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## Endobronchial solitary fibrous tumor

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### ABSTRACT

Solitary fibrous tumor (SFT) is a mesenchymal neoplasm that appears primarily in the pleura and rarely in intrapulmonary or endobronchial topography. The authors report the case of a 47-year-old woman who presented obstructive respiratory symptoms for 4 years. The chest computed tomography and bronchoscopy showed an obstructive polypoid lesion located between the trachea and the left main bronchus associated with distal atelectasis of the left lung. A resection of the lesion was performed and, macroscopically, the mass was oval, encapsulated, and firm, measuring 2.3 × 1.7 × 1.5 cm. Histology revealed low-grade mesenchymal spindle cell neoplasm, with alternating cellularity, myxoid areas, and mature adipose tissue outbreaks, as well as blood vessels with irregular walls. The immunohistochemical study was positive for CD34, CD99, and BCL2. The diagnosis was SFT in an unusual topography. The patient's symptoms remitted after tumor excision, and no systemic problems were evident. SFTs primarily affect adults and often follow a benign course; however, their behavior is unpredictable. The presence of necrosis and mitotic activity may portend a poor prognosis. Endobronchial SFTs are rare but should be evaluated and monitored similar to SFTs at other sites, with a long-term follow-up.

### Keywords

Solitary Fibrous Tumors; Bronchi; Immunohistochemistry; Lung Neoplasms; Pathology

### INTRODUCTION

Solitary fibrous tumor (SFT) is an uncommon soft tissue spindle cell neoplasm with distinctive histology and immunohistochemistry, which is first recognized in the visceral pleura. However, it has been described as originating from many other sites also, such as subcutaneous tissue, deep soft tissues, the head, neck, chest wall, lung, mediastinum, meninges, and the abdominal cavity.<sup>1,2</sup> Pak et al.,<sup>3</sup> in a review of the literature, found 800 descriptions of STF in the

pleura, 15 in the lung parenchyma, and only 2 in an endobronchial location.

### CASE REPORT

A 47-year-old Caucasian woman was diagnosed with late-onset asthma because of a 4-year history of wheezing and productive cough sputum. Despite the asthma treatment, the patient's symptoms

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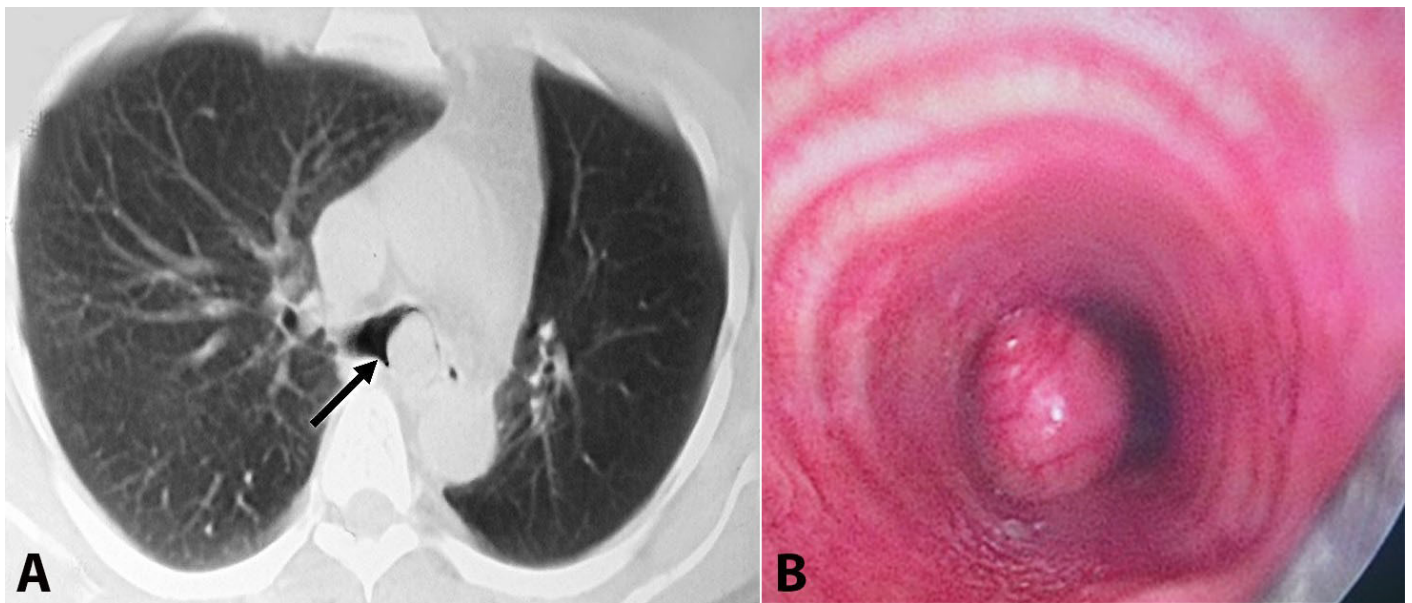


