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Case Report

Multiple serous membrane effusion caused by primary pericardial mesothelioma ☆

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ABSTRACT

Primary pericardial mesothelioma is an extremely rare cancer with a short survival prognosis. Clinical symptoms are often atypical, and most patients are diagnosed after surgery or at autopsy. We report a case of a 35-year-old female patient with multiple serous membrane effusion for more than 1 year. The patient underwent pericardial, pleural, and peritoneal fluid drainage many times and underwent many laboratory tests to find the cause; however, there was no definitive diagnosis. She was admitted to the hospital because of shortness of breath, cough, and sputum for 5 days. She underwent extensive pericardiectomy to resolve the dyspnea and pericardial surgery to find the cause of the multiple serous membrane effusion. After surgery, her dyspnea was relieved, and the serous effusion gradually decreased.

Background

Malignant mesothelioma is an uncommon cancer that originates in the mesothelial cells lining the pleura, peritoneum, vagina, testis, or pericardium. Malignant mesothelioma mostly develops from the pleura and peritoneum, with only 1%-2% of cases arising from the pericardium, vaginal mucosa, and testis [1]. Primary pericardial mesothelioma occurs between 19 and 76 years of age, and it is more common in

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men than women, with a ratio of 3:1 [2]. The disease is often detected at a late stage, with poor response to chemotherapy and radiation therapy and a median survival of 6 months from diagnosis [2,3]. We present the case of a young female patient who faced diagnostic difficulties with this rare pathology.

Case report

A 35-year-old female pharmacist, with no previous history of cardiovascular disease or malignancy, suffered from recurrent multimembrane effusion.

In November 2019, the patient was admitted to Central hospital for shortness of breath and multiple membrane effusion. Pericardial fluid drainage revealed red fluid with many red blood cells, a cell count of 589 cells/mm^3 (neutrophil 20%, lymphocyte 65%, inter-retinal cells 15%), albumin 2.5 g/dL, normal adenosine deaminase (ADA) 17.4 U/L (<40U/L), high elevated lactate dehydrogenase (LDH) 1294 U/L (normal range: 200-400U/L), glucose 73 mg/dL, and protein 3.9 g/dL; however malignant cells were not reported. Various laboratory tests to find the cause of the multimembrane effusion were performed: nonelevated cancer markers, including CA19-9 4.8 IU/mL (<27 IU/mL), CA 125 38 IU/mL (<35 IU/mL), CEA 0.5 ng/mL (< 2.5 ng/mL), CYFRA 21-1 0.42 ng/mL (<3.3 ng/mL), NSE 8.86 ng/mL (15-17 ng/mL), βhCG 1.2 mIU/mL(<5 mIU/mL), and AFP 2.7 ng/mL (<7 ng/mL); negative autoimmune pathology test, including anti-ANA, anti-ds DNA 3.09 IU/mL (<30 IU/mL), C3 83.7 mg/dL (90-180 mg/dL), C4 13.9 ng/mL (10 – 40 ng/mL), and RF 3.8 IU/mL (< 20 IU/mL); and contrast-enhanced thoracoabdominal computed tomography (CT), which showed moderate pericardial effusion with a fluid layer thickness of 16 mm, mild pleural effusion, moderate abdominal effusion, and a left ovary larger than the right ovary with poor contrast enhancement that could not rule out an ovarian tumor. Despite various laboratory tests to find the underlying disease, including cancer markers and autoimmune pathology test, were performed; there was not particularly suggestive. Other blood tests included normal total protein 5.7 g/dL, prealbumin 9.4 mg/dL, red blood cells 4.25 T/L, hemoglobin 130 g/L, hematocrit 38.7%, mild elevated white blood cells 11.34 G/L (neutrophils 85.8%) (normal WBC: 4-10 G/L), platelets: 342 G/L, and C-reactive protein (CRP) 58.9 mg/L (< 5 mg/dL). The patient had a multidisciplinary consultation (including cardiology, respiratory, oncology and pancreatic extrahepatobiliary disease), and she was diagnosed with Demons–Meigs syndrome. She was referred to another hospital specializing in obstetrics and gynecology, but no diagnosis was confirmed.

In January 2020, the patient had recurrent serous membrane effusion, mainly re-establishing pleural effusion. At Lung Hospital, she had the right pleural fluid drawn with orange-yellow color with ADA 7.68 U/L (normal range: < 35 U/L), glucose 4.27 mmol/L, protein 42 G/L, LDH 139 U/L, benign cytology, and pleural biopsy showing chronic inflammation. In May and June 2020, the patient was hospitalized twice at the local hospital with recurrent multimembrane effusion, re-established pleural fluid, and free intra-abdominal fluid that led to difficulty breathing. The patient continued to have pericardial, pleural, and peritoneal fluid drained and underwent repeated tests to investigate the origin of the effusion, including screening for tuberculosis, parasites, autoimmune disease, and contrast-enhanced chest CT. However, abnormality was not found. Left supraclavicular lymph node biopsy and second right pleural biopsy did not show malignancy or the cause of the effusion. She gradually deteriorated, with symptoms of fatigue, dry cough, shortness of breath, and weight loss of about 10 kg over 1 year.

