A lung lesion mimicking malignancy: sclerosing pneumocytoma

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Abstract

Aim: Sclerosing pneumocytoma (SP) is a rare benign pulmonary neoplasm that can mimic malignancy on radiologic imaging, presenting a diagnostic challenge.

Case: A 56-year-old woman was evaluated for an incidentally detected 30 mm solid mass in the the left lower lobe. PET/CT revealed increased FDG uptake (SUVmax: 5.5), and MRI showed marked contrast enhancement suggestive of a neuroendocrine tumor. Bronchoscopy revealed no endobronchial involvement. Pulmonary function was sufficient for resection. Given the lesion's central location, imaging findings concerning for malignancy, and absence of a preoperative diagnosis, video-assisted thoracoscopic lobectomy with mediastinal lymph node dissection was performed. Histopathological and immunohistochemical analysis confirmed SP. The postoperative course was uneventful, and no recurrence was observed during 14 months of follow-up.

Conclusions: Sclerosing pneumocytoma should be included in the differential diagnosis of solitary pulmonary nodules. In patients with radiological features mimicking malignancy, anatomical resection may be required for definitive diagnosis and oncological safety.

***Keywords**: Lung tumor; imaging, lobectomy; sclerosing pneumocytoma; diagnostic challenge*

1. Introduction

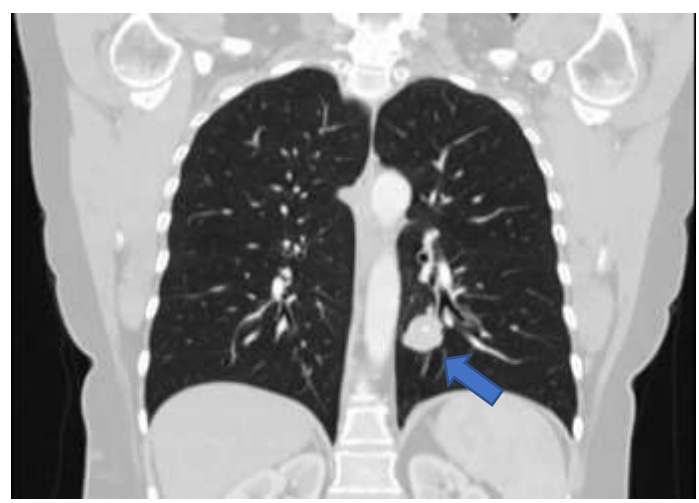
Sclerosing pneumocytoma (SP) is a rare pulmonary neoplasm that is typically benign in nature. It predominantly affects women and non-smokers.[1-3] SP is often asymptomatic and usually detected incidentally during routine imaging studies.[4,5] However, some patients may present with symptoms such as cough, sputum production, or chest pain.[2,4]

The diagnostic process can be challenging, as SP often exhibits radiological features that mimic malignant lesions.[5] Computed tomography (CT) typically reveals a solitary lesion with ill-defined margins and low Hounsfield unit values.[4] Histologically, SP may demonstrate papillary, solid, angiomatous, or sclerotic growth patterns.[2,3] Immunohistochemical analysis supports the diagnosis through characteristic positivity for TTF-1 and panCK.[3,5]

Imaging modalities play a critical role in the evaluation of SP. CT scans are useful for assessing lesion size and localization, with most tumors located in the lower lobes and peripheral regions of the lungs.[1,4] However, a definitive diagnosis is generally established through surgical biopsy and histopathological examination.

This case report discusses the diagnostic and surgical management of an SP lesion that radiologically mimicked malignancy, supported by a review of the relevant literature.

Figure 1



A solid mass lesion measuring 30×22 mm with internal calcifications located in the mediobasal segment of the left lower lobe. a. Axial view; b. Coronal view.

