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Central Lung Adenocarcinoma: A Case Series of Four Patients with Radiological and Clinical Correlates

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Abstract: ***Background**: Lung adenocarcinoma, the most common subtype of non-small cell lung cancer (NSCLC), typically originates in the peripheral regions of the lung.[1,2] However, a subset of these tumors may present centrally, involving the bronchial tree and hilar structures, mimicking radiologic patterns of other central malignancies such as squamous cell carcinoma.[3] Central adenocarcinomas are underrecognized and may present at advanced stages due to delayed symptom onset and diagnostic challenges.[4] **Objective**: To describe the clinical, radiologic, and staging characteristics of central bronchogenic adenocarcinoma in four patients, and to highlight the importance of identifying atypical central presentations of a typically peripheral tumor. **Methods**: This prospective case series includes four patients diagnosed with centrally located lung adenocarcinoma at East Point College of Medical Sciences and Research Center over a 12-month period from January 2024. Detailed clinical history, chest CT findings, and histopathological results were reviewed and analyzed. **Results**: All four patients presented with central masses involving the main or lobar bronchi and perihilar regions. CT imaging revealed features such as bronchial obstruction, lobar collapse, lymphangitis carcinomatosis, mediastinal lymphadenopathy, vascular encasement, and in two cases, metastatic disease.[5] All four patients underwent bronchoscopic biopsy. Histopathological evaluation confirmed adenocarcinoma (non- mucinous) in all cases, despite radiologic features resembling squamous cell carcinoma.[3] The central tumor location contributed to advanced-stage diagnosis in these patients. **Conclusion**: This case series highlights an emerging and clinically significant shift in the anatomical presentation of lung adenocarcinoma. Recognizing central bronchogenic adenocarcinomas on imaging is crucial for timely diagnosis and appropriate management.[6] Radiologists and clinicians should maintain a high index of suspicion for adenocarcinoma even in centrally located masses and confirm the diagnosis histologically to guide optimal therapy.*

Keywords: central lung adenocarcinoma, bronchial obstruction, radiologic-histologic mismatch, advanced-stage lung cancer

1. Introduction

Bronchogenic carcinoma includes all primary lung cancers arising from the bronchial epithelium and remains a leading cause of cancer-related morbidity and mortality worldwide.[1] Adenocarcinoma is the most common histological subtype of NSCLC, and is classically associated with peripheral lung fields.[2,7]

In contrast, central lung tumors involving the main or lobar bronchi or perihilar regions are more typically associated with squamous cell carcinoma or small-cell carcinoma.[3,8] However, there is a rising trend in adenocarcinomas presenting centrally.[4,9]

Central adenocarcinomas can mimic squamous malignancies radiologically, including:

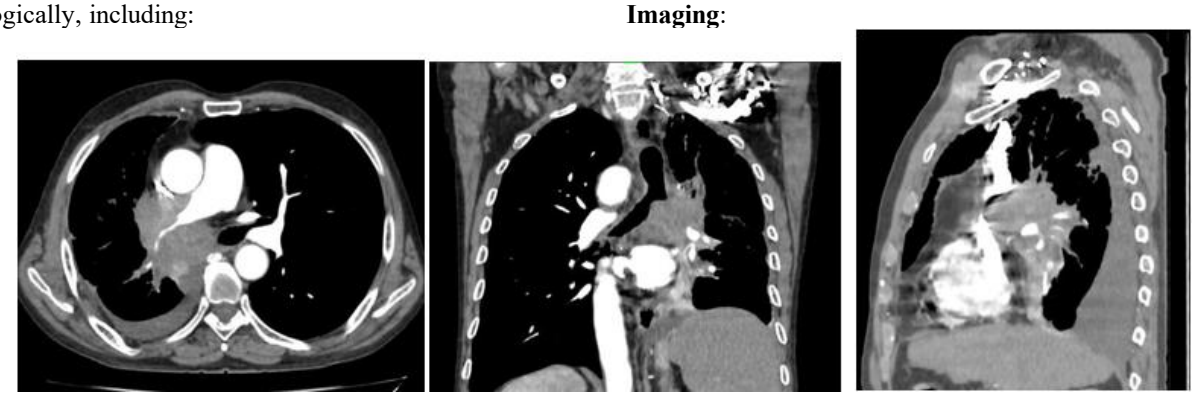
- Endobronchial or peribronchial soft-tissue masses
- Obstructive atelectasis
- Hilar/mediastinal lymphadenopathy
- Vascular encasement
- Metastatic spread

Understanding these overlapping imaging features is crucial for accurate diagnosis, timely histological confirmation, and proper staging.[5,10]

2. Case Presentations

Case 1: A 65-year-old male, with a history of chronic cough, Progressive dyspnea, wheezing, and hemoptysis. He was smoker.

