

Case Report

Primary Cystic Pleuropulmonary Synovial Sarcoma Presenting as Recurrent Pneumothorax

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Keywords

Primary pleuropulmonary synovial sarcoma · Cystic pleuropulmonary synovial sarcoma · Pleuropulmonary synovial sarcoma · Synovial sarcoma

Abstract

Primary pleuropulmonary synovial sarcomas are quite rare, representing 0.1–0.5% of all pulmonary malignancies. We report an entirely cystic monophasic synovial sarcoma in a 25-year-old male who presented with recurrent pneumothorax and no evidence of a mass lesion on imaging. The purpose of this case report is to increase awareness of neoplasms clinically presenting as a pneumothorax with no imaging evidence of a mass-forming lesion and emphasize the significance of fluorescent in situ hybridization testing in nontypical synovial sarcoma cases.

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Introduction

Synovial sarcoma is a malignant mesenchymal neoplasm, which most commonly occurs near the joints of the extremities in young adults [1, 2]. However, primary pleuropulmonary synovial sarcoma (PPSS) is an extremely rare tumor [3], which occurs in a subset of con-

formed synovial sarcomas. Synovial sarcoma has a wide morphological spectrum and is classified into multiple subtypes including: monophasic epithelial, monophasic fibrous, biphasic, and poorly differentiated. Cytogenetic studies have demonstrated that synovial sarcomas have a consistent, specific chromosomal translocation t(X;18) (p11.2;q11.2) and the consequent fusion gene *SYT-SSX* [4, 5]. The transcriptional deregulation by this specific fused gene is thought to be associated with augmented tumorigenesis. In rare instances, synovial sarcomas can present in the pulmonary cavity, as pleuropulmonary synovial sarcomas [1, 3, 6]. We present a case of entirely cystic PPSS which presented as recurrent pneumothorax, confirmed by demonstration of pathognomonic t(X;18) translocation by fluorescent in situ hybridization (FISH) in surgically removed tissue.

Case Report

The patient was a previously healthy 25-year-old male who began having sharp, left-sided chest pain and shortness of breath shortly after he returned to his home town at an altitude of 7,000 feet from sea level.

Chest X-ray revealed a left-sided pneumothorax and a chest tube was placed. Following resolution of his pneumothorax, the chest tube was removed and the patient was discharged only to return the following day with similar symptoms. Chest X-ray showed recurrent left-sided pneumothorax with no evidence of any lesions (Fig. 1). Subsequent imaging showed left-sided lesion (Fig. 2). Video-assisted thoracic resection of a left lower lobe wedge was performed. Gross examination revealed a unilocular bleb measuring 1.1 cm in size with clear resection margins. Microscopically, the collapsed bleb had a spindle cell proliferation in the cystic (bleb) wall which was covered with single layer of reactive mesothelium (Fig. 3a). The spindle cells focally extended into the immediate underlying lung parenchyma (Fig. 3, inset). The lesional cells were hyperchromatic with high nuclear/cytoplasmic ratios and were arranged in orderly fascicles (Fig. 3b). There were 2 mitoses per 10 high-power fields and no tumor necrosis. Immunohistochemical stains were performed, which showed the spindle cells to be negative for cytokeratins (cytokeratin AE1/3, cytokeratin 7, cytokeratin 5/6), epithelial membrane antigen (EMA), and Wilms tumor protein 1 (WT1). The neoplastic cells showed weak staining with CD99 and BCL2. FISH for a *SS18* (18q11.2) rearrangement showed a break apart consistent with a translocation involving the *SS18* gene characteristic of synovial sarcoma (Fig. 4). Metastatic workup was negative. The patient received four cycles of doxorubicin/ifosfamide and is recurrence free 2 years after completion of chemotherapy.