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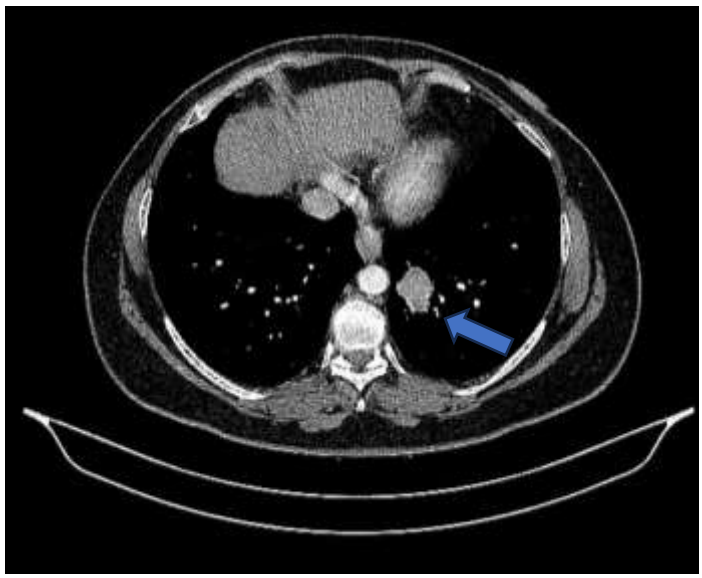
Figure 2



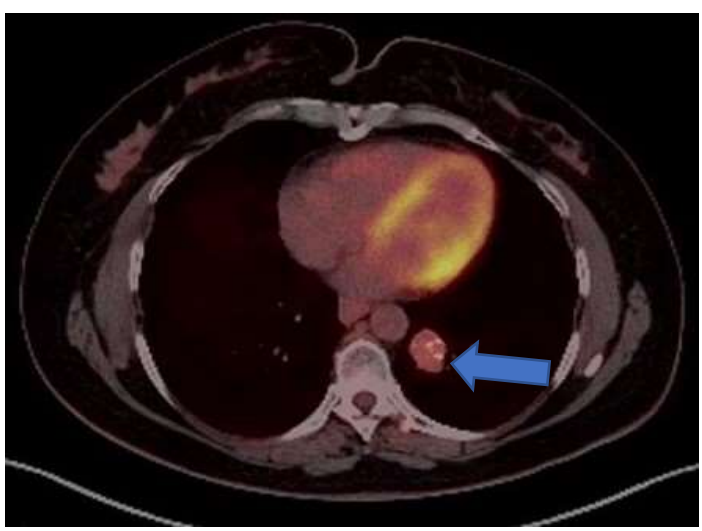
Axial thoracic CT scan in the mediastinal window demonstrates a well-circumscribed, solid mass located in the mediobasal segment of the left lower lobe. The lesion exhibits soft-tissue attenuation with internal areas of calcification. No evidence of mediastinal invasion or lymphadenopathy is observed.

2. Case

A 56-year-old female patient with no active complaints was referred to our clinic following the incidental detection of a pulmonary mass in the left lower lobe during routine preoperative imaging for cholecystectomy.

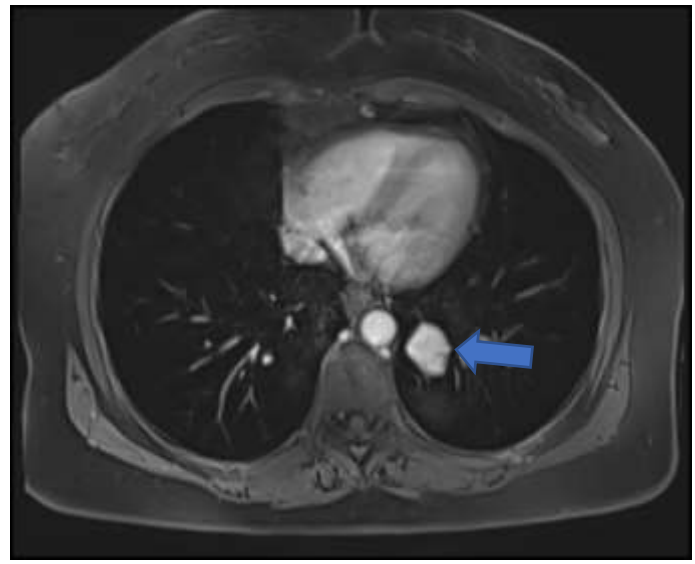
Physical examination revealed no pathological findings in the respiratory system. Thoracic computed tomography (CT) demonstrated a well-circumscribed, solid, nodular lesion measuring approximately 30 mm in diameter, located in the mediobasal segment of the left lower lobe (Figure 1-2).