Imaging:



(a) **(b)** **(c)**

Figure 1: (a- axial b- coronal c- sagittal) Mass lesion with irregular margins and heterogeneous enhancement in central hilar and supra hilar region of right upper lobe occluding right main bronchus, bronchus intermedius extending into proximal upper lobe and lower lobe bronchi.

CT findings:

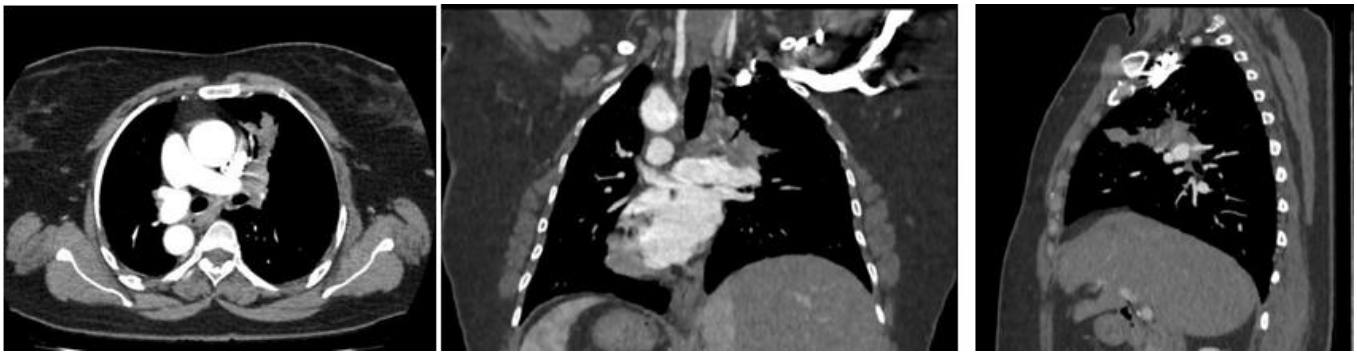
a) Mass lesion with irregular margins and heterogeneous enhancement noted in central hilar and supra hilar region of right upper lobe occluding right main bronchus, bronchus intermedius extending into proximal upper lobe and lower lobe bronchi.
b) There is complete collapse of middle lobe with mediastinal shift to right. Lesion is extending into mediastinum encasing right main, proximal upper and lower lobe pulmonary artery causing severe luminal narrowing in main, proximal upper lobe pulmonary artery.
c) Lesion is partially encasing left main bronchus without causing luminal narrowing. Lesion is compressing SVC anteriorly and esophagus posteriorly. Interlobular septal thickening and few tiny centrilobular nodules noted in right upper lobe- *likely lymphangitic and endobronchial spread.*
d) Few small hyperdense foci noted within the lesion.
e) Right mild pleural effusion
f) Centrilobular emphysematous changes noted in left lung. No other significant abnormality in left lung. No e/o nodules.

Radiological Diagnosis:
Right parahilar mass – Lung malignancy with extensions and mediastinal lymphadenopathy

- **Histopathological diagnosis:** Adenocarcinoma
- **Treatment & Outcome**: Referred to higher center for chemotherapy and further treatment.

