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Successful Endobronchial Electrosurgical Snare Resection of a Pedunculated Leiomyoma: A Minimally Invasive Alternative to Surgery

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Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Patient: Female, 60-year-old
Final Diagnosis: Bronchial leiomyoma
Symptoms: Fever
Clinical Procedure: —
Specialty: Pulmonology

Objective: Unusual or unexpected effect of treatment

Background: Bronchial leiomyoma is a rare benign tumor of the respiratory tract. This clinical presentation is usually non-specific and is often discovered incidentally during bronchoscopy or chest computed tomography (CT) scans. In this report, we present a case of endobronchial leiomyoma that was successfully resected using an electrosurgical snare under flexible bronchoscopy, highlighting a minimally invasive approach to managing this rare condition.

Case Report: A 60-year-old non-smoking woman with a 5-year history of asthma presented with a 4-day febrile illness (peak temperature 38.8°C). She denied any respiratory symptoms. Pulmonary function tests were normal. Chest CT revealed a round mass, approximately 8×10 mm in size, at the orifice of the lingular segment bronchus of the left upper lobe, with no contrast enhancement. Bronchoscopy identified a pedunculated, pale, smooth-surfaced polypoid tumor completely occluding the orifice. The tumor was resected using an electrosurgical snare during a 20-minute procedure. The resection site bled minimally, and bleeding was completely controlled by spraying with epinephrine solution (final concentration 0.0167 mg/mL). Histopathological analysis revealed spindle-shaped cells that were immunoreactive for both smooth muscle actin and desmin, confirming a diagnosis of bronchial leiomyoma. The patient has been followed for 36 months with no evidence of recurrence.

Conclusions: Endobronchial leiomyoma is a rare benign airway tumor. Electrosurgical snare resection is an effective, lung-sparing option for pedunculated or narrow-based lesions without evidence of extraluminal invasion. Surgical resection remains the standard of care when complete endoscopic removal is not feasible, extramural extension is suspected, or the diagnosis is uncertain.

Keywords: Leiomyoma • Bronchoscopes • Electrosurgery

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Introduction

Primary endobronchial leiomyomas are extremely rare, accounting for approximately 2% of benign tumors of the lower respiratory tract. Among pulmonary leiomyomas, approximately a third (33%) are located in the endobronchial tree [1,2]. They typically originate from the smooth muscle cells of the trachea, bronchi, pulmonary vessels, or their embryonic remnants [3]. Clinically, the presentation is often nonspecific, with symptoms such as cough, hemoptysis, or recurrent infections. The tumor is frequently detected on chest computed tomography (CT) and subsequently confirmed by bronchoscopy. Surgical resection remains the cornerstone of treatment. In this report, we present a case of endobronchial leiomyoma that was successfully resected using an electrosurgical snare under flexible bronchoscopy, demonstrating the feasibility and safety of bronchoscopic snare resection for this rare tumor.

