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CASE REPORT

Endobronchial hamartoma: Diagnostic challenges and clinical implications of a rare benign lung tumor

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ABSTRACT

Introduction: Endobronchial hamartomas are rare benign lung tumors, representing only 0.025%–0.032% of all lung tumors and 1.4% of hamartomas. Originating in the bronchial passages, these tumors comprise cartilage, fat, fibrous tissue, and epithelium. Despite their benign nature, they can cause bronchial obstruction, post-obstructive pneumonia, and atelectasis.

Case Report: A 68-year-old male presented with chronic cough and hemoptysis. Imaging revealed a calcified mass in the right lower bronchus, causing partial obstruction. Bronchoscopy identified a smooth, obstructive mass without bleeding or necrosis. Histopathological examination confirmed an endobronchial hamartoma, showing benign bronchial mucosa, cartilage, adipose tissue, submucosal glands, and myxoid stroma.

Discussion: Diagnosing endobronchial hamartomas is challenging due to their rarity, nonspecific symptoms, and nonspecific imaging findings. Advanced imaging techniques, such as computed tomography (CT) scans, can identify calcifications or fatty components, aiding diagnosis. However, histopathological confirmation is crucial to differentiate these lesions from malignant or other benign pulmonary tumors. Early recognition and treatment are essential to prevent complications like recurrent infections and irreversible airway damage.

Conclusion: Although rare, endobronchial hamartoma is a clinically significant benign lung tumor due to its potential to cause notable complications. The diagnostic challenge lies in its often nonspecific initial imaging findings. However, combining advanced radiology modalities, such as computed tomography (CT) and histopathological evaluation. Early recognition of this tumor from other pulmonary lesions is crucial for treatment and better patient outcomes.

Keywords: endobronchial hamartoma, benign lung tumor, radiology

INTRODUCTION

Pure endobronchial tumors are considered rare and uncommon medical conditions that pose significant challenges in terms of their diagnosis and treatment. These tumors can manifest with a wide variety of symptoms and can mimic pulmonary malignancies, making their clinical presentation diverse and, at times, difficult to recognize. Among all lung tumors, less than 1% are classified as benign, and within this small category, hamartomas are recognized as the most frequently occurring type. The incidence of hamartomas, however, remains exceedingly low, ranging between 0.025% and 0.032%. Hamartomas are defined as abnormal masses resulting from the irregular growth and combination of various tissue elements or from an unbalanced proportion of a single type of tissue, usually found within the organ in which the tumor develops.[1,2]

A specific and distinctive subset of hamartomas is known as endobronchial hamartoma, which differs from the more commonly observed intrapulmonary hamartomas. This specialized form of hamartoma arises within the bronchial structures. According to previous research, endobronchial hamartomas account for only 1.4% of all reported cases of hamartomas, further underscoring their rarity.[1] These tumors typically comprise a mixture of cartilage, fat, fibrous tissue, and an epithelial component derived from the bronchial lining.[3] They originate from significant bronchial passages and exhibit a growth pattern that extends into the bronchial lumen, often obstructing the bronchi. This obstruction can occur even before the tumor reaches a

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substantial size, leading to various respiratory symptoms such as difficulty breathing or recurrent infections. Despite their benign nature, endobronchial hamartoma's location and growth pattern make them clinically significant, necessitating accurate diagnosis and appropriate management to mitigate potential complications.[2]

CASE REPORT

A 68-year-old man presented to our hospital with chief complaints of hemoptysis and a chronic cough that had persisted for an extended period. He denied any history of allergies or diabetes mellitus. The physical examination revealed normal vital signs, with no significant abnormalities detected during the auscultation examination. Breath sounds were normal, with no additional sounds like wheezing or crackles. Regarding his past medical history, the patient had a history of pulmonary tuberculosis, which had been successfully treated and completed in December 2022.