Case 2: a 53-year-old female presented with hemoptysis under evaluation

Imaging:



(a) (b) (c)

Figure 2: (a- axial b- coronal c- sagittal) A linear soft tissue density mass lesion is seen in the anterior segment of right upper lobe extending to the hilum

CECT findings:

- A linear soft tissue density mass lesion is seen in the anterior segment of right upper lobe extending to the hilum. The lesion shows mild inhomogenous enhancement. The lesion is seen encasing the branches of pulmonary artery at hilum.
- Lobulated soft tissue nodule is seen in the anterior basal segment of right lower lobe.
- Patchy ground glass attenuation with septal thickening is seen in anterior basal segment of right lower lobe, superior, posterior and lateral basal segments of left lower lobes – *Lymphangitis carcinomatosis*
- Multiple tiny nodules are seen along the right oblique fissure and posterior basal pleura on the left side.
- Few randomly scattered nodules are seen in right upper and left lower lobe –
- *Metastasis*
- Multiple enlarged lymph nodes are seen in right paratracheal, precarinal and prevascular locations. Enlarged lymphnodes area also seen in the left para esophageal area and AP window
- No pleural effusion

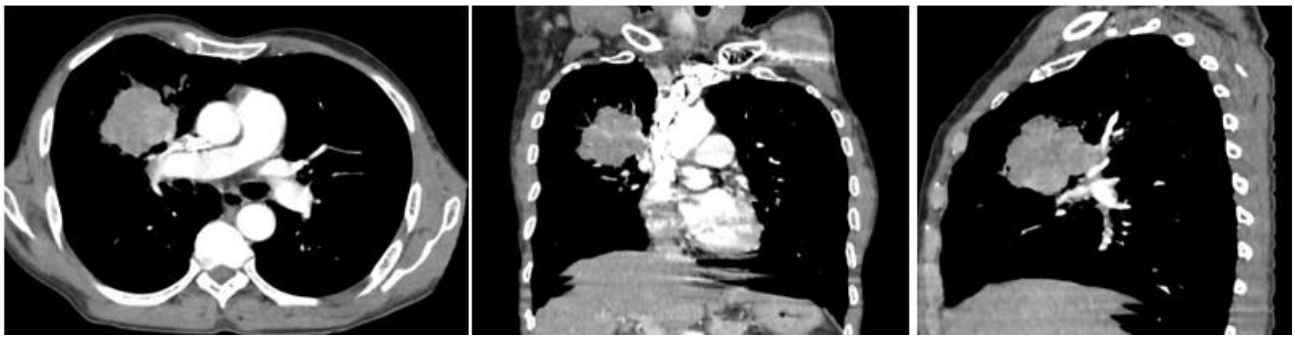
Radiological Diagnosis:
Advanced central bronchogenic carcinoma with presumptive staging of $T_3N_2M_{1a}$.

Histopathological diagnosis: Adenocarcinoma

Treatment & Outcome: Referred to higher center for chemotherapy and further treatment.

Case 3: 75 year old male , smoker with complaints of cough and weight loss since 4 months

Imaging:



(a) (b) (c)

Figure 3: *(a- axial b- coronal c- sagittal) Well defined soft tissue density mass with irregular margins noted at rightparahilar region showing significant and homogenous enhancement.*

CT Findings:

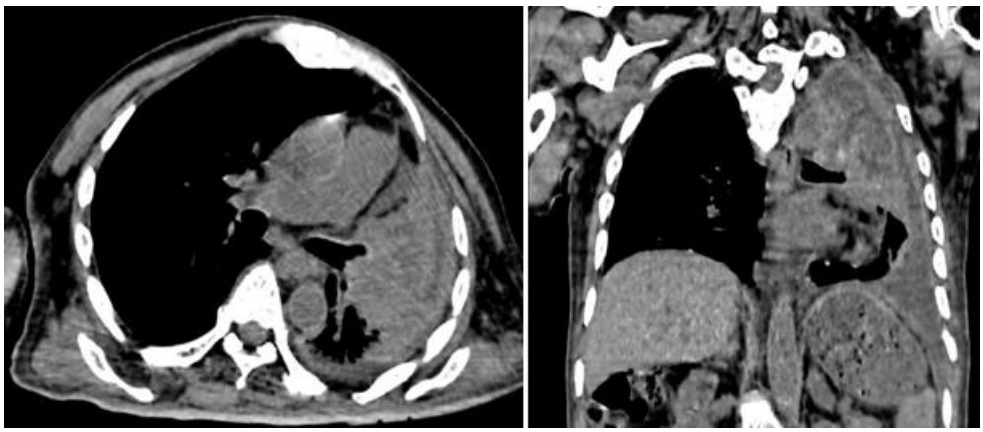
- Well define, soft tissue density mass with irregular margins measuring 5.7x 7.0x 5.3 cm noted at right parahilar region. The mass shows significant and homogenous enhancement.
- The mass is noted in the anterior segment of right upper lobe. Thickening of interlobular septa distal to the mass is noted –*lymphangitis carcinomatosis*.
- Enlarged pretracheal, subcarinal and right hilar lymph nodes noted.