Case Report

A 60-year-old non-smoking woman with a 5-year history of asthma presented with a 4-day febrile illness (peak temperature 38.8°C). She denied any cough, wheezing, dyspnea, hemoptysis, or recurrent respiratory infections during this presentation. The patient had been diagnosed with asthma 5 years earlier due to episodic wheezing and bilateral wheezes on auscultation. At that time, her symptoms improved after a 5-day course of intravenous methylprednisolone (40 mg daily). She subsequently inhaled budesonide/formoterol (Symbicort) for more than 3 months but discontinued it on her own. Her asthma symptoms remained well-controlled without any acute exacerbations during this period. Upon current admission, laboratory tests showed a normal white blood cell count (6.2×10^9/L) and elevated C-reactive protein (62 mg/L). Chest CT revealed a round mass, approximately 8×10 mm in size, at the orifice of the lingular segment bronchus of the left upper lobe. Contrast-enhanced CT scan showed no enhancement (**Figure 1**). Notably, no mediastinal lymphadenopathy or abnormalities of the abdominal organs, including the uterus, were found. Under general anesthesia with propofol and fentanyl, flexible bronchoscopy (Olympus BF-TQ170) via the oral route revealed a pedunculated tumor occluding the lingular segment orifice (**Figure 2**). During the procedure, bronchoalveolar lavage was performed for microbiological studies, including bacterial culture, tuberculosis culture, and Xpert MTB/RIF assay; all tests returned negative. The tumor was resected using a 25-mm electrosurgical snare (Olympus) connected to an ERBE VIO 220D generator set to ENDO CUT Q (effect 3, duration 1, interval 3) and FORCED COAG (effect 2, limit 40 W). The 20-minute procedure was uneventful, with complete resection achieved. The resection site bled minimally, and the bleeding was completely controlled by spraying 10 mL of diluted epinephrine solution (final concentration 0.0167 mg/mL) onto the resection site. Histopathological analysis revealed spindle-shaped cells that were immunoreactive for both smooth muscle actin and desmin, confirming a diagnosis of bronchial leiomyoma (**Figure 3**). Postoperatively, the patient received empirical antibiotic therapy with cefoperazone-sulbactam, and her fever resolved. She recovered well and was discharged without complications.

Discussion

Endobronchial leiomyoma is a rare benign pulmonary neoplasm, hypothesized to originate from smooth muscle cells within the tracheobronchial tree, pulmonary vasculature, or their embryologic precursors [1]. Peripherally located tumors are often asymptomatic. Symptoms correlate with tumor size and location, most commonly including cough, dyspnea, and hemoptysis [4,5]. Paroxysmal dyspnea and wheezing are frequently misdiagnosed as asthma [6]. In the present case, the patient had a 5-year history of asthma that responded well to corticosteroid therapy. Whether the endobronchial leiomyoma was present at the time of initial asthma diagnosis or developed later remains unknown. The tumor was discovered incidentally on CT during a febrile illness, after years of well-controlled asthma symptoms. This case highlights that endobronchial tumors may be unrelated to a patient's asthma history and can remain undetected until discovered incidentally or when complications arise. In addition to primary pulmonary origin, the differential diagnosis should include benign metastasizing leiomyoma and other forms of metastatic or iatrogenic dissemination from gynecologic leiomyomas, particularly in patients with a history of gynecologic surgeries [7]. This is less likely in our patient given the absence of uterine abnormalities.

The detection of endobronchial leiomyoma on chest radiographs is often challenging due to overlapping mediastinal and skeletal structures, with atelectasis being the most frequently observed radiographic finding [8]. In contrast, chest CT demonstrates superior diagnostic sensitivity. Characteristic CT features include well-defined, smoothly marginated masses with elliptical or circular morphology projecting into the bronchial lumen, exhibiting homogeneous density and contrast enhancement [9,10]. Quantitative CT analysis reveals typical attenuation values of 25-46 Hounsfield units (HU) on non-contrast imaging and 46-85 HU following contrast administration [10]. Macroscopically, these tumors present as pale, smooth-surfaced polypoid lesions. In our case, the tumor demonstrated a rounded configuration with narrow-based attachment.

Definitive diagnosis requires histopathologic evaluation, revealing characteristic intersecting fascicles of spindle cells with eosinophilic cytoplasm, coupled with immunohistochemical