progressively worsened with episodes of pain in the left hemithorax, and dyspnea with unidentified triggering agents. The patient had no previous or relevant family health problems. The physical examination of the chest showed bilateral vesicular breath sounds that were decreased in the left base.

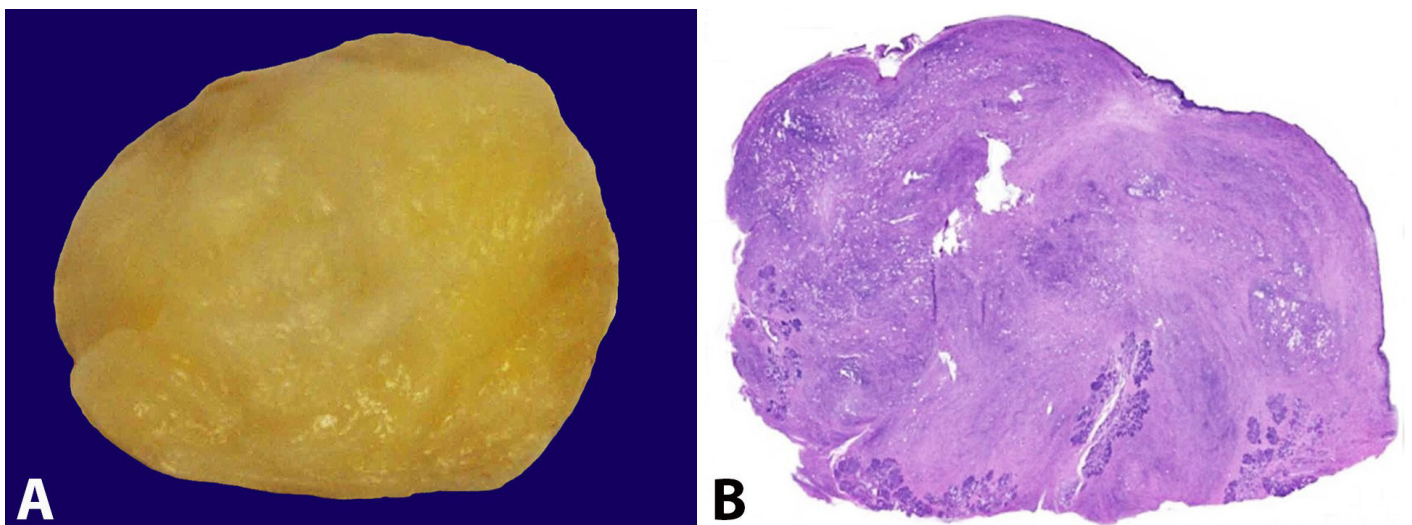
Chest radiography showed a marked volume reduction of the left lung. In a chest computed tomography scan, a rounded lesion was evident, which was partially obstructing the ostium of the left main bronchus (Figure 1A).

The patient underwent a rigid bronchoscopy, which found a mobile polypoid lesion that adhered to the bronchial mucosa. It had a smooth shiny surface, was not friable, and obstructed the left main bronchus (Figure 1B). It was removed endoscopically.

On gross examination, the lesion was oval-shaped, well circumscribed, encapsulated, with a fibroelastic consistency, and measured  $2.3 \times 1.7 \times 1.5$  cm and weighed 5.0 g. The cut surface was smooth, homogeneous, and brownish in color (Figure 2A). All material was sampled for microscopic evaluation.



**Figure 1. A** - Chest CT axial plane showing reduced volume of the left lung and an obstructive lesion (arrow) at the carina obstructing the emergence of the left main bronchus; **B** - Endoscopic view of the polypoid lesion observed within the left main bronchus.