Radiological Diagnosis

Right parahilar mass-lung malignancy with mediastinal lymphadenopathy.

- **Histopathological diagnosis:** Adenocarcinoma
- **Treatment & Outcome**: Referred to higher center for chemotherapy and further treatment.

Case 4: 68 year old male with complaints of cough and breathlessness



(a) (b)

Figure 4: (a- axial b-coronal) A large heterogenous soft tissue attenuating mass lesion in the upper lobe of left lung showing central geographic hypo attenuation with tiny foci of calcifications. There is complete atelectasis of left upper lobe distal to mass and cut off of upper lobe bronchus also noted.

CT Findings:

- A large heterogenous soft tissue attenuating mass lesion measuring 5.7 x7.8cm seen in the upper lobe of left lung showing central geographic hypo attenuation with tiny foci of calcifications. There is complete atelectasis of left upper lobe distal to mass and cut off of upper lobe bronchus.
- Moderate left pleural effusion.
- Passive atelectasis of left lower lobe noted.
- The left lower lobe also shows thickened inter lobular septae and small nodular lesions

Lymphangitiscarcinomatosis

- There is compensatory hyperinflation of right lung with herniation of upper lobe to opposite side.
- Multiple scattered soft tissue nodules measuring 7-13mm in both upper and lower lobe of right lungs. Small nodule in middle lobe shows cavitation – *Metastasis*
- Multiple enlarged lymph nodes were seen in the pretracheal, pre carinal, subcarinal, pre vascular locations and left hilum.
- Lytic lesion with soft tissue component involving the distal body of left scapula.

Healed fracture of anterior aspect of left 6th rib, posterior aspect of left 5th rib – *Skeletal metastasis*

Radiological Diagnosis:

Advanced bronchogenic carcinoma in left upper lobe with malignant pleural effusion, mediastinal lymphadenopathy, metastatic pulmonary nodules and skeletal metastasis.

Histopathological diagnosis: Adenocarcinoma

Treatment & Outcome: Referred to higher center for chemotherapy and further treatment.

3. Results

This case series details four patients with histopathologically confirmed adenocarcinoma of lung, all of which presented as centrally located lung masses, in contrast to the more typical peripheral presentation commonly seen with this subtype of non-small cell lung cancer (NSCLC).

Table 1: Summary of Case Findings

Case	Age/Sex	Symptoms	Key Central Features	Secondary Imaging Features	HPE
1	65/M	Chronic cough, dyspnea, wheezing, hemoptysis	Bronchial obstruction, vascular encasement, mediastinal shift, lymphangitic spread	Right hilar/suprahilar mass occluding main bronchus, mediastinal extension	Adenocarcinoma
2	53/F	Hemoptysis	Vascular encasement, intrapulmonary metastasis, pleural involvement	Linear enhancing mass extending from anterior upper lobe to hilum, bilateral nodules, lymphadenopathy	Adenocarcinoma
3	75/M	Chronic cough, weight loss	Mediastinal lymphadenopathy, lymphangitic carcinomatosis	Right parahilar enhancing mass with septal thickening	Adenocarcinoma
4	68/M	Cough, breathlessness	Complete lobar collapse, lymphangitic carcinomatosis extensive mediastinal lymph nodes and bony metastasis	Large left upper lobe mass with central hypoattenuation, bronchial cutoff, malignant pleural effusion, skeletal and adrenal metastases	Adenocarcinoma

