Intrapulmonary Solitary Fibrous Tumor Diagnosed by Immunohistochemical and Genetic Approaches: Report of a Case

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Abstract
Although solitary fibrous tumors (SFTs) of the pleura are not uncommon, intrapulmonary SFTs are extremely rare. A 72-year-old woman was admitted to our hospital for an investigation of an enlarging intrapulmonary tumor. Because a definitive diagnosis could not be readily established, a pulmonary wedge resection under video-assisted thoracic surgery was performed. Grossly, the tumor was white, well circumscribed, and separate from the pleural surface. Histologically, it consisted of spindle cells proliferating in a vague fascicular pattern, with many dilated capillaries, and intermingled glandular components. These findings suggested a differential diagnosis that included SFT and nonchondromatous pulmonary hamartoma. On immunohistochemical analysis, the spindle cells showed a strong positive reaction to the CD34 antigen. Interphase fluorescent in situ hybridization revealed an absence of HMGA-1 and -2 translocations. These results supported a diagnosis of SFT. A genetic approach may therefore be useful in the differentiation of SFT from nonchondromatous hamartoma.

Key words Lung neoplasm · Solitary fibrous tumor · Pathology · Genetic diagnosis · Video-assisted thoracic surgery · Interphase fluorescent in situ hybridization · CD34

Introduction
Although solitary fibrous tumors (SFTs) of the pleura are not uncommon, SFTs arising from other organs are extremely rare.1–4 Differentiating intrapulmonary SFTs from nonchondromatous pulmonary hamartomas is sometimes difficult. We report here a case of an intrapulmonary SFT, which was resected by video-assisted thoracic surgery (VATS) and diagnosed by immunohistochemistry and interphase fluorescent in situ hybridization (FISH).

Case Report
A 72-year-old woman was admitted to our hospital for an investigation of an abnormal shadow in her left upper lung field on chest X-ray. On admission, she had an intrapulmonary tumor in the left S1+2 segment measuring 11 × 9 mm in size and demonstrating clear margins (Fig. 1), without any symptoms. A bronchoscopic examination revealed no abnormal findings, and a definitive diagnosis could not be established. Since the tumor had increased in size in comparison to her chest X-ray findings of 1 year previously, the tumor was resected using VATS.

A 4-cm access thoracotomy was located at the mid-axillary line in the fourth intercostal space. Two additional thoracoports were placed at the anterior–axillary line in the sixth intercostal space and at the mid-axillary line in the seventh intercostal space. A pulmonary wedge resection was performed including the surrounding normal tissue to avoid an incomplete resection. Grossly, the tumor was firm, ovoid, white, and measured 12 × 9 × 7 mm in size. It was well circumscribed and completely isolated from the pleural surface. The patient’s postoperative course was uneventful. One year after surgery, she was found to be healthy without any recurrence.

Microscopic observations revealed a well-demarcated nodular mass, originating from the wall of the small bronchus and protruding into the adjacent pulmonary parenchyma. The tumor consisted of spindle cells proliferating in a vague fascicular pattern with a scattered deposition of hyalinized collagen fibers. In some regions, elongated tumor cells tended to show a wavy
appearance. There were many dilated capillaries, some of which showed a staghorn pattern. In addition, glandular components were intermingled with spindle cells. The glands were lined by flattened epithelial cells with eosinophilic cytoplasm. Their lumens contained a mucoid substance and they showed various degrees of dilatation. No myxoid or chondroid metaplasia was observed. Cellularity was low and mitotic figures were rare. The differential diagnosis was formulated and it included SFT and nonchondromatous pulmonary hamartoma (Fig. 2a, b).

Immunohistochemical studies were carried out using mouse monoclonal antibodies directed against CD34 (DakoCytomation, Glostrup, Denmark), TTF-1 (DakoCytomation), and MIB-1 (MBL, Nagoya, Japan). The spindle cells showed a strong positive reaction to the CD34 antigen (Fig. 2c). Glandular cells were negative for TTF-1. The MIB-1 index was less than 1%.

Interphase FISH was performed on paraffin-embedded tissue sections as reported previously, to examine the translocations of HMGA-1 and HMGA-2, located at chromosome 6p21 and 12q14–15, respectively. Rearrangements of these genes are known to occur frequently in pulmonary hamartomas. With interphase FISH, 50 tumor cells were observed but no chromosomal structural abnormalities were detected for either HMGA-1 or HMGA-2 (Fig. 2d). These results sup-