

Endobronchial lipoma with obstructive pneumonia: A case report

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Abstract. Endobronchial lipoma (EL) is a rare benign lung tumor, and its incidence rate only accounts for a tiny proportion of all lung tumors. EL has non-specific clinical symptoms and signs, and chest computed tomography is helpful in diagnosis. When fat density nodules are found in the bronchial lumen with no enhancement, EL should be considered. Once this disease is diagnosed, bronchoscopic intervention therapy is the first choice for treatment, and patients generally have a good prognosis. The present report describes the diagnosis and treatment processes of a patient with EL. The patient sought medical attention due to recurrent fever, cough and white sputum for >1 month. The chest CT revealed a hypodensity nodule at the bronchial opening of the basal segment of the lower lobe of the left lung, with the margins showing foci of punctate calcification. The patient underwent a bronchoscopy and the pathological diagnosis was EL. In the present study, a literature review analysis is also included to provide a reference for the diagnosis and treatment of this disease.

Introduction

Lipoma is the most common benign neoplasm of mesenchymal origin and may arise in any location where fat is normally present. Lipoma is generally more common in middle-aged people, and the specific cause is not yet clear, but it may be related to genetics, chronic inflammation and systemic fat metabolism abnormalities (1,2). Endobronchial lipoma (EL) is a rare benign lung tumor with non-specific clinical symptoms and signs, and its incidence rate only accounts for 0.1-0.5% of all lung tumors, with corresponding signs appearing when airway obstruction and lung infection are present (3,4). It occurs mostly in large bronchi rich in adipose tissue, and most of them are found in the main bronchus and lobar bronchus. EL can be divided into intraluminal and extraluminal types,

with the intraluminal type mainly growing into the lumen of the bronchus, whilst the extraluminal type expands into the surrounding lung tissues. The diagnosis of EL generally relies on radiological examinations, mainly chest computed tomography (CT), which can clearly display the location, shape and size of tumors, as well as their relationship with surrounding tissues, and distinguish between intraluminal and extraluminal lesions in the airway (5,6). Bronchoscopy is an important means of diagnosing EL, especially when the chest CT of a patient does not show lesions in the tracheal and bronchial lumens. This indicates that bronchoscopy and chest CT can complement each other in the diagnosis of EL (7). With the development of interventional pulmonary disease techniques, bronchoscopic intervention therapy (BIT) has become the preferred treatment for EL. The treatment process mainly includes three main steps: i) Fully exposing the neoplasm; ii) identifying its base site, removing the neoplasm; and iii) treating the lesion base site to prevent recurrence (8). The present report describes the diagnosis and treatment processes of a patient with EL, with a literature review analysis to provide a reference for the diagnosis and treatment of this disease.

Case report

A 73-year-old female patient was admitted to Hubin Community Health Service Center (Xuzhou, Jiangsu) in March 2024, due to recurrent fever, cough and white sputum for >1 month. Non-contrast chest CT indicated a solid lesion of the lower lobe of the left lung with endobronchial nodule (Fig. 1), therefore a contrast-enhanced chest CT scan was required. For further treatment, the patient was admitted to The Second Affiliated Hospital of Xuzhou Medical University (Xuzhou, Jiangsu) in March 2024. According to the self-report of the patient, since the onset of the disease, their mental status and diet were good, there was no abdominal pain, diarrhea, chest tightness, asthma, chills, and no significant change in weight. However, the patient reported occasional coughs with white phlegm. The patient had a history of elevated triglycerides, but no history of smoking, drinking, hypertension, diabetes, metabolic syndrome and glucose intolerance, and the patient denied any history of infection. Moreover, the patient had no family history of lung cancer (LC).

The results of the physical examinations were as follows: Body mass index, 23.1 (18.5-23.9) kg/m²; body temperature, 36.5°C; blood pressure, 128/70 mmHg; patient was lucid; no palpable swelling of superficial lymph nodes throughout the body; dullness to percussion in the left lower lung; decreased

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breath sounds in the left lower lung; no obvious dry or wet rales heard; synchronized heart rhythm; no murmur heard in the auscultation area of each valve; soft abdomen, with no tenderness or rebound pain; and no swelling in the lower limbs.

The results of the laboratory examinations were as follows: White blood cell, $11 \times 10^9/l$ (reference range, $4-10 \times 10^9/l$); C-reactive protein, 26.10 mg/l (reference range, 0-5 mg/l); serum amyloid A, >2,000 mg/l (reference range, 0-10 mg/l); triglycerides, 2.17 mmol/l (reference range, 0.48-1.70 mmol/l); α -fetoprotein, 2.25 ng/ml (reference range, ≤ 7 ng/ml); carcinoembryonic antigen, 1.24 ng/ml (reference range, ≤ 5 ng/ml); carbohydrate antigen (CA) 72-4, 1.06 U/ml (reference range, ≤ 6.9 U/ml); CA125, 17.50 U/ml (reference range, ≤ 35 U/ml); CA19-9, 6.84 U/ml (reference range, ≤ 37 U/ml); CA15-3, 5.32 U/ml (reference range, ≤ 28 U/ml); CYFRA 21-1, 1.86 ng/ml (reference range, ≤ 4 ng/ml); squamous cell carcinoma antigen, 0.80 ng/ml (reference range, ≤ 1.5 ng/ml); and neuron-specific enolase, 8.49 ng/ml (reference range, ≤ 30 ng/ml).