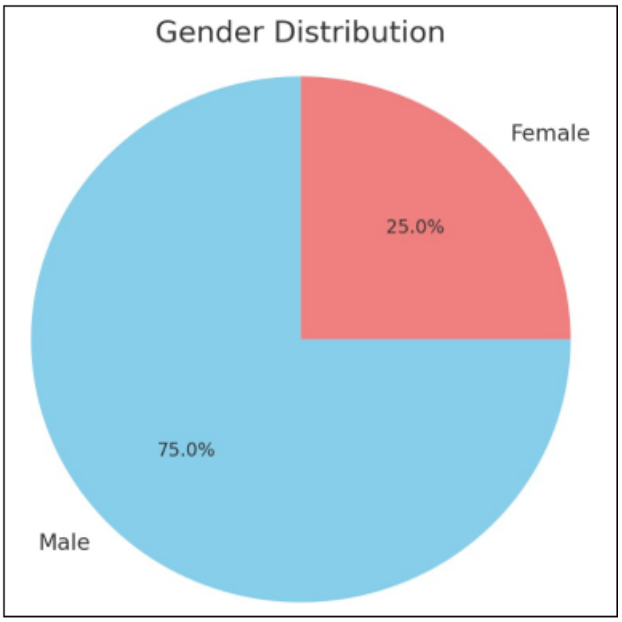


Figure 5: Pie Chart – showing the proportion of male and female patients in the case series.

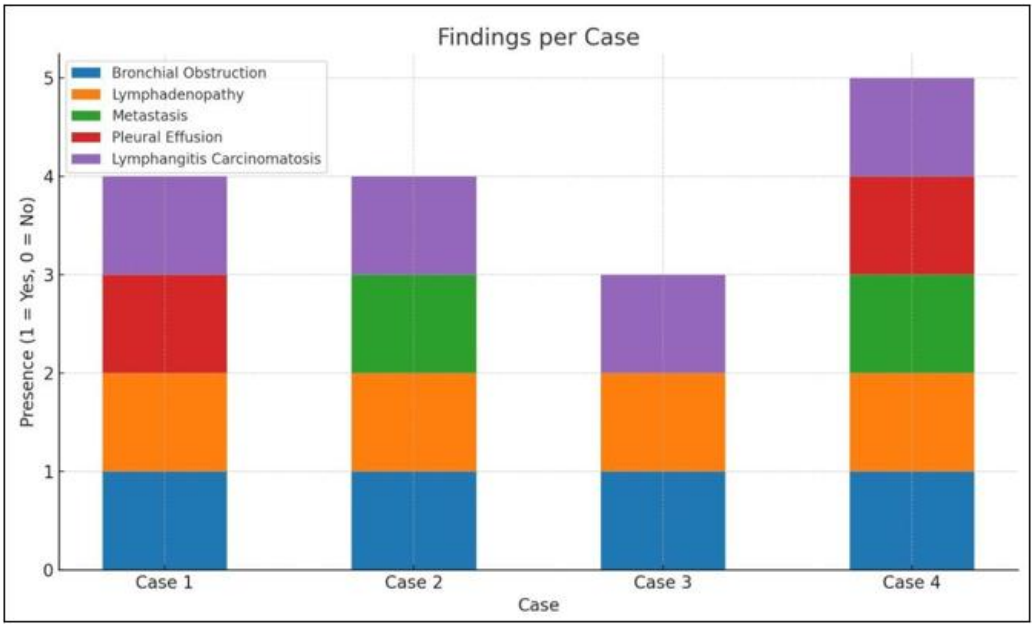


Figure 6: Stacked imaging features – highlighting the presence of bronchial obstruction, lymphadenopathy, metastasis, pleural effusion and Lymphangitis carcinomatosis in each case

Key Observations

a) The tumors were centrally positioned, involving the hilum, main bronchi, and mediastinal structures, unlike the classical peripheral predilection of adenocarcinoma.
b) Radiological findings were:
   - Airway obstruction (bronchial cut-off, post-obstructive collapse) noted in all 4 cases.
   - Lymphadenopathy (pretracheal, hilar, subcarinal) in all 4 cases.
   - Lymphangitis carcinomatosis in 4 cases.
   - Distant metastases (adrenal, skeletal, pleura) in 2 cases.
   - No cavitation or necrosis, which are more typical of squamous cell carcinoma.
   - The central location often resulted in advanced disease at presentation, with radiologic staging consistent with T3 or M1 status in two patients.