Discussion

We report a rare cause of recurrent spontaneous pneumothorax secondary to an entirely cystic pleuropulmonary synovial sarcoma. PPSS are rare, representing 0.1–0.5% of all pulmonary malignancies [1, 7]. These tumors may present with chest pain, cough, or hemothorax [7]. Entirely cystic/bullous PPSS presenting with recurrent pneumothorax have been rarely reported [1]. These lesions may be confused with benign cystic disease, type 1 pleuropulmonary blastoma, mesenchymal cystic hamartoma, lymphangioleiomyomatosis, and metastatic endometrial stromal sarcoma [3, 4, 8]. Before clinical FISH testing became readily available, many of the earlier cases with this histomorphology were likely reported as other

entities such as mesenchymal cystic hamartoma [1, 3]. This patient's tumor was both cytokeratin and EMA negative, a very unusual immunohistochemical staining pattern seen in only 1 of 100 cases, highlighting the importance of ancillary FISH testing for the *SS18* (18q11.2) rearrangement in this differential diagnosis [4–6]. Synovial sarcoma has a wide morphological spectrum, which is generally classified into multiple subtypes: monophasic epithelial, monophasic fibrous, biphasic, and poorly differentiated [2, 9]. Many clinical, microscopic and genetic parameters have been reported to influence the length of survival for synovial sarcoma [10–12]. The long duration of symptoms and initial slow growth of synovial sarcomas may simulate those of or give a false impression of a benign process [2, 12], such as in the case presented. Most primary pulmonary and mediastinal synovial sarcomas are located in the lung parenchyma, and rarely extend into the bronchial tree or occur in the heart or pericardium [13, 14]. Despite the rare occurrence of this tumor type, PPSS should be considered on the differentiation of a primary lung or pleura mass, especially in young and middle-aged adult patients [9]. Current treatment consists of surgical resection followed by chemotherapy, radiation therapy, or both [15]. This case report serves to increase awareness of neoplasms clinically presenting as a pneumothorax without evidence on imaging of lesion or mass and to emphasize the role of FISH testing in such cases as this of nontypical synovial sarcoma.

Statement of Ethics

The patient's informed consent was acquired prior to publication of the case.

Disclosure Statement

The authors have no disclosures to declare.

References

- 1 Cummings NM, Desai S, Thway K, Stewart S, Hill DA, Priest JR, Nicholson AG, Rintoul RC: Cystic primary pulmonary synovial sarcoma presenting as recurrent pneumothorax: report of 4 cases. *Am J Surg Pathol* 2010;34:1176–1179.
- 2 Spillane AJ, A'Hern R, Judson IR, Fisher C, Thomas JM: Synovial sarcoma: a clinicopathologic, staging, and prognostic assessment. *J Clin Oncol* 2000;18:3794–3803.
- 3 van der Heijden EH, Kaal SE, Hassing HH, Verhagen AF, Looijen-Salamon M, Mesenchymal cystic hamartoma? A revised diagnosis after 23 years. *Thorax* 2014;69:84–85.
- 4 Okamoto S, Hisaoka M, Daa T, et al: Primary pulmonary synovial sarcoma: a clinicopathologic, immunohistochemical, and molecular study of 11 cases. *Hum Pathol* 2004;35:850–856.
- 5 Kawai A, Woodruff J, Healey J, Brennan M, Antonescu C, Ladanyi M: *SYT-SSX* gene fusion as a determinant of morphology and prognosis in synovial sarcoma. *N Engl J Med* 1998;338:153–160.
- 6 Essary LR, Vargas SO, Fletcher CD: Primary pleuropulmonary synovial sarcoma: reappraisal of a recently described anatomic subset. *Cancer* 2002;94:459–469.
- 7 Frazier AA, Franks TJ, Pugatch RD, Galvin JR: From the archives of the AFIP: Pleuropulmonary synovial sarcoma. *Radiographics* 2006;26:923–940.
- 8 Al-Ani Z, Naqvi J, Oh T: A Primary pleuropulmonary synovial sarcoma mimicking a carcinoid tumor: case report and literature review. *Radiol Case Rep* 2016;11:45–49.
- 9 Okcu MF, Munsell M, Treuner J, Mattke A, et al: Synovial sarcoma of childhood and adolescence: a multicenter, multivariate analysis of outcome. *J Clinical Oncol* 2003;21:1602–1611.
- 10 Mirzoyan M, Muslimani A, Setrakian S, Swedeh M, Daw HA: Primary pleuropulmonary synovial sarcoma. *Clin Lung Cancer* 2008;9:257–261.

