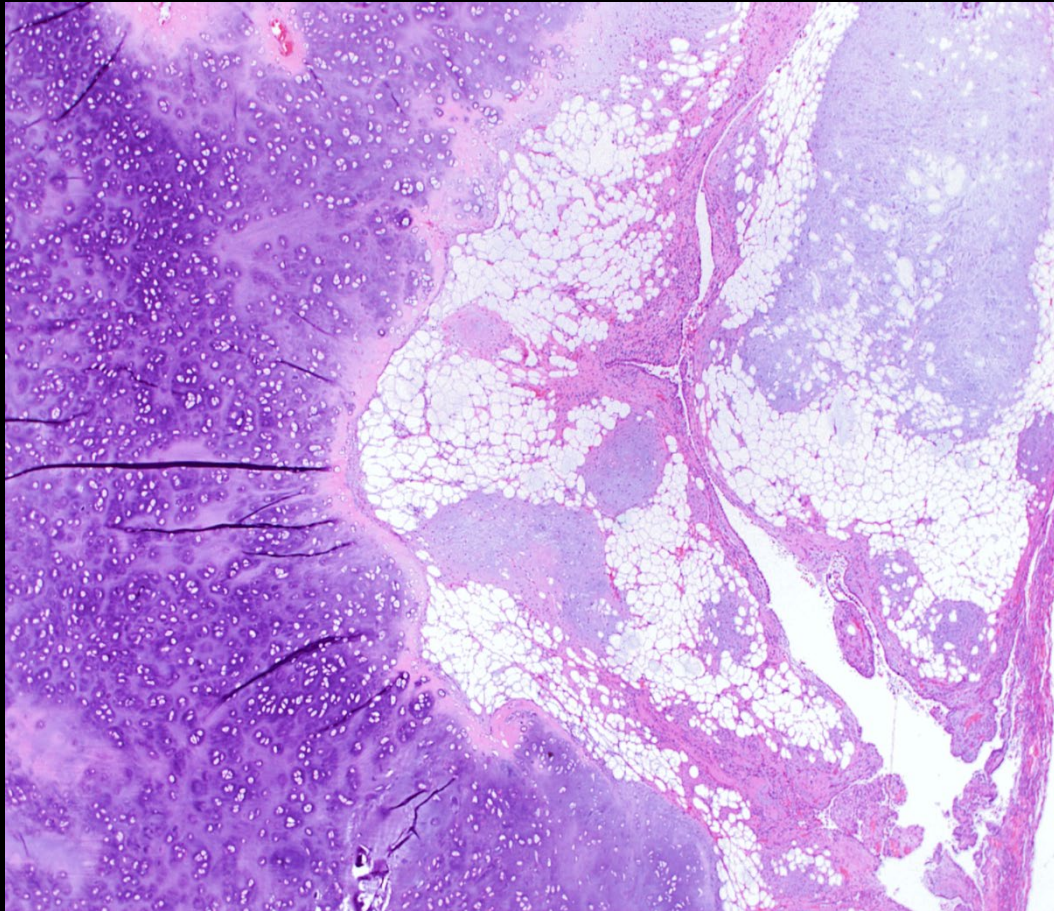
Gross Findings

s/p robotic assisted wedge resection of LLL of lung

