

Mediastinal synovial sarcoma invading the right inferior pulmonary vein and left atrium

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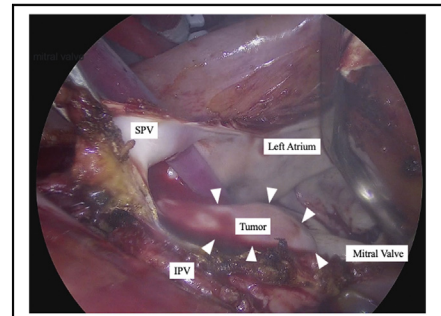
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A synovial sarcoma in the left atrium compressed the right inferior pulmonary vein.

CENTRAL MESSAGE

This case was a mediastinal tumor with invasion into the left atrium and right inferior pulmonary vein, treated with cardiopulmonary bypass and resection of the right lower lung lobe and left atrium.

See Commentary on page XXX.

▶ Video clip is available online.

A 44-year-old woman without any symptoms was noted to have a mass on a plain radiograph taken during an annual health check-up. Computed tomography revealed a tumor in the posterior mediastinum with calcification and invasion into the left atrium and right inferior pulmonary vein (Figure 1, A). ¹⁸F-Fluorodeoxyglucose positron emission tomography demonstrated high accumulation of fluorodeoxyglucose in the tumor with a maximum standardized uptake value of 12.6 (Figure 1, B). The tumor was located near the esophagus; however, transesophageal echocardiography showed no obvious invasion into the esophagus. Immunohistochemically, the atypical cells were positive for AE1/AE3, synaptophysin, and p16 but negative for S-100 and chromogranin-A. The histologic features were suggestive of a neuroendocrine tumor, but the small volume of the specimen made it difficult to confirm the diagnosis.

The patient was scheduled to undergo tumor extirpation combined with resection of the right lower lung lobe and left atrium, and she was prepared for artificial cardiopulmonary bypass (CPB) to facilitate left atrial resection and reconstruction. Considering the reconstructive route after esophagectomy, an anterolateral thoracotomy of 12 cm in length was performed in the right fifth intercostal space with the patient in the left semilateral position to approach the right thoracic cavity (Video 1). Although the tumor did

not invade the esophagus, it was necessary to perform right lower lobectomy and left atrial resection under CPB because the invasion into these organs was found after opening the pericardial sac. Thus, the right lower lobe pulmonary artery and right lower lobe bronchus were cut with autosutures without resection of the right inferior pulmonary vein. Standard cannulation for CPB was performed, and full extracorporeal circulation was initiated. The tumor was found to be protruding into the left atrium and extending near the right superior pulmonary vein. The left atrium was resected while confirming the extent of tumor invasion (Figure 2). The resection stump close to the right upper pulmonary vein was pathologically negative, as shown by intraoperative rapid diagnosis. The tumor was considered to have originated in the posterior mediastinum because it compressed the left atrium from outside the wall and had no continuity with the lung tissue. The left atrium was reconstructed using a bovine pericardial patch that was sutured in place with 4-0 polypropylene suture. The total

Case Report

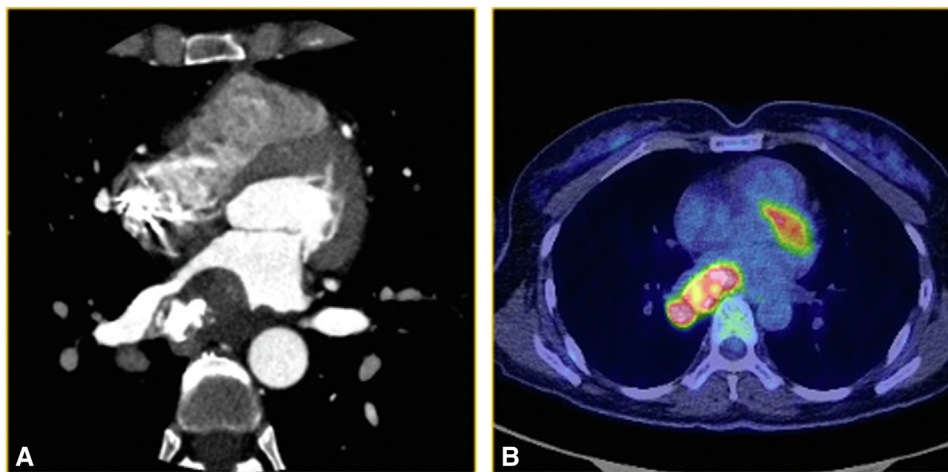
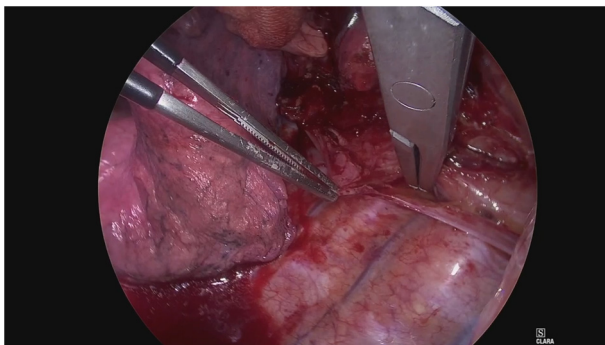