- 11 Trassard M, Le DV, Hacene K, et al: Prognostic factors in localized primary synovial sarcoma: a multicenter study of 128 adult patients. *J Clin Oncol* 2001;19:525–534.
- 12 Spurrell EL, Fisher C, Thomas JM, Judson IR: Prognostic factors in advanced synovial sarcoma: an analysis of 104 patients treated at the Royal Marsden Hospital. *Ann Oncol* 2005;16:437–444.
- 13 Hartel P, Fanburg-Smith J, Frazier A, Galvin J, Lichy J, Shilo K, Frank T: Primary pulmonary and mediastinal synovial sarcoma: a clinicopathologic study of 60 cases and comparison with five prior series. *Mod Pathol* 2007;20:760–769.
- 14 Murphey MD, Gibson MS, Jennings BT, Crespo- Rodríguez AM, Fanburg-Smith J, Gajewski DA: From the archives of the AFIP: Imaging of synovial sarcoma with radiologic-pathologic correlation. *Radiographics* 2006;26:1543–1565.
- 15 Lopes JM, Bjerkehagen B, Holm R, Bruland O, Sobrinho-Simões M, Nesland JM: Immunohistochemical profile of synovial sarcoma with emphasis on the epithelial-type differentiation. A study of 49 primary tumours, recurrences and metastases. *Pathol Res Pract* 1994;190:168–177.

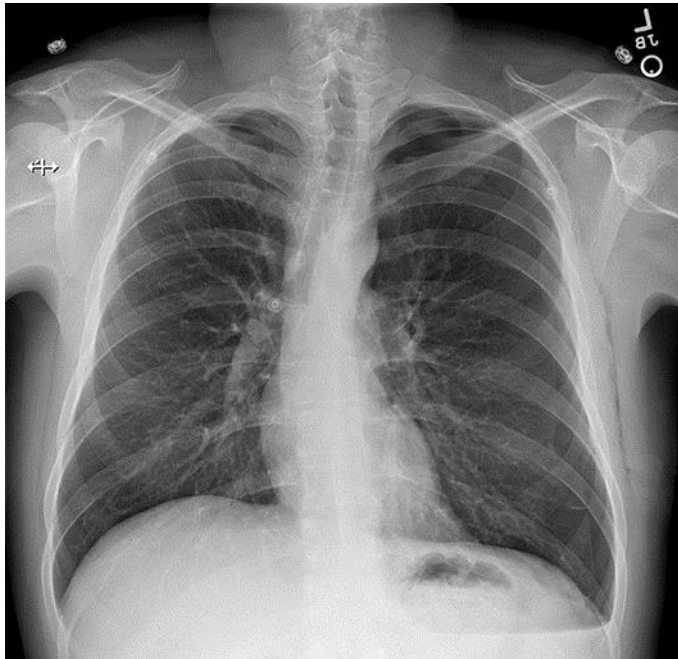


Fig. 1. There is a pneumothorax on the left with approximately 3.8 cm of the distance between the pleural space apically. There is a mild mediastinal shift to the right. The right lung is clear. No pleural effusion, pulmonary edema, or focal consolidation is seen.