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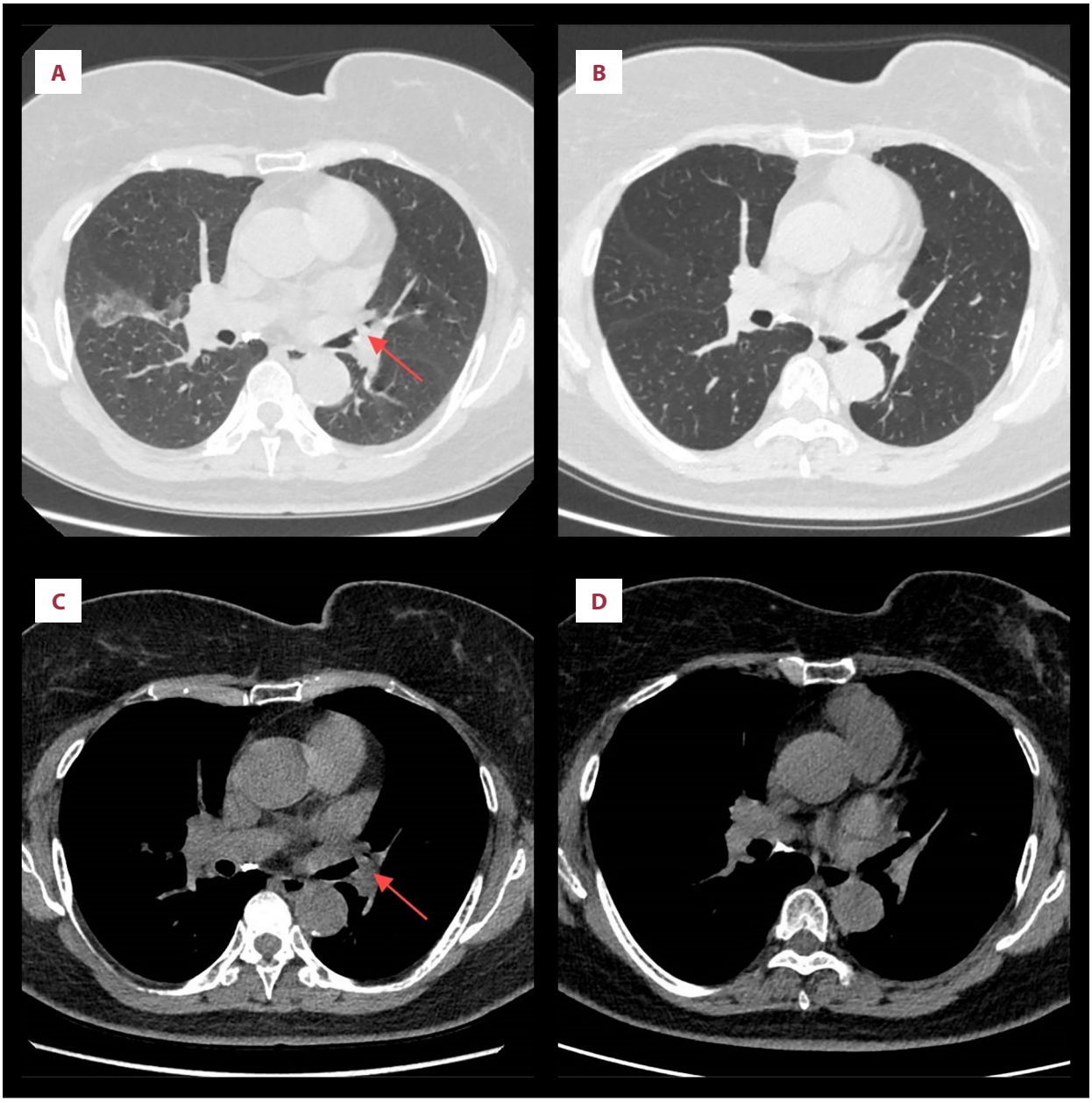

Figure 1. (**A, C**) Thoracic CT showing the leiomyoma in the left upper lobe bronchus. (**B, D**) Follow-up chest CT 6 months after successful resection. CT, computed tomography.

studies demonstrating strong reactivity for smooth muscle actin and desmin. These immunophenotypic markers are pivotal in distinguishing this entity from other benign endobronchial pathologies [11].