FIGURE 1. Findings of computed tomography and ^{18}F -fluorodeoxyglucose positron emission tomography (^{18}F -FDG-PET). A, Chest computed tomography shows a mass of more than 5 cm infiltrating the *right inferior* pulmonary vein and *left atrium*. B, ^{18}F -FDG-PET shows a maximum standardized uptake value of 12.6 in the mass.

circulatory arrest time was 173 minutes, and the patient was safely weaned off CPB with no cardiotoxic drugs.

The tumor had a total size of $48 \times 46 \times 22$ mm and was invading the right inferior pulmonary vein and left atrium pathologically (Figure E1). The final pathologic diagnosis was synovial sarcoma because the tumor cells were positive for AE1/AE3 and reverse-transcription polymerase chain reaction showed the *SS18-SSX1* fusion gene. The tumor also showed central necrosis and few mitotic figures (3 per 10 high-powered fields). The patient received 5 courses of postoperative adjuvant chemotherapy (doxorubicin/ifosfamide) and has been without recurrence for 15 months postoperatively.



VIDEO 1. We performed an anterolateral thoracotomy of 12 cm in length in the right fifth intercostal space to approach the right thoracic cavity. The tumor invaded the right lower lung lobe and left atrium. The right inferior pulmonary vein was not resected, and the basal pulmonary artery and right lower lobe bronchus were cut. The tumor was found to protrude into the left atrium and extend near the right superior pulmonary vein. Under cardiopulmonary bypass, the left atrium was resected in one block with the right inferior lobe. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00069-X/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00069-X/fulltext).

The institutional review board of Kyushu University approved the study protocol and publication of data (institutional review board number: 2020-807, March 31, 2021). The patient provided informed written consent for the publication of the study data.

DISCUSSION

Synovial sarcoma is a malignant mesenchymal tumor that predominantly occurs in the extremities; less than 5% of cases occur in the thoracic region.¹ The surgical treatment for sarcoma is radical complete resection, which is also beneficial for mediastinal synovial sarcoma.^{2,3} Although our patient demonstrated no signs of invasion between the mediastinal synovial sarcoma and esophagus, we prepared a retrosternal route for reconstruction and approached the



FIGURE 2. Pathologic findings. Resected specimen with *right lower lobe* and *left atrium*.

tumor by thoracotomy. We also tried to shorten the CPB time by resecting the bronchus and pulmonary artery first. Although the general approach to a mediastinal tumor in cardiovascular surgery is median sternotomy or the combination of median sternotomy and posterolateral thoracotomy, anterolateral thoracotomy is relatively less invasive and may be correlated with favorable clinical outcomes.⁴ Our team, along with thoracic and cardiovascular surgeons, discussed and confirmed that resection and reconstruction of the left atrium could be performed under anterolateral thoracotomy. In this case, the tumor extirpation with right lower lobectomy and left atrial reconstruction was performed through a small right anterior lateral thoracotomy with the aid of a thoracoscope so that the surgery was as minimally invasive as possible.

CONCLUSIONS

We experienced a case of mediastinal synovial sarcoma with invasion into the right inferior pulmonary vein and left

atrium. Radical resection was performed through a relatively minimally invasive approach compared with sternotomy.

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Case Report

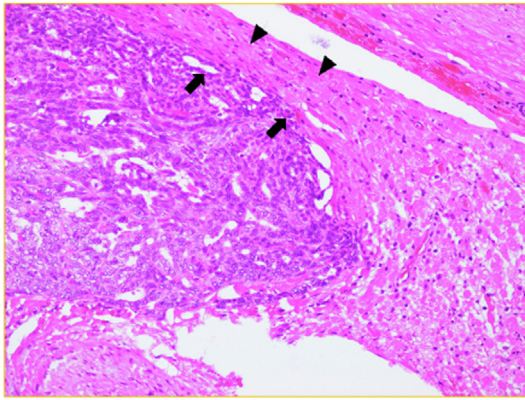


FIGURE E1. Pathologic findings. The tumor cells had infiltrated the *left atrium* (hematoxylin and eosin, $\times 20$). The *arrowheads* indicate the *left atrial wall*, and the *arrows* indicate invasion of tumor cells into the *left atrium*.