Figure 3



PET/CT imaging reveals a 24×27 mm nodular lesion located in the lateral basal segment of the left lower lobe, with lobulated contours, internal calcifications, and increased FDG uptake (SUVmax: 5.50).

Figure 4



Thoracic/mediastinal MRI demonstrates a well-defined nodular mass lesion measuring 28×23 mm in the medial region of the left lower lobe on axial images. Post-contrast sequences following intravenous contrast administration show marked enhancement of the lesion, raising suspicion for a neuroendocrine tumor.

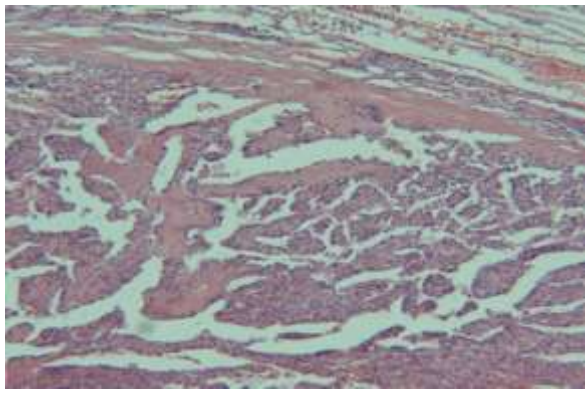
Minimal calcified areas were noted around the lesion. Positron emission tomography/computed tomography (PET/CT) showed increased metabolic activity within the lesion, with a maximum standardized uptake value (SUVmax) of 5.5 (Figure 3).

Further characterization with thoracic and mediastinal magnetic resonance imaging (MRI) revealed a well-defined lesion with homogeneous contrast enhancement following intravenous administration, suggestive of a neuroendocrine tumor (Figure 4). Brain MRI showed no evidence of intracranial pathology or metastatic disease.

In the preoperative evaluation, flexible bronchoscopy was performed to exclude possible endobronchial extension and to obtain a diagnostic biopsy if feasible; however, no endobronchial pathology was observed. Preoperative pulmonary function testing revealed an FEV_1 of 2.16 L (87%), FVC of 2.41 L (77%), and an FEV_1/FVC ratio of 89.7%, all considered adequate for lobectomy. No obstructive or clinically significant restrictive ventilatory impairment was identified.

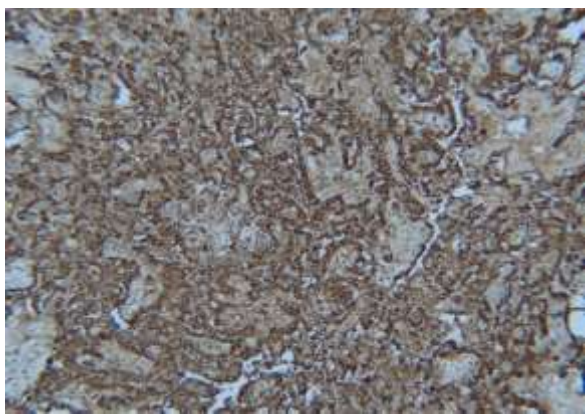
Given the lesion's central localization, radiologic features suspicious for malignancy, and the absence of a definitive preoperative diagnosis, the patient underwent video-assisted thoracoscopic surgery (VATS) with left lower lobectomy and mediastinal lymph node dissection. The postoperative course was uneventful, and the patient was discharged on postoperative day seven. Histopathological examination confirmed the diagnosis of sclerosing pneumocytoma (Figures 5–7). Immunohistochemical analysis showed positivity for TTF-1 and EMA. No lymph node involvement was identified. The patient continues to be followed postoperatively and remains recurrence-free at 14 months.