Surgical resection has traditionally been the primary curative treatment for bronchial tumor, with established techniques including lobectomy, segmental resection, and bronchotomy [8,12]. However, recent advancements in bronchoscopic interventions have expanded therapeutic options, with increasing adoption of minimally invasive endoluminal techniques. Current bronchoscopic modalities include cryosurgery, Nd-YAG laser ablation, argon plasma coagulation, and electrosurgical resection, which demonstrate significant advantages in safety profiles and postoperative recovery [4,13-15]. Treatment selection requires thorough evaluation of tumor vascularization and anatomical relationships. For endobronchial leiomyomas, particularly those with narrow-based attachments, bronchoscopic intervention represents a safe and effective approach [4]. In contrast, broad-based lesions that are not amenable to complete endoscopic resection may still require surgical management [16].

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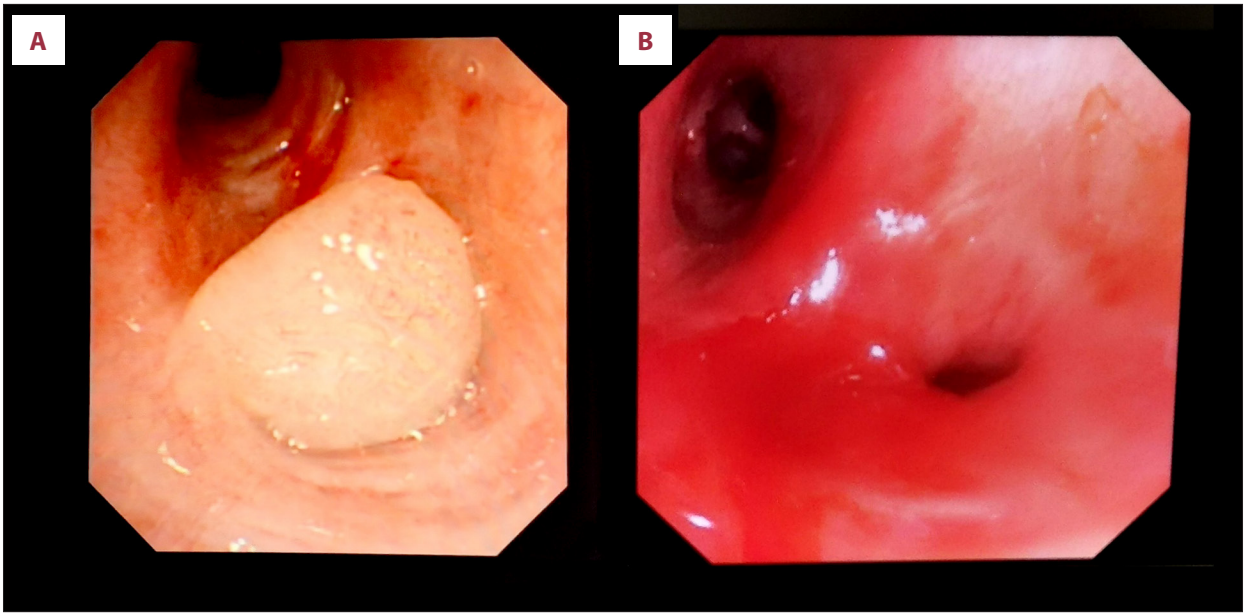

Figure 2. (**A**) Preoperative view of the leiomyoma occluding the left lingular bronchus. (**B**) Postoperative view of patent orifice after snare resection.

