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Case Presentation

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A Large Volume of Unilateral Pleural Effusion Caused by Mediastinal Mass

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Introduction

Pleural effusion occurs due to an underlying medical condition that affects the balance in the fluid distribution within the body (transudative effusion) or directly affects the pleura (exudative effusion), resulting in an accumulation of fluid in the pleural space [1]. The diagnosis of pleural effusion involves a combination of patient history, physical examination, and diagnostic tests, including chest imaging, thoracentesis, and laboratory analysis of the pleural fluid. In general, the presence of a transudative pleural effusion suggests that extrapulmonary conditions like heart failure or cirrhosis and that it is expected to occur on both sides of the chest. Conversely, exudative fluid accumulation indicates that local pleural lesion like tumor growth or inflammation are the probable cause of the fluid buildup and may often manifest on just one side of the chest. Here we would like to present a large volume of unilaterally transudative pleural effusion case caused by extrapulmonary condition.

Case Presentation

A 59-year-old female presented to the respiratory department outpatient clinic with complaints of shortness of breath that have worsened over the past year. On the physical examination, the patient is noted to have decreased breath sounds on the left side of his chest, dullness to percussion, and reduced tactile fremitus. Clinical laboratory tests showed that the patient's heart, liver, and kidney functions were intact. Thoracentesis aspiration is reserved for treating dyspnea, a total of 4000 ml yellowish liquid drained from the thoracic cavity. Afterward, a chest tube was placed, and the daily drainage volume was approximately 500 ml.

The TB-IGRA indicated that the concentration of interferon released by tuberculosis-specific T cells was 266.47 pg/mL. Then thoracoscopy and biopsy of the parietal pleura were performed but yielded a negative outcome. The pleural effusion was confirmed as transudative after repeated analysis during hospitalization **(Table 1)**. The fluid cytology revealed the presence of histiocytes, mesothelial cells, and inflammatory cells. However, there were no signs of malignant cells found. No evidence of bacterial and fungal infections was found in the pathogenic examination.

Table 1: Routine tests on pleural fluid during hospitalization.

Tests		
Gross appearance	Slightly cloudy and yellowish	Slightly cloudy and yellowish
Protein, g/L		
Pleural fluid	21.3	24.9
Serum	48.1	48.1
Glucose, mmol/L	8.00	7.04
LDH, IU/L		
Pleural fluid	87.0	81.0
Serum	145.0	145.0
Cell count,/mm^3	55	22
ADA, U/L	1	2

LDH: Lactate dehydrogenase; ADA: Adenosine deaminase

Image and Pathology

A chest CT scan showed left-sided large-volume pleural effusion. Contrast-enhanced and Positron Emission Tomography (PET) - Computed Tomography (CT) scans found a cystic-solid low density adjacent to arcus aortae in the left superior mediastinal, the largest cross-sectional areas were 34×25mm^2, and the early and delayed imaging of lesions showed a slightly increased radioactive uptake, with SUVmax 2.87 and 2.05 **(Figure 1)**. In addition, the patient underwent two more thoracoscopic sessions, and the parietal pleural biopsy only showed inflammatory lesions with epithelial cell proliferation.