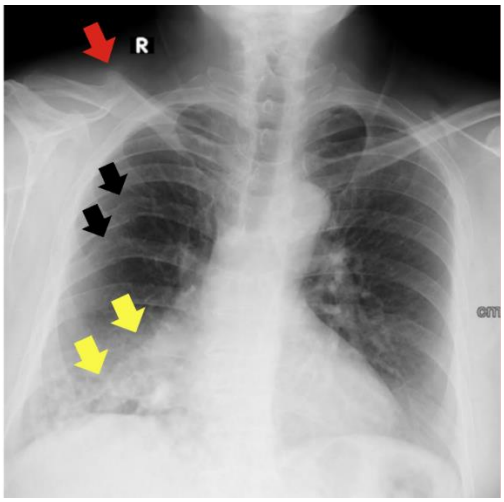
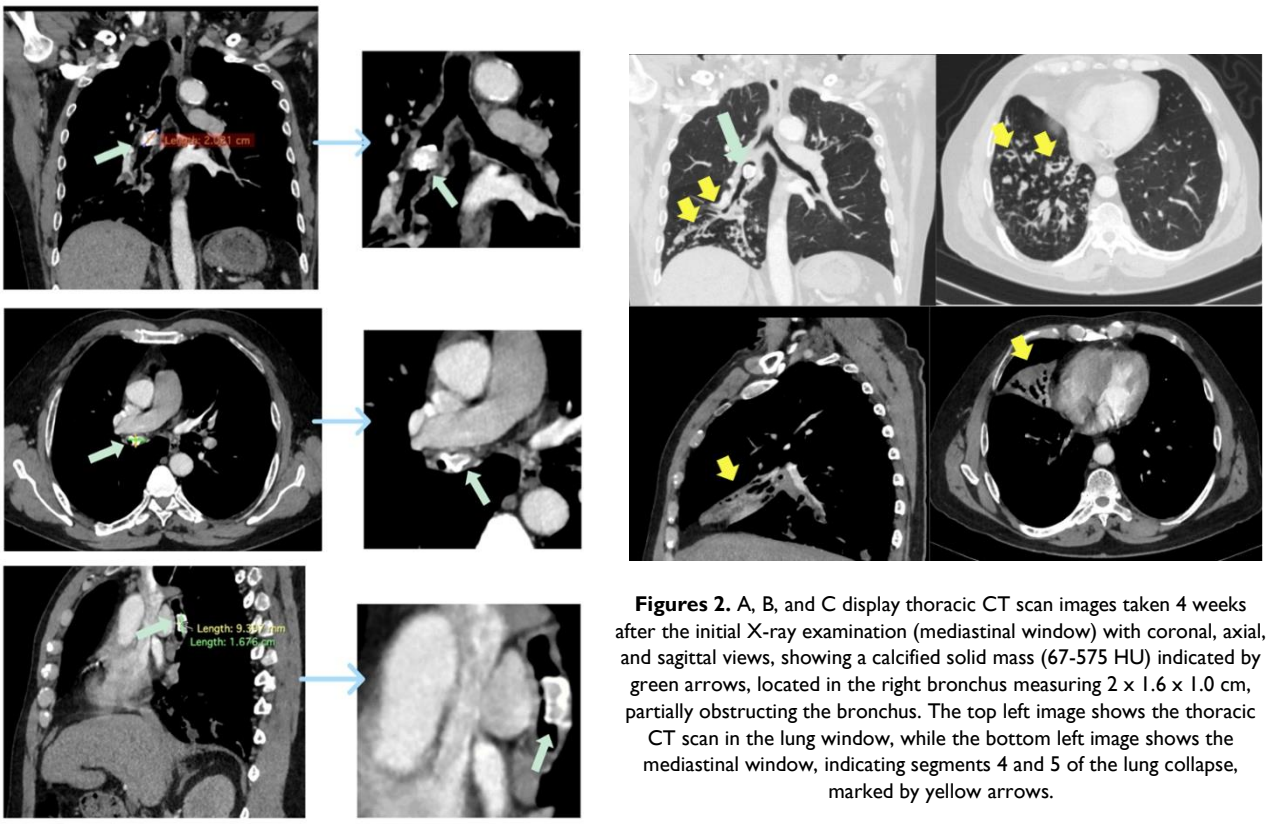


Figure 1. On the chest X-ray, abnormalities were observed, including reticulonodular opacities and consolidation in the right lower lung lobe, indicated by yellow arrows. Cardiomegaly with aortic elongation was also noted. Old fractures of the 6th and 7th posterior ribs were identified, marked with black arrows, and an old fracture of the right midclavicular region, highlighted by red arrows.