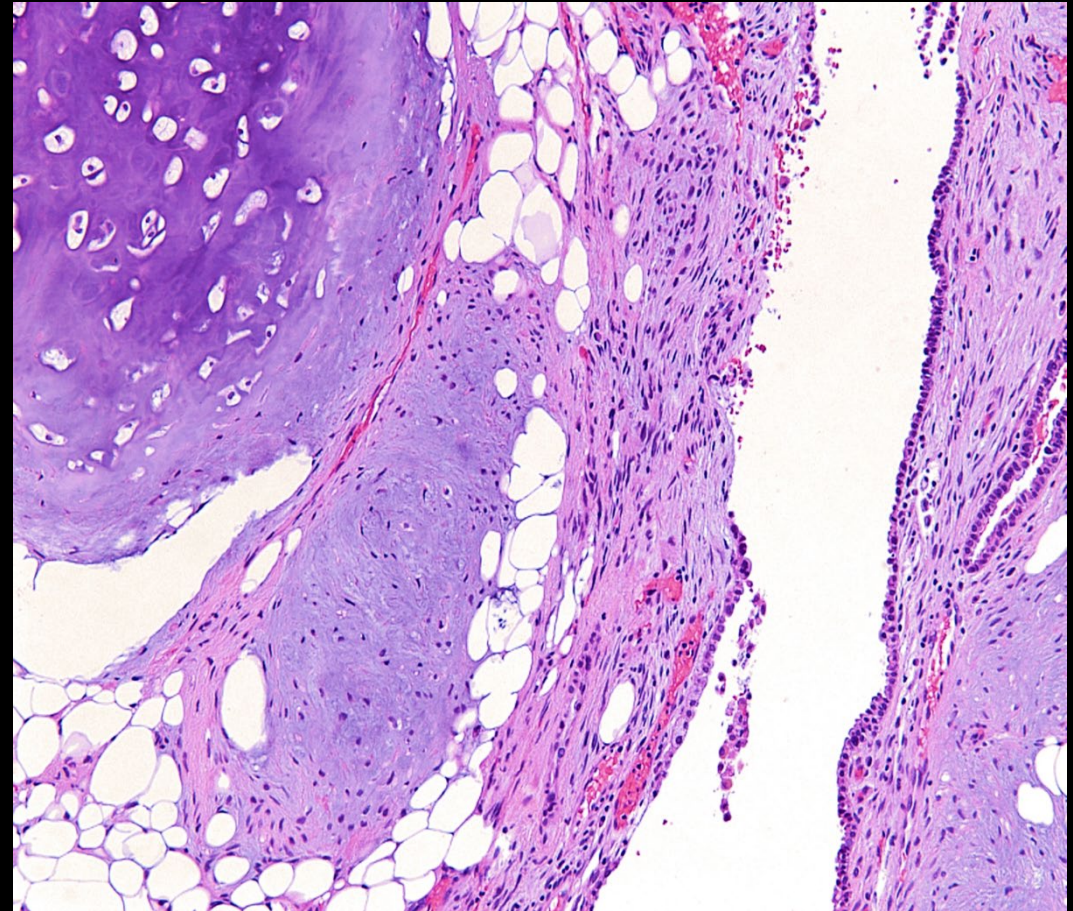


On dissection, the nodule separated from the tissue without apparent attachments.