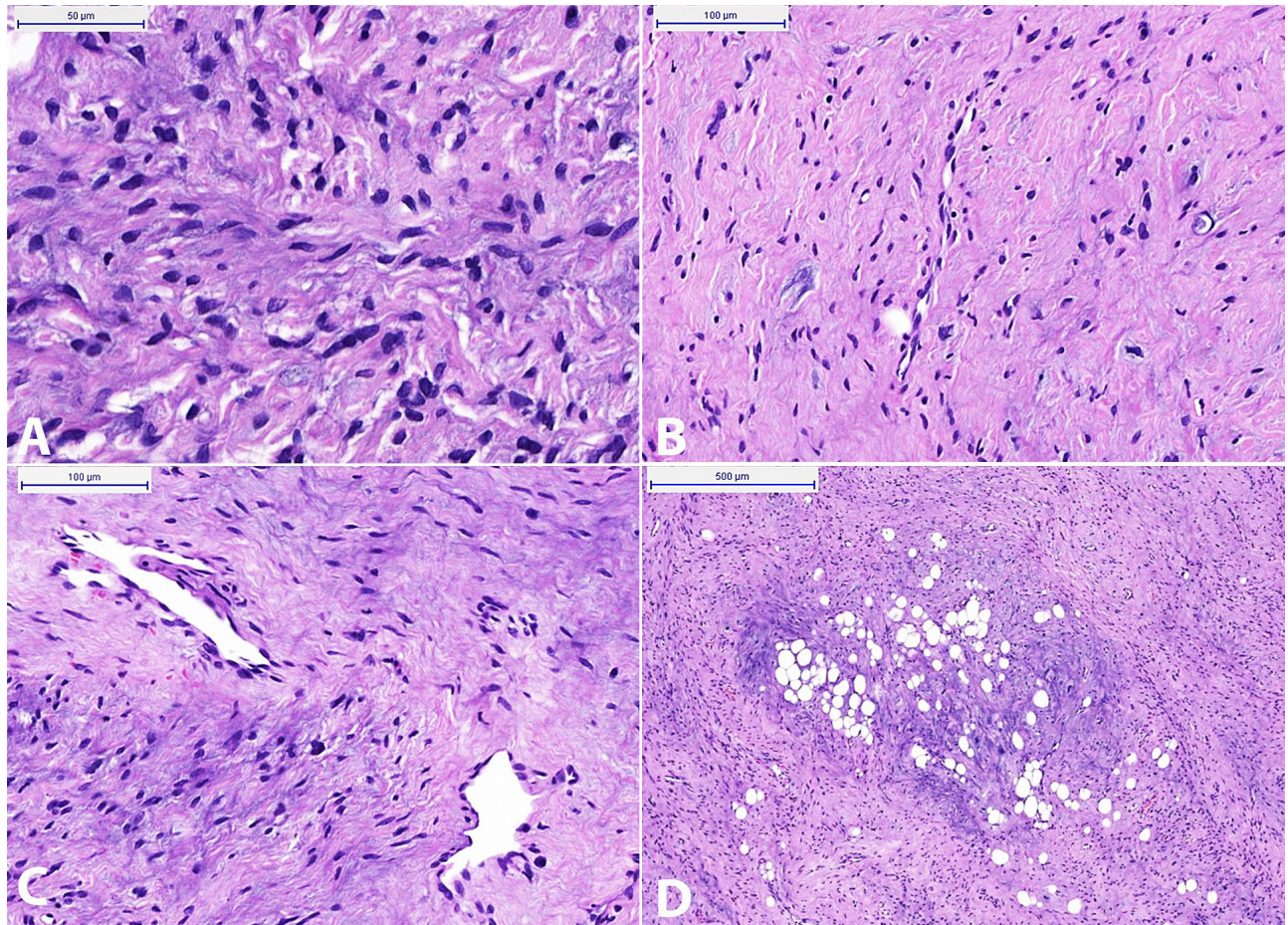


**Figure 2. A** - Macroscopic view of the light-brownish oval lesion with a bright and irregular surface; **B** - Photomicrography of the tumor; histologic section showing varied cellularity of the neoplasia. Note the absence of necrosis (H&E, 50X).