The results of the radiological examinations were as follows: Contrast-enhanced chest CT (on admission) revealed a hypodensity nodule at the bronchial opening of the basal segment of the lower lobe of the left lung, with the margins showing foci of punctate calcification, measuring $\sim 12 \times 10 \times 9$ mm, with a CT value of ~ 105 HU. There was no significant enhancement (Fig. 2). The bronchus of the basal segment of the lower lobe of the left lung was obstructed, with streaks of non-enhanced hypodensity shadow in the distal lumen, and a large patchy hyperdensity shadow in the lower lobe of the left lung, with marked homogeneous enhancement (Fig. 3).

The final imaging diagnosis was made as follows: i) LC has a high density of masses without fat components, and is often accompanied by obvious malignant signs, such as distant metastasis and lymph node enlargement (3); ii) bronchial foreign body (BFB) usually has a history of foreign body aspiration, and the foreign body generally appears as a hyperdensity shadow on radiological examination (4); iii) pneumonia and bronchitis usually appear on radiological examinations as thickened bronchial vascular bundles and intrapulmonary exudative shadows, which are distinctly different from the fat-dense mass of EL; and iv) hamartoma often contains soft tissue and calcifications in addition to a fatty component (5,6). Therefore, the imaging features of this lesion are a fat-density mass in the lumen, with the margins showing foci of punctate calcification, with no enhancement after contrast agent injection. Based on the imaging features and clinical manifestations of the patient, LC, BFB, pneumonia and bronchitis, and hamartoma were excluded, and the final imaging diagnosis was EL.

After a multidisciplinary team discussion in the Department of Respiratory Medicine, the patient was finally diagnosed with EL of the basal segment of the lower lobe of the left lung with obstructive pneumonia and pulmonary atelectasis, and bronchoscopy was recommended.

The patient underwent a bronchoscopy in March 2024, which revealed a neoplasm in the lumen of the bronchial opening in the basal segment of the lower lobe of the left lung, which was soft in texture, yellowish in appearance and smooth in surface, and which completely obstructed the lumen (Fig. 4A and B). This was taken microscopically for pathology

examination. Subsequently, the patient underwent bronchoscopic high-frequency electrocoagulation with a trap and lesion resection under general anesthesia, and the bronchus remained unobstructed after the surgery (Fig. 4C).

The tissue was fixed with 4% neutral formalin (24 h at 25°C) and embedded in paraffin, and 4- μ m serial sections were prepared and subjected to staining with hematoxylin and eosin (Fuzhou Maixin Biotechnology Development Co., Ltd.) for 8 h at 25°C. Observation was performed using a Olympus CX33 light microscope (Olympus Corporation). Hematoxylin and eosin staining revealed chronic inflammation of the bronchial mucosa, with proliferative adipose tissue visible beneath the mucosa and focal active growth (Fig. 5A). The results of the pathology examination suggested that the main component within the tumor was adipose tissue. Tumors containing adipose tissue are commonly known as lipomas and hamartomas, while hamartomas contain not only adipose tissue, but also blood vessels and smooth muscle components (9). Immunohistochemistry (IHC) staining (Fig. 5B-L) demonstrated the following: P63 (-), CD34 (+), cytokeratin 7 [CK7 (-)], epithelial membrane antigen [EMA (-)], leukocyte common antigen [LCA (-)], S-100 (+), Calponin (-), thyroid transcription factor-1 [TTF-1 (-)], Vimentin (+), ETS-1 related gene [ERG (VE+)], Syn (-). S-100 (+) and Vimentin (+) suggested this to be adipose tissue, as hamartomas should express Calponin (+) (10). Therefore, the diagnosis of hamartoma is excluded, and the final pathological diagnosis was endobronchial lipoma. It was also suggested that the patient should undergo genetic testing, but this was refused due to the expense.