Table 2

Case	Age	Gender	Bronchial Obstruction	Lymphadenopathy	Lymphangitis carcinomatosis	Metastasis	Pleural Effusion	Histopathology
1	65	Male	1	1	1	0	1	Adenocarcinoma
2	53	Female	1	1	1	1	0	Adenocarcinoma
3	75	Male	1	1	1	0	0	Adenocarcinoma
4	68	Male	1	1	1	1	1	Adenocarcinoma

4. Discussion

Lung adenocarcinoma has traditionally been described as a peripheral tumor due to its origin from alveolar epithelial cells and terminal bronchioles.[1,2] However, recent case series and imaging studies have increasingly reported central locations involving the bronchial tree and mediastinum.[4,5]

Shift in Anatomical Presentation:

Historically, central lung cancers were more often squamous cell carcinomas, while adenocarcinomas were peripheral.[37] All four cases in this series exhibited central masses on imaging, with involvement of main or lobar bronchi, perihilar structures, and adjacent vessels—an atypical but increasingly recognized pattern.[4,9]

Relevance in Modern Oncology:

- Biopsy strategy: Central lesions are best accessed via bronchoscopy or endobronchial ultrasound-guided techniques.[11]
- Treatment planning: Involvement of the bronchial and vascular structures often necessitates multimodal approaches, such as chemoradiotherapy or palliative care, over surgical resection.[12]
- Prognostic implications: Central tumors are often diagnosed at more advanced stages due to delayed symptom onset, making early identification and staging are vital for improving outcomes.[6,13]

This series reinforces the importance of including adenocarcinoma in the differential diagnosis for central lung lesions, particularly in patients with persistent respiratory symptoms and no peripheral masses on imaging.

5. Conclusion

This case series documents a distinct central presentation of bronchogenic adenocarcinoma. Despite imaging features mimicking squamous histology, all cases were confirmed as **non-mucinous adenocarcinoma**. Radiologists must consider adenocarcinoma in the differential diagnosis of central masses to enable **timely biopsy, accurate staging, and treatment planning**.

References

[1] Travis WD, Brambilla E, et al. WHO Classification of Tumours of the Lung, Pleura, Thymus and Heart. 4th ed. Lyon: IARC Press; 2015.

[2] Detterbeck FC, Boffa DJ, Kim AW, Tanoue LT. The eighth edition lung cancer stage classification. *Chest*. 2017;151(1):193–203.

[3] Suster S, Moran CA. Carcinomas with mucin production. *Ann DiagnPathol*. 2010;14(5):333–340.

[4] Park CM, Goo JM, et al. Radiologic findings of central-type adenocarcinoma of the lung. *Radiographics*. 2007; 27(2):391–408.

[5] Yoon SH, Lee HY, et al. Imaging predictors of prognosis in lung adenocarcinoma. *Radiology*. 2011;261(3):830–836.

[6] Rami-Porta R, Bolejack V, et al. Lung cancer staging and survival. *Eur Respir J*. 2018;51(5):1800190.

[7] Mukhopadhyay S, Katzenstein AL. Pulmonary adenocarcinoma: update on classification. *Arch Pathol Lab Med*. 2011;135(12):1623–1627.

[8] Kim TJ, Lee JH, et al. CT differentiation of central squamous cell carcinoma from adenocarcinoma. *Korean J Radiol*. 2013;14(3):457–464.

[9] Henschke CI, Yip R, Miettinen OS. Women's susceptibility to tobacco carcinogens. *Lung Cancer*. 2011;71(3):291–293.

[10] Austin JHM, Müller NL, Friedman PJ. Glossary of terms for CT of the lungs. *Radiology*. 1996;200(2):327–331.

[11] Herth FJ, Becker HD, Ernst A. Endobronchial ultrasound-guided transbronchial needle aspiration. *Chest*. 2003;123(2):604–607.

[12] Lim W, Ridge CA, et al. Optimal imaging strategies in lung cancer staging. *Clin Radiol*. 2012;67(10):953–964.

[13] Goldstraw P, Ball D, Jett JR, Le Chevalier T, Lim E, Nicholson AG. Non-small-cell lung cancer. *Lancet*. 2011;378(9804):1727–1740