Primary Synovial Sarcoma of the Lung

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Abstract

A 45-year-old woman presented chest pain and a well-defined oval shaped mass on a chest radiograph. A malignant pulmonary tumor was suspected and a right pneumonectomy was performed. The tumor measured about 13 × 12 cm, was pale-yellow in color and soft in texture. Histologically, it had round to oval and spindle-shaped cells with minimal cytoplasm, hyperchromatic nuclei, inconspicuous mitoses and only slight fibrous stroma. Immunohistochemically, the tumor cells were positive for vimentin, CD 99, BCL-2 protein and EMA. The reverse transcriptase-polymerase chain reaction (RT-PCR), using RNA extracted from fresh-frozen tissue, demonstrated SYT/SSX-2 fusion transcripts, confirming the diagnosis of synovial sarcoma.

Key words: primary synovial sarcoma, lung tumor, molecular analysis, fine needle biopsy, immunohistochemistry, enchondroma

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Introduction

Synovial sarcoma, an aggressive neoplasm accounting for up to 14% of soft tissue sarcomas (1), was recently recognized as a primary tumor in the lung and pleura (2).

Primary sarcomas of the lung constitute about 0.1% of malignant lung tumors (3). However, as a result of the use of potent diagnostic tools such as immunohistochemistry and molecular genetics, more primary sarcoma are being found. Histogenesis remains unknown though is thought to be a totipotential mesenchymal cell (4).

We present a case of primary lung synovial sarcoma, associated with other mesenchymal benign tumors within other locations and molecular analysis of the SYT-SSX fusion gene transcripts using the reverse transcription polymerase chain reaction (RT-PCR) confirmed the diagnosis.

Case Report

A 45-year-old female patient presented with progressive chest pain and coughing. Physical examination revealed decreased breath sounds, dullness to percussion, decreased fremitus and absence of egophony over the right lung, but otherwise the patient presented good health. The patient had a 20 pack/year smoking history and surgery for uterine leiomyoma 14 years before. No family history of cancer was reported. The results of blood tests, standard biochemical and urine analysis were normal. Arterial blood gases, electrocardiogram and lung function tests were normal. Standard chest X-ray showed a well-defined mass on the right side (Fig. 1). The abdominal ecography showed three nodules in the uterine (51, 21, and 14 mm in diameter) suggesting myomas.

The computed tomography scan revealed a smooth mass with a dimension of 10 × 5 cm without adenopathies or pleural effusion (Fig. 2). A bronscoscopy was carried out and the only notable finding was an extrinsic compression of the lower lobe. A fine needle biopsy was suggestive of mesenchymal tumor; however, it was uncertain whether the tumor was cytologically malignant or benign. As reported by other authors, the results of PAAF exam were inconclusive.

Positron emission tomography was performed revealing a large irregular area (10 × 8 × 9 cm) in the posteromedial region of the right lung and an irregular lesion in the left femur bone (Fig. 3). A bone scan also revealed this femur lesion and a magnetic resonance imaging showed a low signal on T1 and a high signal on T2 (Fig. 4). A biopsy was performed and the results were consistent with an enchon...
Routine chest radiograph. A well-defined oval-shaped mass in the right lung.

Contrast-enhanced CT shows a smooth mass without adenopathy or pleural effusion.

Positron emission tomography. Large irregular area in the posteromedial region of the right lung with high metabolism.

Coronal cut of left femur. A 3-cm centromedular lesion was observed in the upper area of the left femoral diaphysis at the subtrochanteric level with a lobular appearance. Inside, it presents a chondroid matrix.

droma.

Right pneumonectomy was performed. The surgical specimen included a 13 × 12 × 8 cm tumor. It was well-circumscribed, but non-encapsulated and compressed adjacent tissues on the cut surface (Fig. 5A). The tumor was whitish-yellow in color and soft in consistency with cystic degenerative changes and hemorrhage. There was no calcification in the tumor. Nor was there infiltration of the hilar and bronchomediastinal nodes.

The histological study of the tumor concluded that it was a case of spindle cell sarcoma with myxoid areas consisting of fusiform cells with relatively monotonous appearance and rounded or oval nuclei and scarce mitotic activity (Fig. 5B). Immunohistochemistry was positive for vimentin (Fig. 5C), O-13 (Fig. 5D), BCL-2 protein (Fig. 5E) and EMA (Fig. 5F).