At the end of November 2020, the patient was hospitalized at a local hospital for 1 day because of increasing shortness of breath with ascites, cough, and sputum for 5 days. She was then transferred to our hospital.

At the emergency department of UMC, the patient was awake with no fever, pulse 114 bpm, blood pressure 100/60 mm Hg, and SpO2 98% on room air. She had slight dyspnea, with a respiratory rate of 24 breaths per minute and yellow sputum. Heart rate was regularly rapid, breath sounds decreased at the bottom of the lungs, and she had abdominal ascites and leg edema. Biochemical tests included CRP 94.1 mg/L, NT Pro-BNP 745 ng/L (normal: < 125 ng/L), albumin 34.8 g/L (35-52

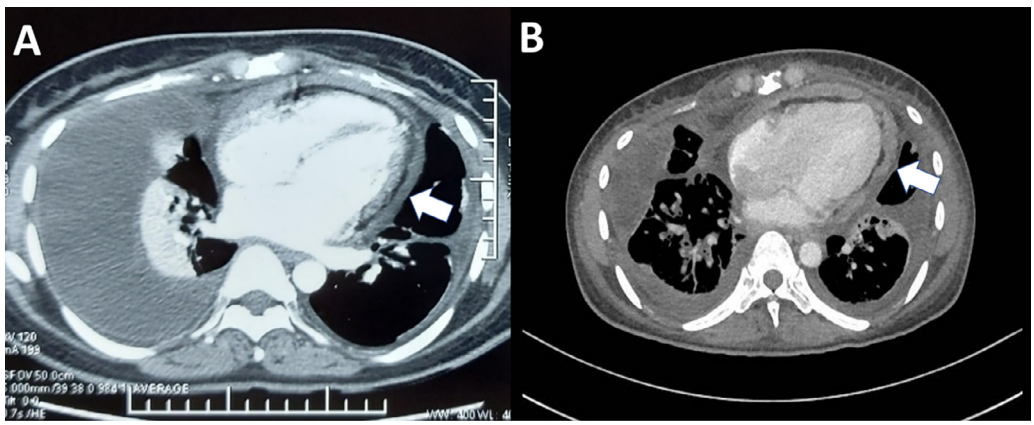

Fig. 1 – (A) Axial CT on May 13, 2020, revealed pericardial thickening. (B) Axial CT on November 24, 2020, revealed (B) irregular pericardial thickening with some calcifications and bilobular interlobular septal thickening suggesting of metastasis. Note that pericardial thickening in the first imaging was not as clear as second imaging maybe (due to the masking effusion).

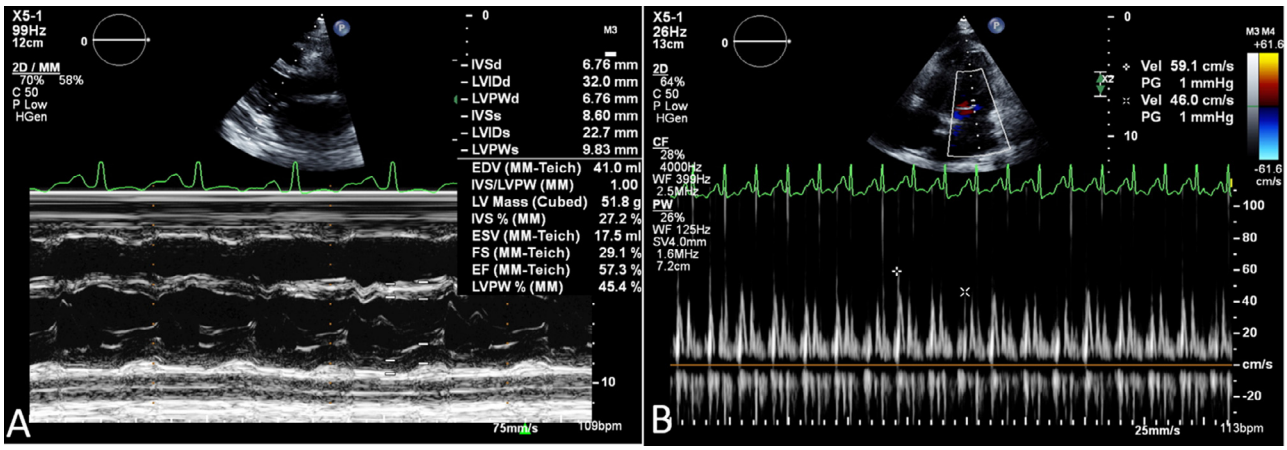

Fig. 2 – Echocardiogram with paradoxical interventricular septum (A) and respiratory E wave velocity changes (B).