Immunohistochemical assessments were performed as follows: The lesion tissue was fixed with 4% neutral formalin (24 h at 25°C) and embedded in paraffin. The lesion tissue sections (4- μ m thickness) were placed in an oven at 60°C for 120 min and then dewaxed in xylene (500 ml) three times at 25°C for 10 min each. The sections were rehydrated by washing in an ethanol gradient series (100 and 95% for 3 min, and 85 and 75% for 1 min) and then rinsed with distilled water. The sections were placed at 100°C in EDTA (pH 9.0 $\pm$ 0.2) buffer (1:50; cat. no. MVS-0099; Fuzhou Maixin Biotechnology Development Co., Ltd.) and the repair solution was used for antigen retrieval for 20 min (hot repair at 100°C in EDTA 1:50; 2,500 ml liquid for 20 min). The permeabilization reagent used was TritonX-100, with a concentration of 0.3%. The blocking reagent used was goat serum (Fuzhou Maixin Biotechnology Development Co., Ltd.), with a concentration of 5%, at room temperature for 1 h. Subsequently, sections were washed with distilled water, treated with 3% H₂O₂ (blocking reagent) solution at 25°C for 10 min to inhibit endogenous peroxidase activity and washed with PBS (cat. no. PBS-0061; Fuzhou Maixin Biotechnology Development Co., Ltd.). Tissue sections were then incubated at room temperature for 40 min with primary antibodies. Following primary antibody incubation, sections were washed three times with PBS for 5 min each time and incubated with goat anti-rat/rabbit IgG polymer labeled with HRP (1:800; ready-to-use type; cat. no. SP KIT-C2; Fuzhou Maixin Biotechnology Development Co., Ltd.) at 25°C for 15 min. Sections were washed three times with PBS for 5 min each time. Tissues were incubated with diaminobenzidine (DAB) color development solution (1:50; cat. no. DAB-2031;

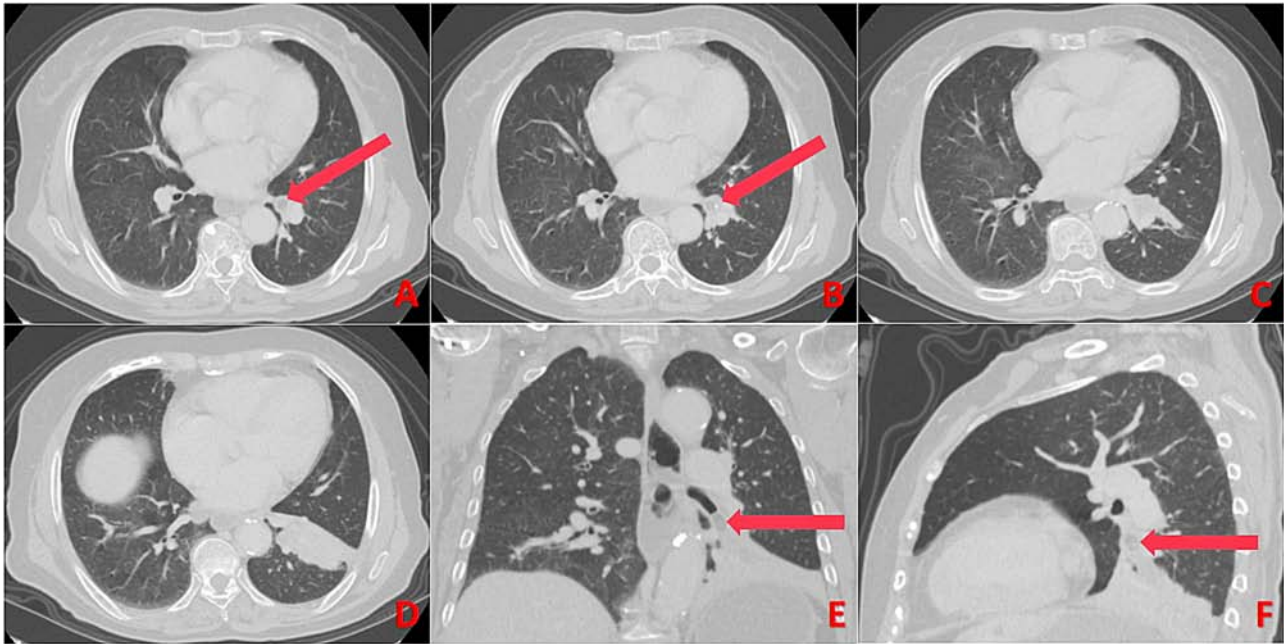


Figure 1. Non-contrast chest CT (March 2024) (magnification, x2). (A) Axial image: Solid lesion of the lower lobe of the left lung with endobronchial nodule (red arrow). (B) Axial image: Spot like calcification can be seen in endobronchial nodule (red arrow). (C) Axial image: Solid lesion of the lower lobe of the left lung. (D) Axial image: Solid lesion of the lower lobe of the left lung. (E) Coronal image: Endobronchial nodule of the lower lobe of the left lung (red arrow). (F) Sagittal image: Endobronchial nodule of the lower lobe of the left lung (red arrow).