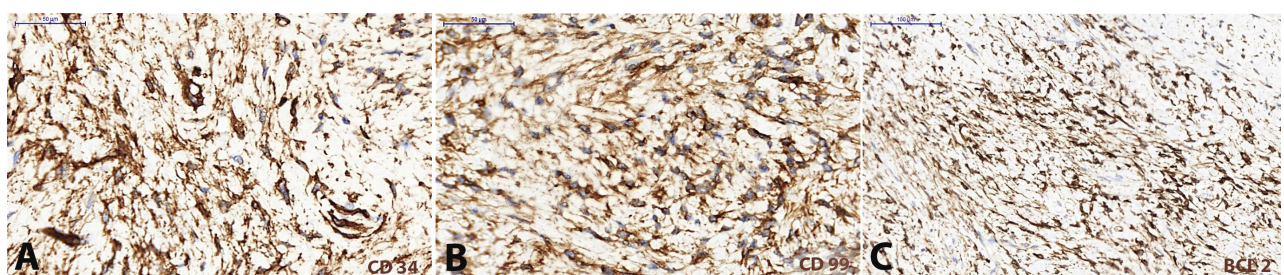


Histological sections of this material showed low-grade mesenchymal neoplasm without cellular atypia or necrosis, represented by spindle cells arranged in small, loose, fascicular arrangements, with hypercellular and hypocellular areas (Figures 2B and 3A). The hypocellular areas had dense collagen bands and focal myxoid changes. There were focal aggregates of mature fat cells. Blood vessels were irregular in shape and focally showed a “staghorn” configuration (Figures 3B, 3C, 3D).

The mitotic counting was 2 per 10 high-power fields. The morphological findings were consistent with a benign spindle cell neoplasm. The immunohistochemical study revealed negativity for cytokeratin (AE1/AE3), S100 protein, smooth muscle actin, and desmin. The neoplastic cells were positive for CD34, CD99, and BCL2 (Figure 4A, 4B, 4C, respectively). The histological features were consistent with the diagnosis of SFT. The patient became asymptomatic after the lesion’s excision, and during



**Figure 3.** Photomicrography of the tumor. **A** - Hypercellular neoplastic area; spindle cells with minimal atypia. Note the absence of mitotic activity (H&E, 400X); **B** - Area of less intense cellularity, with dense collagen and focal myxoid degeneration (H&E, 200X); **C** - Blood vessels with “staghorn” configuration (H&E, 200X); **D** - Spotlights of mature adipose tissue within the fusocellular neoplastic areas (H&E, 200X).



**Figure 4.** Photomicrography of the tumor. Immunohistochemistry: **A** - Positivity for CD 34 (400X); **B** - Positivity for CD 99 (400X); **C** - Positivity for BCL 2 (200X).



the 18-month follow-up no other lesions were detected.

## DISCUSSION

SFT is a mesenchymal neoplasm, often with a hemangiopericytic pattern,<sup>1,2,4</sup> and framed in the group of soft tissue tumors as of uncertain histological type and indeterminate malignancy.<sup>1</sup> This group of tumors also comprises the ossifying fibromyxoid tumor, the mixoinflammatory fibroblast sarcoma, the pleomorphic hyalinizing angiectatic tumor, and the phosphaturic mesenchymal tumor.<sup>1</sup> The World Health Organization has classified SFT in the group of fibroblastic/myofibroblastic tumors.<sup>2</sup> Since the initial descriptions of this neoplasm, there has been a discussion on the use of the terminology hemangiopericytoma/SFT; currently, SFT is the preferred nomenclature.<sup>1,2</sup>

This tumor usually affects adults aged between 20 and 70 years, with no gender preference. The clinical behavior is represented by a painless and slow-growing mass, which is eventually associated with compressive symptoms.<sup>1,2</sup> In the case reported herein, the patient had an obstruction to the respiratory airway, which was clinically misdiagnosed as late-onset asthma.

Macroscopically, these tumors may be encapsulated and they are well-circumscribed, sometimes forming nodules (as noted in visceral topographies), or appearing as exophytic masses (as seen in serous surfaces). In general, the size varies between 5.0 cm and 10.0 cm, the color is grayish-white, and there is eventual central bleeding and/or necrotic foci. Histologic evaluation reveals varying cell density composed of spindle cells with rounded nuclei, and indistinct cytoplasm with or without mild atypia. Focal hyalinization and thickening of the vessel walls have often been observed and, together with the branch and irregularities of vascular walls (staghorn-like vascular network), this gives the hemangiopericytic-like pattern to the lesion.<sup>1,2</sup> Varying proportions of myxoid patterns are also reported.<sup>5,6</sup> The presence of mature adipose tissue foci has already been described, mainly in the variant called “fat-forming,” which has a similar outcome and prognosis.<sup>7</sup>