Morphology and immuno-phenotype suggested a diagnosis of synovial sarcoma. A RT-PCR, using RNA extracted
Figure 5. Surgical specimen of the monophasic synovial sarcoma of the lung, showing a white-tan cut surface (A). Typical appearance with fascicles and sheets of uniform, relatively small ovoid neoplastic cells. Myxoid change is also seen (right) (hematoxylin and eosin ×100) (B). Immunohistochemistry discloses strong reactivity for vimentin (C), O-13 (D), and BCL-2 protein (E) (×200). Epithelial membrane antigen (EMA) was also positive (×400) (F).

Discussion

Synovial sarcoma is the third most common histological type of extremity soft tissue sarcoma, behind liposarcoma and malignant fibrous histiocytoma (5). Although it rarely involves the lung as a primary site of disease, primary intra-thoracic tumors are increasingly being reported as a result of growing awareness and diagnostic capabilities (1, 2). Synovial sarcoma appears in one of two major forms, monophasic or biphasic. The first is the most common pulmonary subtype (2) and is comprised solely of spindle cells, while the latter contains both spindle cells and epithelial cells arranged in glandular structures (6). The present case showed a predominantly fusocellular monophasic pattern of densely packed spindle cells with increased nuclear to cytoplasmic ratio. Mitotic activity was scarce.

Immunohistochemically, most synovial sarcomas show immunoreactivity for cytokeratins and/or EMA (2, 7). Bcl-2 and O-13 are frequently positive (8, 9). Intranuclear and in-
Figure 6. Reverse transcription-polymerase chain reaction detection of transcripts of SYT-SSX1 and SSX2 fusion genes. The SYT-SSX-2 gene is amplified, but SSX-1 is negative.

tracyploasmic immunoreactivity for S-100 protein can be identified in up to 30% of the tumors (10) and CD34 is usually negative (11). Desmin is absent but focal reactivity for muscle specific actin or smooth muscle actin is noted on occasion in monophasic type. Zeren et al reported that these epithelial markers were diffusely positive in nearly all of the 25 cases of primary pulmonary sarcomas with features of monophasic synovial sarcoma (12). The present case was positive for vimentin, O-13, BCL-2 protein and EMA and negative for S-100, desmin, muscle specific actin and smooth muscle actin.

Synovial sarcoma (SS) is cytogenetically characterized by the translocation t(X;18) (p11.2-q11.2) generating a fusion between the SYT gene on chromosome 18 and one member of the SSX family gene (SSX1; SSX2; SSX4) on chromosome X (10, 11). Biphasic tumors generally present an SYT-SSX1 fusion transcript, and monophasic tumors have an SYT-SSX2 transcript (13-15).

Some patients may remain asymptomatic and discover the lesion by coincidence in a routine X-ray, however, most patients present non-specific symptoms. Endobronchial location is rare and is usually found only in advanced disease (16). A broncoscopy was carried out on our patient and the only notable finding was an extrinsic compression of the lower lobe. Similar to previous reports, the fine-needle biopsy of this mass was inconclusive (17).

Positron emission tomography (PET) showed a large irregular area in the posteromedial region of the right lung with high metabolism indicative of primary lung synovial sarcoma. This is similar to the findings in the study by Matsuo et al (2006) who used PET to differentiate original tumors from metastatic tumors (18). In a previous study, Lucas et al (1998) considered PET to be more accurate in the detection of original soft-tissue sarcomas than in the detection of their metastases (19).

Synovial sarcomas respond more favorably to chemotherapy than most other subtypes of sarcoma (20). We have found no prospective study involving primary synovial sarcoma of the lung with adjuvant chemotherapy, perhaps due to the small number of cases. In other sarcomas, the use of aggressive adjuvant chemotherapy in patients with bulky, high risk, high grade sarcomas (in stage II and III) can provide some clinical value for progression-free survival after optimal local therapy (21).

The present case presented as an intrapulmonary tumor, with no signs of local recurrence or distant metastasis after 12 months of follow-up. However, it is known that synovial sarcomas may have a long, indolent course followed by late metastases.

In conclusion, we describe a lung synovial sarcoma, confirmed by a SYT-SSX2 fusion. The patient also had other benign mesenchymal tumors (uterine leiomyoma and a femur enchondroma). Other malignant extrathoracic primary tumors were ruled out by physical exam; positron emission tomography and bone scan (22). Thus, a final diagnosis of primary synovial sarcoma of the lung was made.

References


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