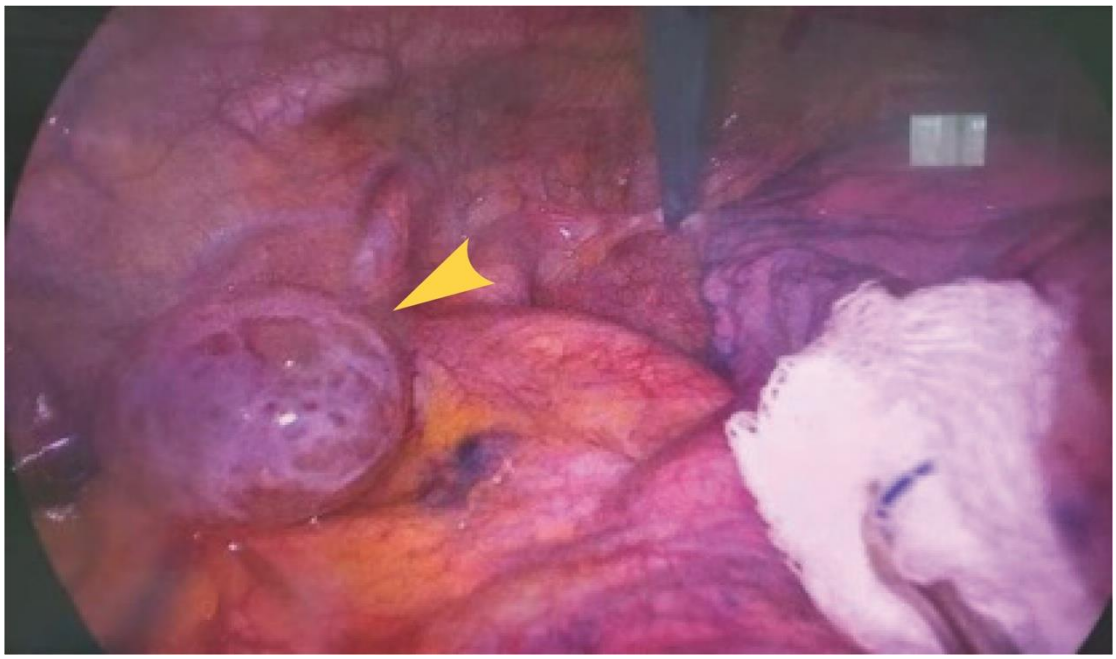

Figure 1: The surgical field of thoracoscope. The arrowhead indicates the mass.

Treatment

A standard anti-TB regimen with HRZE was administered for 3 months, but there was no observed improvement. Subsequently, a thoracoscopic procedure was conducted for the purpose of resecting a mass in the mediastinum. During the thoracoscopic exploration, it was observed that there were no adhesions between the visceral and parietal pleura. The mediastinal mass was found to be near the left phrenic nerve and adjacent blood vessels. Described as spherical and hard, the mass had a complete capsule and a well-developed blood supply **(Figure 2)**. The pleural fluid drained gradually decreased, and the tube was removed on the fifth day after surgery when drainage flow was < 30 ml per day. Pathological results were reported as angiogenic tumor **(Figure 3)**. Immunohistochemical analysis showed that tumor cells were negative for CK(AE1/AE3), Desmin, S-100, CD99, STAT6, SOX-10, Bcl2, HMB45, CD117, Inhibin-α, NSE, CD56, CgA, Syn, D2-40, GLUT-1, and were positive for Vimentin, CD34(+), α-SMA, ERG, Caldesmon, Calponin. Ki-67 (MIB-1) reacted with 5% of cells.