Laboratory tests, including sputum analysis, showed no signs of infection or abnormalities, and the GeneXpert test for acid-fast bacilli (AFB) was negative. Initial chest X-ray (Figure 1) demonstrated reticulonodular opacities in the right lower lung lobe, deformities in the 6th and 7th posterior ribs on the right side, and shortening in the right midclavicular region.

For further evaluation, a follow-up thoracic CT scan (Figure 2) performed four weeks later revealed a calcified lesion in the right lower bronchus. A bronchoscopy was conducted, which identified a smooth mass obstructing the lower bronchus without evidence of bleeding, necrosis, or dilated blood vessels. Histopathological examination (Figure 3) of the tissue obtained during bronchoscopy revealed benign bronchial mucosa, adipose tissue, submucosal glands, cartilage, and myxoid stroma.



Figures 2. A, B, and C display thoracic CT scan images taken 4 weeks after the initial X-ray examination (mediastinal window) with coronal, axial, and sagittal views, showing a calcified solid mass (67-575 HU) indicated by green arrows, located in the right bronchus measuring 2 x 1.6 x 1.0 cm, partially obstructing the bronchus. The top left image shows the thoracic CT scan in the lung window, while the bottom left image shows the mediastinal window, indicating segments 4 and 5 of the lung collapse, marked by yellow arrows.

DISCUSSION

Most tumors within the tracheobronchial tree are malignant, making benign tumors a relatively rare occurrence. Among benign lung tumors, which account for less than 1% of all cases, hamartomas are the most frequently encountered type, with an estimated incidence ranging from 0.025% to 0.32%. Hamartomas are benign tumors characterized by both mesenchymal and epithelial components.[1] These tumors originate from primitive bronchial mesenchymal tissue, which can differentiate into various mature mesenchymal elements. Consequently, hamartomas may contain diverse mesenchymal components, such as fat, cartilage, and smooth muscle. The presence of at least two mesenchymal elements differentiates hamartomas from other benign endobronchial tumors, such as chondromas or lipomas. In contrast, chondromas and lipomas typically comprise a single mesenchymal component, either cartilage or fat.[4]

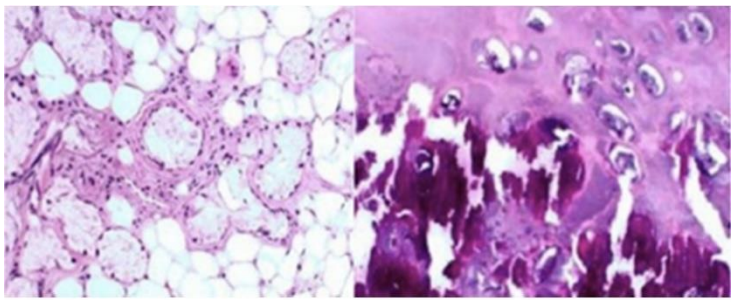


Figure 3. Histopathological examination revealed microscopic fragments of benign bronchial mucosa, adipose tissue, submucosal glands, cartilage, and myxoid stroma.

Hamartoma symptoms can vary significantly based on the tumor's location. When located in the parenchyma, hamartomas are often asymptomatic. In contrast, endobronchial hamartomas may irritate the bronchial mucosa, leading to persistent coughing as an early symptom, as noted in our patient. At more advanced stages, endobronchial hamartomas can obstruct the bronchus, causing symptoms such as fever, coughing, sputum production, wheezing, and difficulty breathing. These obstructions can also lead to complications, including post-obstructive pneumonia and lobar atelectasis, as observed in our case. Additionally, hemoptysis may occur if the tumor compresses blood vessels, resulting in invasion or perforation.[3,5]