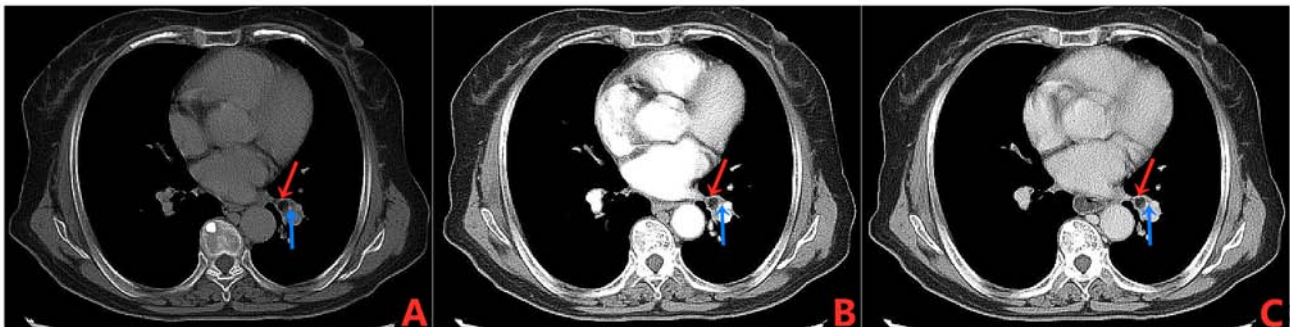


Figure 2. Contrast-enhanced chest CT (March 2024; magnification, x4). (A) Axial image: A hypodensity nodule at the bronchial opening of the basal segment of the lower lobe of the left lung (red arrow), with the margins showing foci of punctate calcification (blue arrow), with a CT value of ~105 HU. (B) Axial of arterial phase: Nodule does not show any significant enhancement (red arrow), with the margins showing foci of punctate calcification (blue arrow). (C) Axial of venous phase: Nodule does not show any significant enhancement (red arrow), with the margins showing foci of punctate calcification (blue arrow).

Fuzhou Maixin Biotechnology Development Co., Ltd.) at 25°C for 5-10 min, and then washed with distilled water. Hematoxylin was applied at 25°C for 1 min and samples were washed in tap water and then dyed blue in PBS. The slides were then washed with 75, 85, 95 and 100% ethanol (500 ml each) for 1 min each to remove excess water and facilitate observation under the microscope. Finally, tissue sections were placed in xylene (500 ml) three times for 1 min each and a drop of neutral gum was added to seal. IHC sections were observed under a light microscope (Olympus CX33; Olympus Corporation) without software analysis. IHC was performed using an IHC kit (polymer method; cat. no. KIT-5003; Fuzhou Maixin Biotechnology Development Co., Ltd.) using primary antibodies purchased from Fuzhou Maixin Biotechnology Development Co., Ltd. to target the following proteins (pre-diluted working solutions unless otherwise

indicated): P63 (1:200 dilution; cat. no. 2407100694f), CD34 (1:200 dilution; cat. no. 2404240034c), CK7 (1:200 dilution; cat. no. 2405150166e), EMA (1:100 dilution; cat. no. 2403130581b), LCA (1:200 dilution; cat. no. 2306140037c), S-100 (1:200 dilution; cat. no. 2404170585b), Calponin (1:200 dilution; cat. no. 2311210712f), TTF-1 (1:2,000 dilution; cat. no. 2406130599d), Vimentin (1:1,000 dilution; cat. no. 2312200735g), ERG (1:1,000 dilution; cat. no. 2310180748e) and Syn (1:500 dilution; cat. no. 2405150742c).

The patient had no discomfort after surgery and requested to be discharged. In June 2024, at 3 months post-discharge, the patient was followed up at the outpatient department and had reported no discomfort. Non-contrast chest CT revealed no obvious abnormalities in both lungs. Long-term follow-up on this patient will be performed and the management of similar patients will be improved.