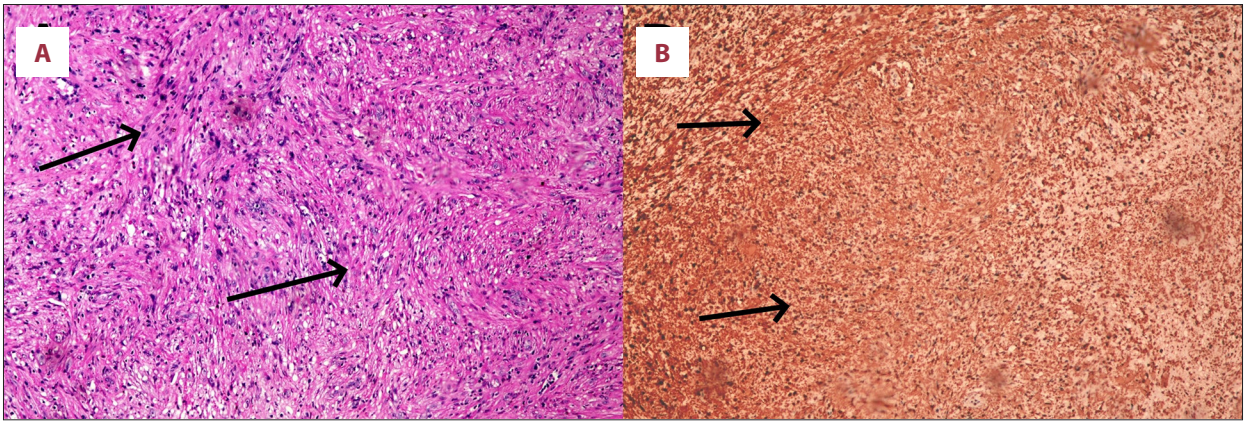

Figure 3. (**A**) The resected specimen shows spindle-shaped cells without nuclear atypia (hematoxylin and eosin stain, magnification ×10). (**B**) Smooth muscle cells staining positive for desmin (original magnification ×10).

In the present case, although the patient was asymptomatic, bronchoscopy showed complete occlusion of the lingular segment orifice, posing a risk of future obstructive complications such as post-obstructive pneumonia or atelectasis. Bronchoscopic resection was preferred over surgical management for several reasons. First, the tumor's pedunculated morphology with a narrow base made it technically amenable to complete endoscopic snare resection. Second, the patient had preserved lung function and no evidence of extraluminal invasion on CT, making lung-sparing intervention particularly suitable. Third, the minimally invasive nature of the procedure offered advantages in terms of safety, recovery, and lower morbidity compared with surgical alternatives such as lobectomy or bronchotomy. Finally, the patient's preference for avoiding surgery was respected after thorough discussion of the risks and benefits.

Given its narrow base, electrosurgical snare resection was a minimally invasive and effective preventive approach. The procedure was straightforward and highly efficient, with only minimal oozing at the resection site, which was easily controlled by topical application of hemostatic agents. Compared with conventional surgery, bronchoscopic intervention offers advantages in terms of safety and recovery. The patient in our case has been followed up for 36 months post-resection, during which she remained asymptomatic, with no paroxysmal wheezing or cough, and required no asthma medications. Postoperative pulmonary function tests revealed normal spirometry with isolated mild small airway dysfunction, and a bronchial provocation test (methacholine challenge) at 12 months was negative. Chest CT at 6 and 36 months showed no tumor recurrence. Control bronchoscopy was not performed due to

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the absence of symptoms and negative CT findings, which is consistent with current practice for benign endobronchial tumors after complete resection. Fractional exhaled nitric oxide was not measured during follow-up, which we acknowledge as a limitation. Although recurrence of endobronchial leiomyoma is uncommon, cases have been reported following incomplete resection [17], necessitating regular postoperative surveillance. The 36-month clinical, functional, and radiological follow-up in this case supports complete resection and sustained clinical remission.

Conclusions

Endobronchial leiomyoma is a rare benign airway tumor. Electrosurgical snare resection is an effective, lung-sparing option for pedunculated or narrow-based lesions without evidence of extraluminal invasion. Surgical resection remains the standard of care when complete endoscopic removal is not feasible, extramural extension is suspected, or the diagnosis is uncertain.

Department and Institution Where Work Was Done

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Patient Informed Consent

Informed consent was obtained from the patient for publication of this case report.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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