Conventional radiographic imaging frequently produces nonspecific findings, challenging establishing a definitive diagnosis. In our patient, the imaging showed opacities and consolidation in the right lower lung field, suggesting atelectasis. These findings indicate a partial or complete collapse of lung tissue, often caused by bronchial obstruction. This observation is consistent with reports in the literature, which describe conventional radiographs as capable of identifying abnormalities such as atelectasis, pneumonia, and bronchiectasis.[1,3] These conditions are often interconnected; for instance, bronchial obstruction can lead to secondary infections like pneumonia, and over time, chronic changes may result in bronchiectasis. Although conventional radiography is valuable for detecting these patterns, it typically necessitates follow-up with advanced imaging modalities like CT scans to achieve more accurate and detailed diagnostic insights.[3]

Despite being benign, the clinical manifestations of endobronchial hamartomas often require further investigation and intervention, especially when symptoms become apparent or when obstruction leads to complications such as post-obstructive pneumonia or atelectasis. Understanding the differences in location and presentation is crucial for accurate diagnosis and effective management of these rare yet significant lung tumors.[3,5]

On our patient's thoracic CT scan, a solid mass with partially irregular margins and areas of calcification was observed in the right lower bronchus. This mass caused a partial bronchus obstruction, leading to atelectasis in the inferior region. Such findings are consistent with the characteristics of endobronchial hamartomas, which often present as obstructive lesions. Macroscopically, endobronchial hamartomas typically appear as polypoid nodules with a broad base projecting into the lumen of a large bronchus. These lesions are known for their firm consistency and distinct appearance, which often include irregular surfaces or calcifications. In our case, the imaging findings closely aligned with these typical macroscopic features, further supporting the diagnosis of an endobronchial hamartoma. This case highlights the importance of accurately combining imaging findings with clinical presentation to identify such rare lesions.[2,3]

In our case, further evaluation was conducted with a bronchoscopy biopsy, followed by histopathological examination. The results revealed fragments of benign bronchial mucosa, adipose tissue, submucosal glands, cartilage, and myxoid stroma, No evidence of malignancy was found. consistent with a endobronchial hamartoma. These findings are consistent with previous studies, which describe the histological characteristics of pulmonary hamartomas. Most central and peripheral pulmonary hamartomas predominantly consist of cartilage, often called chondromatous hamartomas, along with varying amounts of fibromyxoid connective tissue, fat, bone, and smooth muscle, with their presence decreasing in frequency.[1,2]

Endobronchial lesions, in particular, are noted to have a higher abundance of fat and maintain a consistent association with the bronchial wall. Another defining feature of both endobronchial and parenchymal hamartomas is the presence of slit-like spaces lined by benign, entrapped pulmonary epithelium. Additionally, the surface of endobronchial hamartomas is typically covered by either respiratory epithelium or metaplastic squamous epithelium. These histological characteristics confirm the diagnosis and highlight the distinct features that differentiate hamartomas from other benign or malignant lesions in the bronchial and pulmonary regions.[2,3]

CONCLUSION

Endobronchial hamartomas, though uncommon, are significant among benign lung tumors due to their potential to cause notable clinical complications. This case involved a patient presenting with chronic cough and hemoptysis, attributed to a partially obstructive calcified mass in the right lower bronchus, as evidenced by radiological findings of atelectasis and consolidation, which highlighted its impact on the bronchial lumen. Histopathological analysis confirmed the diagnosis of an endobronchial hamartoma, characterized by benign bronchial mucosa, cartilage, adipose tissue, and myxoid stroma, with no signs of malignancy. The diagnostic complexity of such tumors lies in their often nonspecific initial imaging findings; however, a combination of advanced imaging techniques, like CT scans, and detailed histopathological evaluation enables accurate diagnosis. Despite their benign nature, these tumors can cause complications such as bronchial obstruction, post-obstructive pneumonia, and atelectasis, underscoring the need for timely recognition and management. This case aligns with endobronchial hamartomas' known clinical and histological features, emphasizing distinguishing them from other pulmonary lesions to ensure early diagnosis and intervention, thereby optimizing patient outcomes.

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