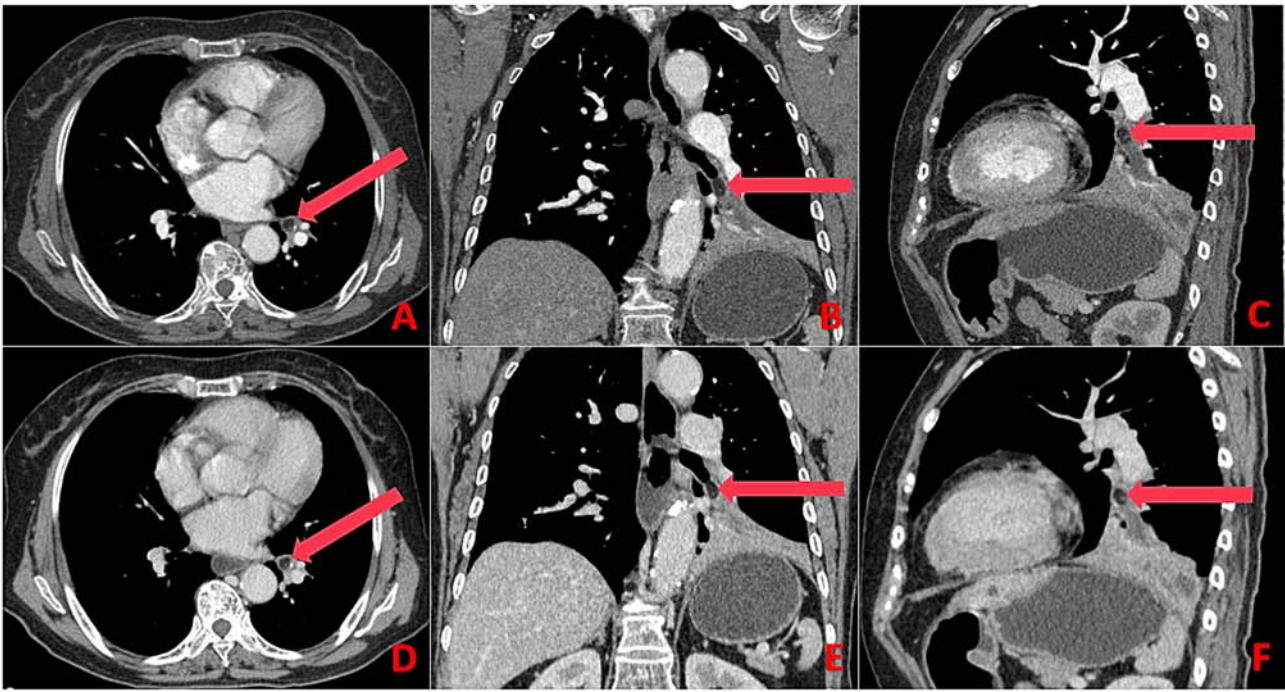


Figure 3. Contrast-enhanced chest CT (March 2024; magnification, x2). The (A) axial, (B) coronal and (C) sagittal of arterial phase show a hypodensity nodule at the bronchial opening of the basal segment of the lower lobe of the left lung, with the margins showing foci of punctate calcification. No significant enhancement observed (red arrow). The (D) axial, (E) coronal and (F) sagittal of venous phase show a hypodensity nodule at the bronchial opening of the basal segment of the lower lobe of the left lung, with the margins showing foci of punctate calcification. No significant enhancement observed (red arrow). The bronchus of the basal segment of the lower lobe of the left lung was obstructed, with streaks of non-enhanced hypodensity shadow in the distal lumen, and a large patchy hyperdensity shadow in the lower lobe of the left lung, with marked homogeneous enhancement.

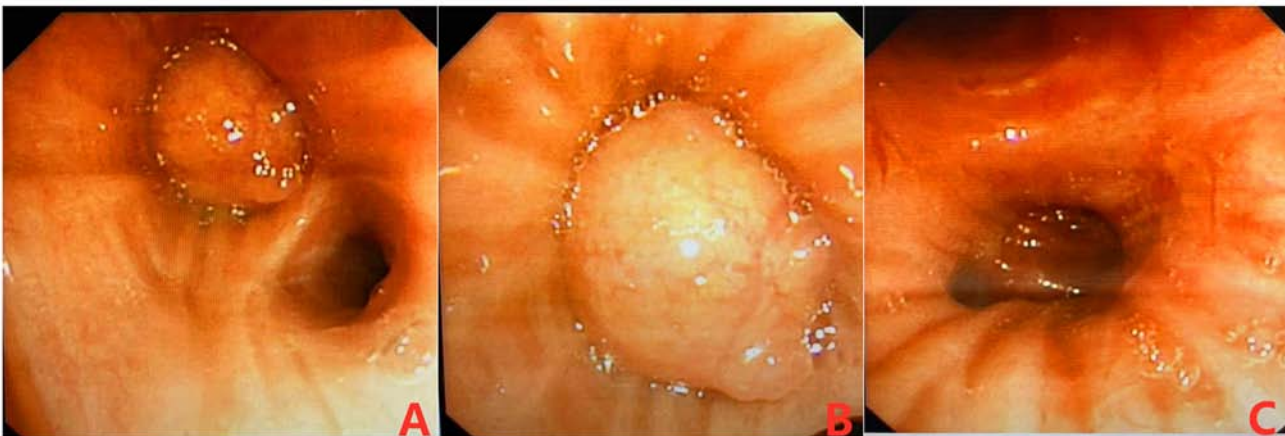


Figure 4. Bronchoscopy images. (A) Neoplasm in the lumen of the bronchial opening in the basal segment of the lower lobe of the left lung, which was soft in texture, yellowish in appearance and smooth in surface (magnification, x2). (B) Neoplasm in the lumen of the bronchial opening in the basal segment of the lower lobe of the left lung, which completely obstructed the lumen (magnification, x4). (C) Bronchus remained unobstructed after the surgery (magnification, x2).

Discussion

EL is a rare benign lung tumor, and its incidence rate accounts for only 0.1-0.5% of all lung tumors (11). The pathogenesis of EL is not clearly defined, but researchers hypothesize that it is related to the ectopic accumulation of adipose tissue (12). EL occurs mostly in large bronchi rich in adipose tissue, and most of them are found in the main bronchus and lobar bronchus, and can be divided into intraluminal and extraluminal types, with the intraluminal type mainly growing into the lumen of the bronchus, whilst the extraluminal type expands

into the surrounding lung tissues (13). EL is more common in middle-aged and elderly men, and it has been reported that smoking and obesity may be risk factors (14). The present report describes the case of an elderly female patient with EL located in the basal segment of the left lower lobe of the bronchus, belonging to the intraluminal type.