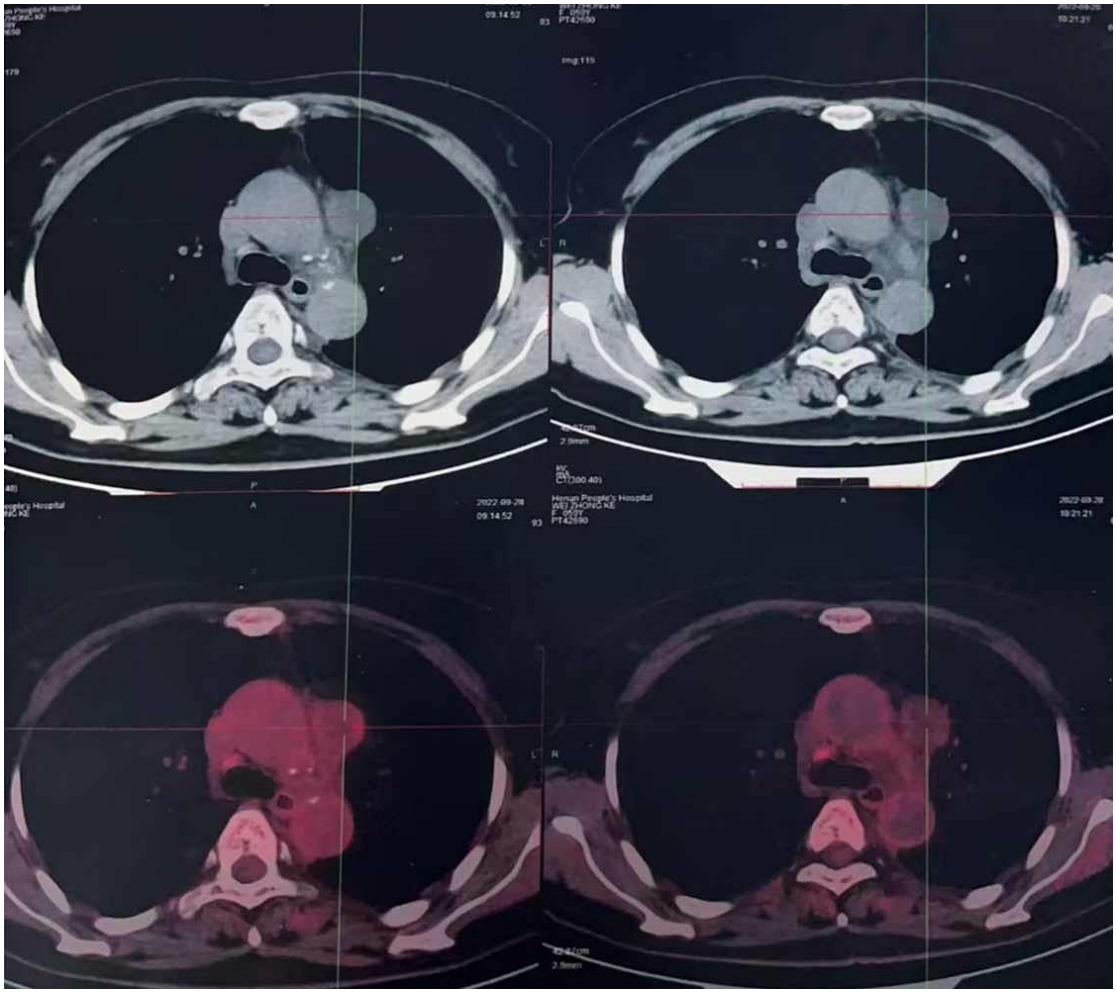

Figure 2: PET/CT imaging showed a smooth mass in the para-aortic nodes zone with a size of 34×32 mm and a CT value of about 7 HU. The early and delayed imaging showed mild increased FDG uptake, SUVmax 2.87 vs. 2.05. SUV, standarized uptake value.