Figure 5



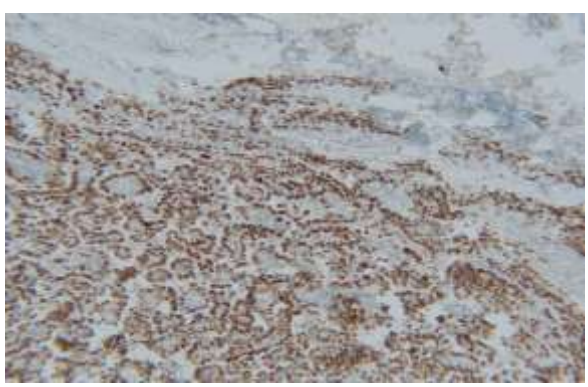
Hematoxylin and eosin (H&E) stained section at 10× magnification shows papillary and solid architecture in a case of sclerosing pneumocytoma. Papillary projections are lined by monomorphic cells overlying fibrovascular cores. Sclerotic areas and low mitotic activity support the benign nature of the lesion.

Figure 6



Immunohistochemical staining for EMA (epithelial membrane antigen) shows strong membranous positivity in tumor cells at 10× magnification. This finding supports the epithelial origin of the tumor and reinforces the diagnosis of sclerosing pneumocytoma.

Figure 7



Immunohistochemical staining for TTF-1 (Thyroid Transcription Factor-1) shows diffuse nuclear positivity in tumor cell nuclei at 10× magnification. This pattern is consistent with pulmonary epithelial origin and supports the diagnosis of sclerosing pneumocytoma.

3. Discussion

Sclerosing pneumocytoma (SP) is a rare pulmonary tumor, generally benign in nature, most frequently observed in middle-aged women and often detected incidentally on routine chest radiographs. Although histopathologically benign, SP can exhibit increased metabolic activity on PET/CT, which may lead to radiologic misinterpretation as malignancy. Reported SUVmax values vary widely, with some lesions reaching up to 7.4.[6] In a series of three cases, SUVmax values of 1.64, 2.49, and 3.12 were reported, yet all lesions were confirmed benign.[7] A positive correlation between tumor size and SUVmax has also been described, suggesting that larger lesions may demonstrate higher FDG uptake.[6]

In the present case, the lesion demonstrated a SUVmax of 5.5, within the suspicious range for malignancy. The marked contrast enhancement on MRI and central intralobar localization further contributed to diagnostic uncertainty. Based on these findings, a multidisciplinary evaluation concluded that lobectomy was warranted for both diagnostic and therapeutic purposes.

Video-Assisted Thoracoscopic Surgery (VATS) is a widely used approach in the treatment of SP, allowing histopathologic confirmation and complete resection with favorable outcomes and low complication rates.[1,8] Surgical techniques performed via VATS include wedge resection, segmentectomy, lobectomy, and mediastinal lymph node dissection, selected according to tumor size, localization, and preoperative suspicion of malignancy. While parenchyma-sparing techniques such as wedge resection and segmentectomy are preferred for small, peripheral lesions due to comparable disease-free survival and lower complication rates[1,8,9] more extensive resections, including lobectomy or rarely pneumonectomy, may be required in large, central, or multifocal lesions[1,8-11] In centrally located SP, parenchyma-sparing approaches are often not feasible, and lobectomy with mediastinal lymph node dissection is generally recommended, especially in the presence of radiologic suspicion of malignancy.[9,11] The frequency of surgical techniques reported in the literature varies (Table 1).