The molecular biological mechanism of EL is a complex process that is yet to be fully understood, which involves the interaction of multiple genes, signaling pathways and cellular processes. Possible explanations for the mechanism of EL are as follows: i) Gene mutation: Mutations in specific genes may

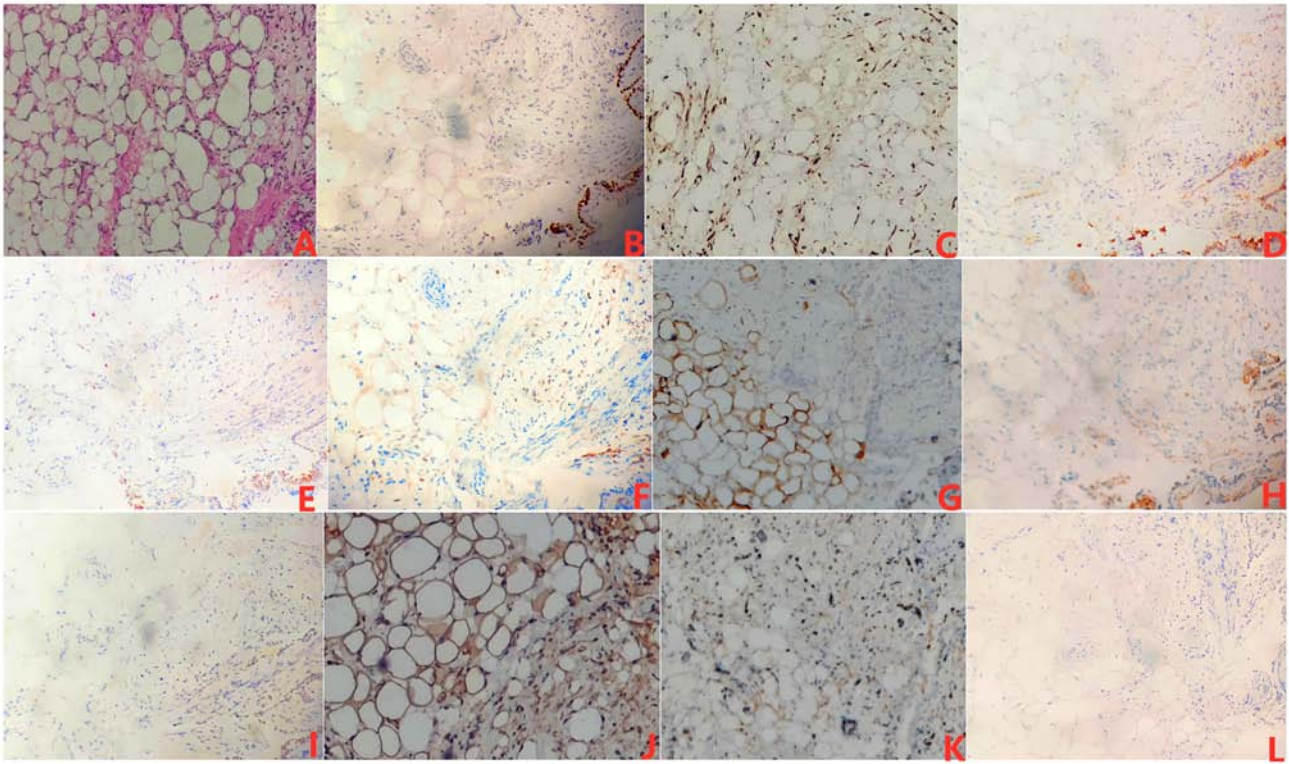


Figure 5. Pathological and immunohistochemical examination (magnification, x200). (A) Hematoxylin and eosin staining revealed chronic inflammation of the bronchial mucosa, with proliferative adipose tissue visible beneath the mucosa and focal active growth. Immunohistochemistry images: (B) P63 (-), (C) CD34 (+), (D) cytokeratin 7 (-), (E) epithelial membrane antigen (-), (F) leukocyte common antigen (-), (G) S-100 (+), (H) Calponin (-), (I) thyroid transcription factor-1 (-), (J) Vimentin (+), (K) ETS-1 related gene (VE+) and (L) Syn (-).