Histopathological Findings

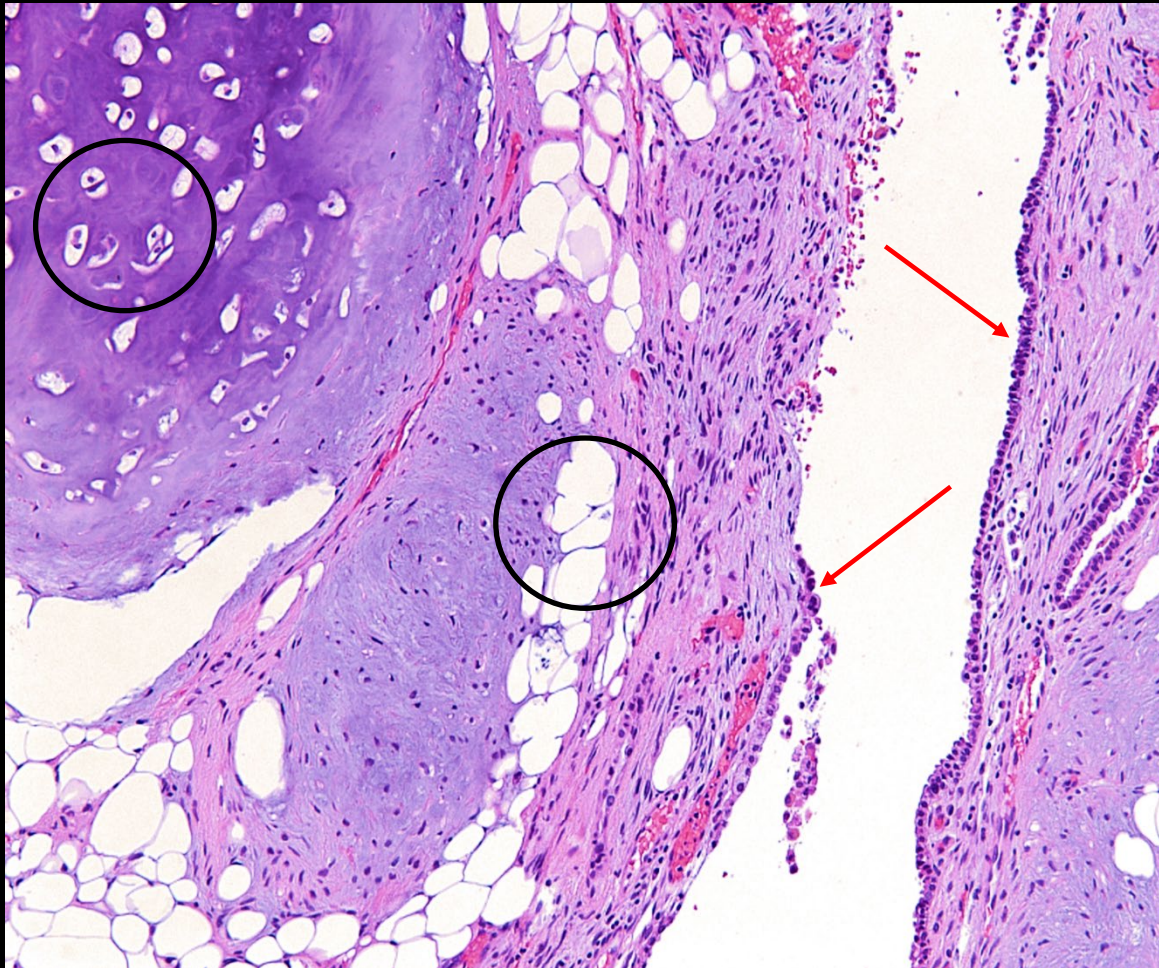


4x H&E image



10x H&E image

Histopathological Findings



10x H&E image

Microscopic analysis of the nodule reveals isogenous groups, consistent with hyaline cartilage (black circle, left), in addition to fat droplets (black circle, right). The mesenchyme is seen entrapped within a low cuboidal respiratory epithelium (red arrows), consistent with the site of origin.

By definition, a hamartoma must contain at least two mesenchymal tissues.

A **pulmonary hamartoma** is defined as the above in addition to entrapment within respiratory epithelium.

Final Dx:

Pulmonary Hamartoma

Case Discussion: Background

- A hamartoma, derived from “hamartia” or the Greek word for “faulty”, is a usually benign mixture of disorganized tissue native to a particular location.
 - Capable of malignant transformation, but this is rare
 - Contrast to a teratoma, a mass of tissue foreign to a particular location
- Hamartomas can occur almost anywhere, but are most common in the lungs, hypothalamus, breast and colon.
- Most cases are asymptomatic and found incidentally on imaging for another condition.

Case Discussion: Clinical Presentation

- Evaluation: The presentation of a hamartoma depends on its location and can range from asymptomatic to nonspecific symptoms related to the site of origin:
 - Hypothalamus: gelastic or dacrystic seizure, altered mental status, vision changes
 - Lung: chronic cough, hemoptysis, fever, respiratory sounds (i.e., crackles)
 - Heart: chest pain, palpitations, edema, dyspnea

Case Discussion: Diagnosis and Treatment

- Diagnosis

- Imaging: A Chest CT is the diagnostic imaging test of choice and classically demonstrates localized collections of fat alternating with foci of “popcorn” calcifications.

- This is an example of a hamartoma that does not fit the classic presentation.

- The calcifications were punctate and indeterminate, and technique limited definitive identification of intralesional fat.

- Histopathology: A sample of tissue will demonstrate haphazard growth of normal tissue and the architectural pattern of cytologically normal cells native to the local site.

- Treatment

- Watchful waiting is acceptable management of asymptomatic hamartomas.

- Wedge resection is the treatment of choice for patients with symptomatic pulmonary hamartomas.

References

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