Regarding the immunohistochemical evaluation, three markers have been highlighted: CD34, CD99,

and BCL2, which are positive in 90%, 70%, and 30% of cases, respectively. Variable positivity is described for epithelial membrane antigen and smooth muscle actin. Markers, such as desmin, S100 protein, and cytokeratin, are necessarily negative.<sup>2</sup> Recently, Bouvier et al.<sup>8</sup> described the overexpression of the *ALDH1* gene in 84% of cases of SFT. They observed high sensitivity and specificity of the immunohistochemistry for the detection of this gene product for the diagnosis of SFT, especially when associated with the standard markers of this neoplasm.<sup>8</sup> This research emphasized their use, particularly in the meninges topography to differentiate it from meningioma, because only 1.2% of meningotheial tumors have an overexpression of this gene.<sup>8</sup>

Unlike other soft tissue tumors, which have specific chromosomal/genetic alterations, SFT does not have well-defined molecular abnormalities. Recently, the literature highlighted gene fusion *NAB2/STAT6*, associated with deregulation of the *NAB2* gene—a gene regulator of the early growth response 1 transcription factor.<sup>9,10</sup>

The intrapulmonary or endobronchial location of this tumor is unusual.<sup>4,9</sup> Rao et al.<sup>4</sup> described the clinical, morphological, and immunophenotypic characteristics of 24 cases of intrapulmonary SFT.<sup>4</sup> They emphasized that the appearance of these tumors in topography may be related to (i) direct continuity between the mesenchyme and subpleural pulmonary interlobular septa; (ii) parenchymal lung fibroblasts; or (iii) invaginations of the visceral pleura.<sup>4</sup>

In the case presented herein, the presence of myxoid areas and adipose tissue associated with the fibrous component gave rise to the differential diagnosis of a bronchial lipomatous tumor (i.e. adipocytes lesion with discrete cellular atypia). Boland et al.,<sup>11</sup> in a study of such cases, showed that even the most atypical lesions reveal a cytogenetic profile consistent with lipomas, and they emphasized that liposarcoma, in this location, is quite unusual. Spindle cell lipoma, a lesion with a variable proportion of adipose tissue, is another differential diagnosis. However, it rarely originates in deep topographies and it lacks the typical irregular shape of the vasculature.<sup>2,12</sup> Myofibroblastoma, a common cancer in the breast and abdominal wall, also could be a possibility, but it presents positivity for desmin, which is not observed in SFT.<sup>2,12,13</sup> It should be noted that SFT, spindle cell

lipoma, and myofibroblastoma are neoplasms with overlapping morphology and immunophenotype features. The expression of CD34 in these tumors emphasizes the plasticity of differentiation of these cells.<sup>12,13</sup>

The majority of patients with SFT have a benign course following excision. The two most important criteria for bad prognostic predictors are mitotic activity (more than 4 mitoses in 10 high-power fields) and necrosis.<sup>1,2</sup> Other criteria for bad prognosis include a tumor size > 5.0 cm, marked cellularity, hemorrhage, and cellular pleomorphism.<sup>1</sup> Rao et al.,<sup>4</sup> in a study of patients with intrapulmonary SFT, showed that even tumors with mild atypia and lacking mitotic activity or necrosis rarely fare poorly. Therefore, excision and careful clinical follow-up are essential. DeMicco et al.,<sup>14</sup> after a study at the MD Anderson Cancer Center, proposed a risk stratification model based on age (cut-off: 55 years), size (< 5.0 cm, 5.0-10 cm, 10-15 cm, ≥ 15 cm), and mitotic activity (0, 1-3 mitoses, and ≥ 4 mitoses). Each item gives a score, rendering a classification of low risk (0-2 points), moderate risk (3-4 points), and high risk (5-6 points).<sup>14</sup> Low-risk patients had an absence of metastases and 100% survival after 5 and 10 years. However, high-risk patients showed only a 15% free rate of metastatic disease after 5 years, 60% survival after 5 years, and 0% survival after 10 years.<sup>14</sup> Our patient was classified as low-risk; therefore, rigorous clinical monitoring was recommended.

SFT is a compelling neoplasm for clinicians, surgeons, and pathologists, and is often difficult to diagnose. In this case, the challenge was imposed by the location and the morphologic variation with focal adipose tissue and myxoid changes. This report highlights the importance of careful morphological evaluation in risk stratification to predict the biological behavior of this lesion.

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**Conflict of interest:** None

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