be important factors in the development of EL. For example, studies have reported that there is a rearrangement of the high mobility group AT-hook 1/2 gene in lipomas, which is a common chromosomal abnormality that may be related to the formation of lipomas (15,16); ii) abnormal proliferation and differentiation of adipocytes: EL is mainly composed of mature adipocytes, and its occurrence may be related to abnormal proliferation and differentiation of adipocytes. Under normal circumstances, the proliferation and differentiation of adipocytes are strictly regulated, but under certain conditions, this regulation may be imbalanced, leading to excessive proliferation of adipocytes and the formation of tumors (17); iii) signal pathway disorder: The PI3K/Akt/mTOR and Wnt/ β -catenin signaling pathways serve important roles in the proliferation and differentiation of adipocytes. If these signaling pathways are abnormally activated or inhibited, it may lead to abnormal proliferation and differentiation of adipocytes, thereby forming lipomas (18); iv) epigenetic regulation: Epigenetic regulation includes processes such as DNA methylation and histone modification, which regulate cell proliferation and differentiation by affecting gene expression patterns. In lipomas, there may be abnormalities in certain epigenetic modifications that lead to abnormal gene expression related to adipocyte proliferation and differentiation (19); v) inflammation and immune factors: Chronic inflammation and immune cell infiltration may affect the proliferation and differentiation of adipocytes by producing growth factors, cytokines and other mediators, thereby promoting the formation of lipomas (20); and vi) genetic and environmental factors: Genetic factors may

make individuals susceptible to the occurrence of lipomas, whilst environmental factors such as diet and lifestyle habits may trigger or accelerate the formation of lipomas (21,22).

The imaging manifestations of EL are mainly soft tissue masses in the trachea and bronchi. The blockage of the lumen by the lesion can cause atelectasis and airway stenosis. At the same time, patients with a long medical history may have mediastinal lymph node enlargement and a small amount of pleural effusion. When chest CT shows a soft tissue mass in the lumen with fat density, and there is no enhancement after contrast agent injection, it can indicate the diagnosis of EL (23). Xu *et al* (24) reported that the CT value of EL ranges from -40 to -120 HU, which is helpful for diagnosis, and which is similar to the present case. Moreover, a meta-analysis of 36 patients with EL reported between 1994 and 2019, indicated that 80% of EL tumors had a size <1.5 cm, whilst tumor types such as hamartomas and leiomyomas had a size >1.5 cm (25). The maximum diameter of EL in the present case was 1.2 cm, which is consistent with the results reported in the literature. Furthermore, the typical signs of lipoma under bronchoscopy are yellow, yellow-brown, or gray, oval, polypoid, or pedunculated tumors with smooth surfaces, few blood vessels, and a few lobes (4). In terms of pathology examination, EL is composed of mature adipose tissue covered by normal bronchial epithelium (4). The pathology examination of the patient in the present case demonstrated that the main component within the tumor was adipose tissue, which is consistent with the pathological characteristics of lipoma.

The clinical symptoms of EL lack specificity, and there may be no obvious positive signs on examination, with corresponding signs appearing when airway obstruction and lung infection are present (26,27). The clinical symptoms of this disease are related to the size and location of the tumor, the degree of bronchial obstruction and the presence or absence of secondary damage to the distal bronchial lung tissues (28,29). The main symptoms include fever, cough, sputum, chest tightness, shortness of breath and dyspnea, and hemoptysis is relatively rare (30). If EL grows in the central bronchus, the common clinical manifestations are cough, hemoptysis and obstructive pneumonia. Distal bronchial obstruction destroyed by inflammation may manifest as bronchiectasis, and the clinical manifestations are similar to those of obstructive lung diseases (25). Therefore, EL is often misdiagnosed as pneumonia, bronchial asthma, lung carcinoma and tracheobronchial foreign body (31).

Moran *et al* (32) reported four cases of EL, which indicated that 3/4 patients presented with cough, which is similar to the present case. Due to the clinical suspicion of malignancy, all patients underwent radical surgical procedures; lobectomy was performed in three patients, and pneumonectomy in one. The patient in the present case underwent bronchoscopic high-frequency electrocoagulation with relatively minor trauma. The prognosis of the four patients was good, and there was no recurrence reported so far. Pollefiel *et al* (33) reported two cases of EL, and one case was EL with a hilar lipoma. The patient with EL associated with a hilar lipoma presented with vague thoracic pain, with no other respiratory symptoms, which is different from the present case. The reason may be that the location of the lipomas are different. The endobronchial tumor was resected during rigid bronchoscopy, and the thoracic discomfort was resolved spontaneously. Huisman *et al* (34) described three cases of EL. Out of the three patients, one presented with hemoptysis and two were initially diagnosed as chronic obstructive pulmonary disease. They were all treated using electrocautery which achieved complete removal. The reason for the different clinical manifestations of EL may be the location where EL grew. Overall, the prognosis of EL is generally good, and both the patient in the present case and the cases described in the literature have a good prognosis.

The diagnosis of EL mainly relies on radiology examinations, particularly chest CT, which can clearly display the location, shape and size of tumors, as well as their relationship with surrounding tissues, and distinguish between intraluminal and extraluminal lesions in the airway (35). When chest CT indicates that the lesion in the bronchial lumen is fat dense, with a CT value ranging from -40 to -120 HU and no enhancement, it can be highly suggestive of EL (36,37). In addition, airway three-dimensional reconstruction technology can greatly improve the diagnostic positivity rate, and magnetic resonance imaging can better detect lipoma, but its display of calcification is not as good as CT, and it can be used as one of the complementary examination methods (38).