Table 1

Surgical Methods and Reported Usage Rates in SP[1,8-10]

Surgical Method	Reported Usage (%)
Wedge Resection	19-49
Segmentectomy	31
Lobectomy	16-81
Pneumonectomy	6-18

In our patient, the lesion was centrally located within the left lower lobe and not amenable to peripheral resection. Radiologic findings, including high SUVmax and suspicious enhancement pattern, supported the decision for lobectomy to achieve both diagnostic clarity and oncologic safety. The surgical plan was formulated after multidisciplinary discussion. Intraoperative frozen section was not performed because preoperative imaging findings had already guided the surgical strategy; moreover, previous studies have reported false-negative or inconclusive diagnoses in 25–56% of SP cases diagnosed via frozen section.[12]

Flexible bronchoscopy was performed to assess possible endo-

bronchial extension and obtain biopsy if feasible. Bronchoscopy plays an important role in surgical planning for pulmonary masses by confirming anatomical localization and excluding alternative diagnoses. It is particularly valuable in central and large lesions, enabling detection of endobronchial invasion, acquisition of biopsy specimens, and guidance for the surgical approach.[13]

While sublobar resection is sufficient for most SP cases, certain clinical conditions necessitate lobectomy. These include large tumor size requiring adequate margins (reported in lesions 3.5–13.5 cm).[14,15] central or hilar location where sublobar resection is technically not feasible.[9,15] presence of lymph node metastasis or local invasion[16,17], multifocal or extensive disease[10,18], and cases preoperatively misdiagnosed as malignancy (e.g., adenocarcinoma). In such scenarios, anatomical lobectomy with mediastinal lymph node dissection ensures both diagnostic accuracy and oncologic safety.

Clinical Outcomes and Considerations

Lobectomy is considered a safe and effective option in patients with large, central, lymph node-positive, or radiologically suspicious SP.[9,14,17] While overall prognosis is favorable, misdiagnosis or insufficient resection may result in recurrence or poor comes.[10,16]

Surgical approach in SP should be individualized based on radiological, anatomical, and clinical factors. Anatomical lobectomy remains a valid option when indicated.

Radiation Therapy

Radiation therapy is rarely utilized in the management of SP. However, a few cases in the literature report favorable outcomes with external beam radiotherapy (EBRT), although such applications remain anecdotal.[19].

Genetic and Molecular Features

Studies investigating the molecular profile of SP have identified recurrent mutations in mTOR pathway-related genes including AKT1, PIK3R1, and PTEN. These findings warrant further investigation into the potential use of mTOR inhibitors in metastatic or recurrent cases.[20]

4. Conclusion

Sclerosing pneumocytoma is a rare pulmonary tumor that, despite its benign histopathological features, may radiologically mimic malignancy, thereby posing significant diagnostic challenges. In lesions that are centrally located demonstrate increased FDG uptake, and exhibit contrast enhancement suggestive of malignancy, the surgical decision-making process should involve multidisciplinary evaluation. In cases where malignancy cannot be confidently excluded, anatomical resection (lobectomy) represents an appropriate strategy to ensure both diagnostic accuracy and oncologic safety. This case highlights the importance of individualized surgical planning in clinical scenarios where SP contributes to diagnostic uncertainty.

Statement of ethics

This study was conducted in accordance with the principles of the Declaration of Helsinki. As this is a single-patient case report, approval from an institutional ethics committee was not required. However, written informed consent was obtained from the patient for the use of clinical data and publication of all accompanying images.

genAI

No artificial intelligence-based tools or generative AI technologies were used in this study. The entire content of the manuscript was originally prepared, reviewed, and approved by both authors.

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Conflict of interest statement

The authors declare that they have no conflict of interest.

Availability of data and materials

This Data and materials are available to the researchers.

Author Contributions

Both authors contributed equally to the article. Both authors read and approved the final manuscript.

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