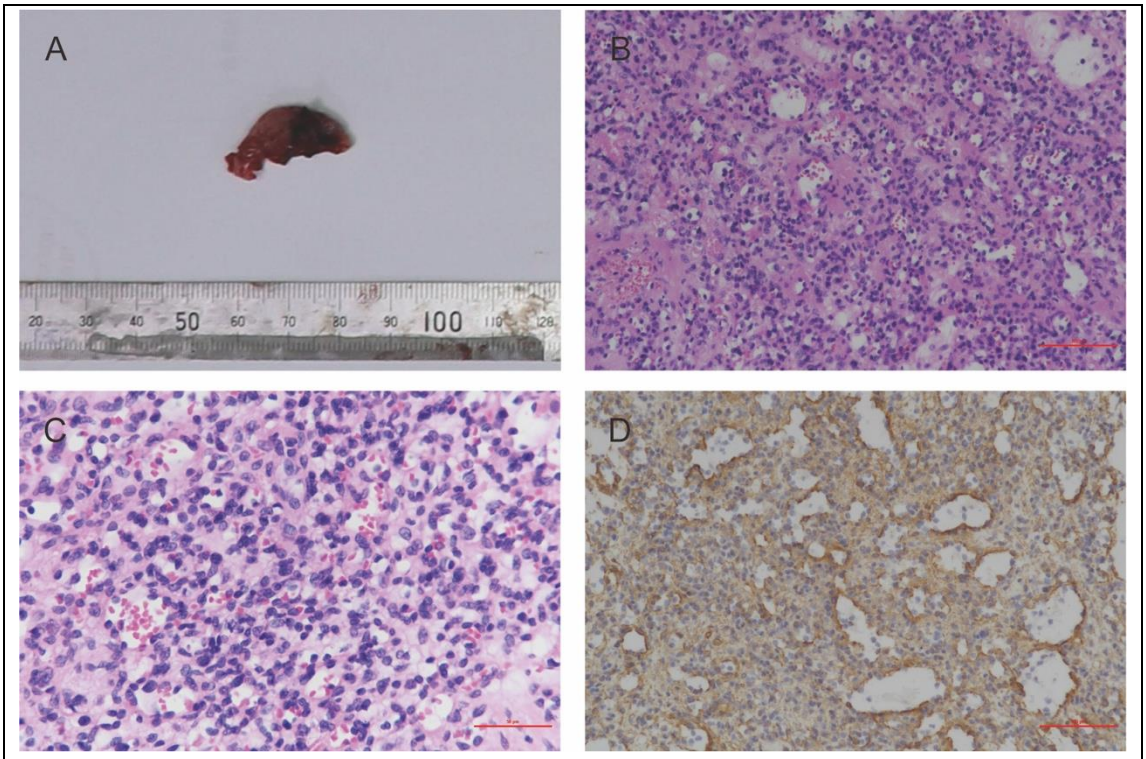

Figure 3: Pathomorphological of mass.

A) Gross findings of the resected mass, measuring 2.3 ×2× 0.8 cm, with a gray and pink cross-section and soft texture.

B) Tumor cells are small and uniform, arranged in a nested pattern around capillaries. (HE, 200x)

C) The small and uniform tumor cells performed weakly eosinophilic cytoplasm and epithelioid appearance. The cell nucleus has no obvious atypia, and no clear nuclear division is observed. (H&E, 400x)

D) α-SMA is diffusely positive in tumor cells. (IHC staining, 200x)

Discussion

The critical distinction between transudative and exudative effusions may guide clinician for further investigation as the presence of a transudative effusion indicates potential underlying systemic conditions such as heart failure or cirrhosis, while the existence of an exudative effusion suggests that local factors may be the underlying cause [1,2]. The main method used to distinguish between transudates and exudates over the past few decades is known as the Light criteria [3]. According to these criteria, if any of the following conditions are met, it is identified as an exudative effusion: (1) the

ratio of pleural fluid protein to serum protein is greater than 0.5, (2) the ratio of pleural fluid Lactic Acid Dehydrogenase (LDH) to serum LDH is greater than 0.6, or (3) the pleural fluid LDH level exceeds two-thirds of the normal upper limit for serum LDH. Based on the Light Criteria, the pleural effusion is classified as transudative. As elaborate above, transudative pleural effusion frequently caused by systemic conditions and performed as bilateral. While exudative counterpart performed as unilateraland associated with inflammatory or tumor lesions. In the current case, massive effusion with transudative and unilateral features cannot be explained by conventional etiology. The mass found in the mediastinum on the CT scan is a benign lesion that is located adjacent to the aorta. Given the uncertainty in the cause of pleural effusion and the risks associated with surgery, surgical resection was not performed initially. After observation and 3 months of anti-tuberculosis treatment, excluding other infectious factors, we considered the possibility of tumor compression on lymphatic vessels leading to obstruction of lymphatic reflux and causing significant pleural effusion on the same side. Although lymphatic reflux could not be observed during the surgical procedure, it is reassuring that the persistent pleural effusion dramatically disappeared after surgery, supporting our initial judgment. Mediastinum hemangioma is a rare benign tumor whose incidence rate is below 0.5% in mediastinal lesions **[4]**. In a literature review analyzed 19 cases retrospectively, frequent clinical symptoms include chest tightness, back pain, and cough. While most of them were found accidently during health physical examination **[5]**. Pleural effusion, a common disorder, can be caused by more than 50 diverse conditions **[6,7]**. Among them, when considering pleural effusion caused by venous or lymphatic reflux disorders, such as unilateral transudative effusion caused by mediastinal hemangioma in this case, it is very rare in clinical practice and cannot be easily confirmed.

Patient Consent and Ethic

The patients gave informed consent and written informed consent was obtained. The procedure was approved by clinical research ethics committee of China-Japanese Friendship Hospital (2023-KY-065-1).

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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