Bronchoscopy is one of the most important methods for diagnosing EL. The typical signs of EL under bronchoscopy are yellow, yellow-brown or gray, oval, polypoid or

pedunculated masses with smooth surfaces, few blood vessels, and a few lobulations (24,39). However, bronchoscopy also has certain limitations: i) When the lesion is located at or below the segment, the exposure of bronchoscopy is limited; and ii) although abnormalities have been found under bronchoscopy for certain patients, EL originates from the adipose tissue of the submucosal layer, the tumor body is smooth and can move with respiration, and its surface is often covered by normal bronchiolar mucosal ciliated columnar epithelium or inflammatory squamous epithelium, therefore it is not easy to clamp to the tumor tissue when it is superficial, thus leading to a delay in diagnosis (40).

In addition, EL needs to be differentiated from the following diseases: i) LC: LC that occurs above the segmental bronchus may have similar CT manifestations to bronchial lipoma, such as thickening of the tube wall, narrowing of the tube lumen, and obstructive pneumonia. However, LC has a high density of masses, without fat components, and is often accompanied by obvious malignant signs, such as distant metastasis, lymph node enlargement and typical symptoms such as cough and blood in sputum (41); ii) bronchial asthma (BA): Patients with BA often have episodes of dyspnea, audible rales, and a family or personal history of allergies. Symptoms may resolve rapidly with the administration of bronchodilators. Unlike EL, BA usually has no significant abnormalities on radiology examinations (42); iii) bronchial foreign body (BFB): Patients often experience sudden irritating dry cough or breathing difficulties, and chest CT can show hyperdensity shadows in the airway that are circular, quasi circular or irregular in shape. Compared with EL, patients with BFB usually have a history of foreign body aspiration, and the foreign bodies appear as hyperdensity shadows on radiology examinations (43); iv) pneumonia and bronchitis: Both diseases can also cause symptoms such as cough and sputum, and dry and wet rales can be heard on auscultation. However, pneumonia and bronchitis usually appear on radiology examinations as thickened bronchial vascular bundles and intrapulmonary exudative shadows, which are distinctly different from the fat-dense mass of EL (44); and v) hamartoma: This contains soft tissue and calcifications in addition to a fatty component, whereas calcifications are generally absent within EL (45).

EL is a benign lesion with a good prognosis after surgical treatment (31,34,46). For EL (intraluminal type) that grows in the large airway lumen, BIT should be preferred. Before the surgery, radiology examinations should be performed to clarify the size, location, surrounding conditions and blood supply of the lesion. This can improve efficiency and shorten the surgery time whilst ensuring safety. It can completely alleviate obstructive symptoms, with low risk, few complications, good patient tolerance, and can protect lung tissue and function (47). EL that is not suitable for BIT, such as patients with recurrent infections, concomitant lung atelectasis or bronchiectasis, multiple lesions, concurrent malignant tumors, and especially patients with tumors that cannot be completely resected endoscopically and those that are combined with tumors in multiple sites, should be considered for surgical treatment. Furthermore, surgical modality should be chosen in such a way as to protect the lung tissues as much as possible and to preserve the function of the lungs (48,49).

Bronchial obstruction caused by EL can lead to damage to the distal lung parenchyma, and long-term delay in diagnosis and treatment can cause irreversible damage to the lungs. Therefore, once discovered, EL should be removed as soon as possible. Respiratory, oncology and radiology physicians need to improve their understanding of the disease, select appropriate examination methods for diagnosis and differentiation, diagnose and treat early, and improve patient prognosis.

The Second Affiliated Hospital of Xuzhou Medical University has currently confirmed 5 cases of EL (one case each in 2014, 2022 and 2024, and two cases in 2019). However, more cases need to be reported for analysis to validate epidemiology data and improve the management of such patients.

In conclusion, EL is a rare benign lung tumor with non-specific clinical symptoms and signs. Chest CT is helpful in diagnosis. When fat density nodules are found in the bronchial lumen with no enhancement, EL should be considered. Once this disease is diagnosed, BIT is the first choice for treatment, and patients generally have a good prognosis.

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Availability of data and materials

The data generated in this present study may be requested from the corresponding author.

Authors' contributions

YW and PD conceived and designed the study, collected and assembled the data and wrote and revised the manuscript. Both authors have read and approved the final version of the manuscript. YW and PD confirm the authenticity of all the raw data.

Ethics approval and consent to participate

The present study involving a human participant was reviewed and approved by the Ethics Committee of The Second Affiliated Hospital of Xuzhou Medical University (Xuzhou, China; approval no. KY-20241027). The patient provided written informed consent to participate in the present study.

Patient consent for publication

The patient provided written consent for their information to be published.

Competing interests

The authors declare that they have no competing interests.

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