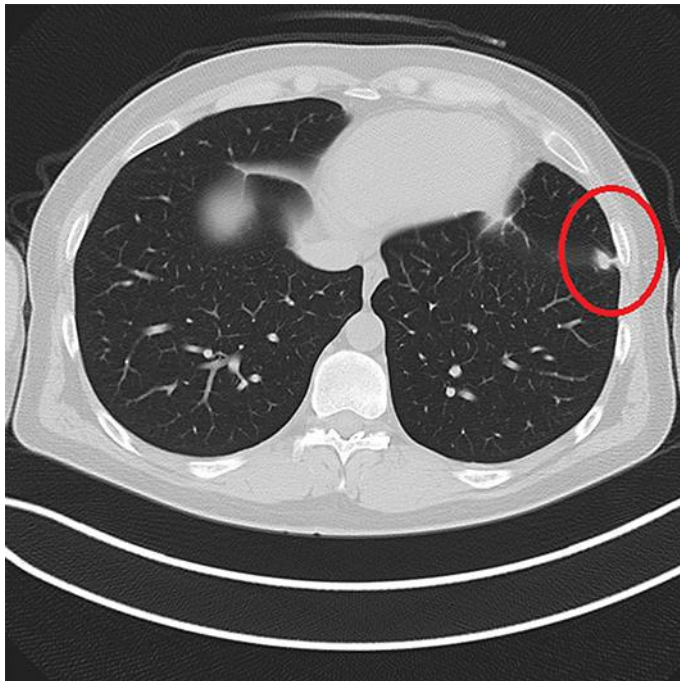


Fig. 2. A small opacity is present in relation to the inferior-lateral pleural surface and adjacent to the left hemidiaphragm, likely pleural thickening. Subcentimeter opacity is present in relation to surgical staples in the inferior left lung.

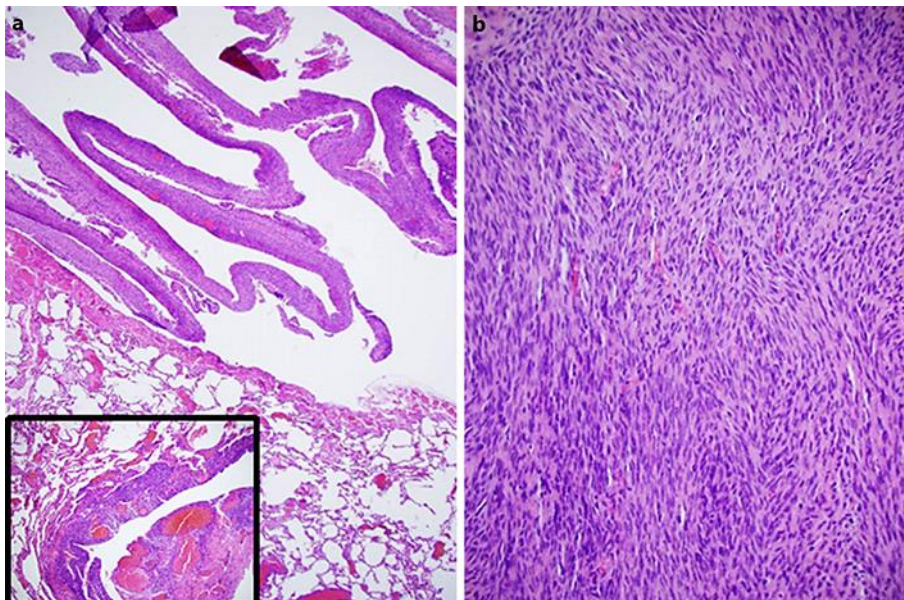


Fig. 3. Collapsed bleb (cyst wall) containing monotonous spindle-shaped cells with mesothelial cells on one side (**a, b**; HE, 4× and 20×). Spindle cells focally extended into the adjacent alveolar spaces without forming a nodular mass (**Inset**; HE, 4×).

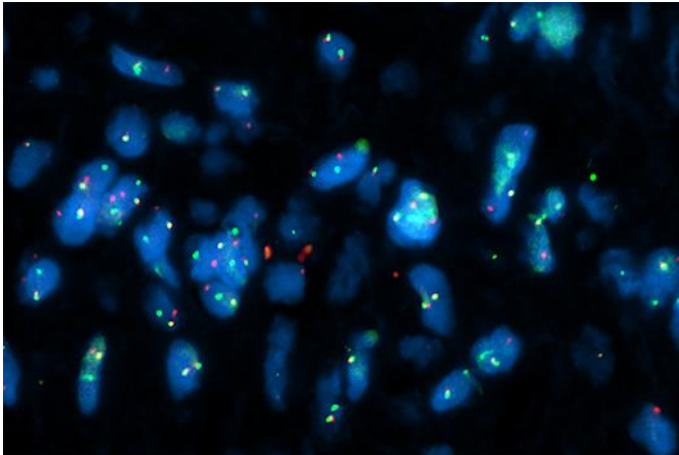


Fig. 4. Dual-color, break-apart interphase fluorescent in situ hybridization for *SS18* (18q11.2) gene rearrangement. Within a single nucleus, split red and green signal indicate the presence of a *SS18* (18q11.2) rearrangement involving one chromosome, while a fused red-green signal within the same nucleus indicates an intact 18q11.2.