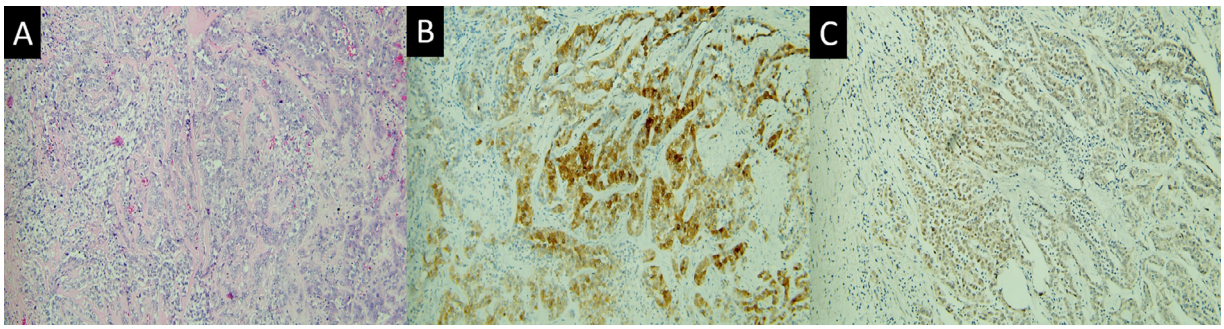

Fig. 3 – Histopathological examination of post-pericardiectomy specimen reveals malignant cells with epithelial appearance; (A) hematoxylin and eosin × 10. Immunohistochemical reactions demonstrate the mesothelial origin of the neoplastic cells; (B) calretinin cytoplasmic stain × 10; (C) WT1 nuclear stain × 10.

g/L), and total bilirubin slightly increased at 1.11 mg/dL (< 1.02 mg/dL). Complete blood count revealed increased neutrophils 89.3% [7.8 G/L] (normal: 45%-75%, 1.8-7.5 G/L), white blood cells 8.73G/L, red blood cells 4.24 T/L, hemoglobin 126 g/L, and platelets 295 G/L. Coagulation test revealed long prothrombin time (PT) (17.1 seconds) (normal PT: 11.1-15.2 seconds), INR 1.33 (0.8-1.2), and fibrinogen 4.44 g/L (normal range: 2-4 g/L). Chest X-ray revealed alveolar damage in the lower third of the lungs and small bilateral pleural effusion with passive atelectasis at the bottom of the lung. Contrast-enhanced thoracoabdominal CT revealed bilateral pleural thickening creating noncommunicating compartments, moderate bilateral pleural effusion, and irregular pericardial thickening (D_{max} of 10 mm and pericardial enhancement compared with old CT), a small amount of intra-abdominal fluid, and liver congestion with dilated inferior vena cava and hepatic varices (Fig. 1). Electrocardiography revealed diffuse negative T waves in the peripheral and prethoracic leads. Because thickened pericardium was noticed on CT, 2 echocardiograms performed by 2 different physicians were indicated before an interdisciplinary consultation. Both echocardiograms showed diffuse pericardial thickening, scattered calcifications, paradoxical movement of the interventricular septum, 22%-35% change in E wave velocity with respiration, and no diastolic flow reversal of hepatic venous blood (Fig. 2). Considering the symptoms and laboratory findings, she was diagnosed with constrictive pericarditis likely due to malignancy, and a pericardiectomy with pericardial biopsy to determine the cause was scheduled.

During surgery, pericardial thickening (10 mm) was noted, with some calcifications. Pathology results after immunohistochemical staining showed malignant mesothelioma (Fig. 3). The patient recovered and decided not to received chemotherapy, so she was discharged after 3 weeks.

Discussion

Primary tumors of the pericardium are extremely rare. A large series of autopsies reported a rate of 0.0022% in 500,000 cases [4]. Currently, with 200 cases reported in the literature, only 25% are diagnosed before the patient's death [4], indicating that primary pericardial mesothelioma is difficult to diagnose.

Clinical manifestations vary widely and include constrictive pericarditis, pericardial effusion, acute cardiac tamponade, heart failure, and cardiomyopathy, as demonstrated by the diversity of reported cases [3,5]. This illness required our patient to visit many different hospitals for over 1 year before receiving a definitive diagnosis.

In patients with pericardial effusion, it is essential to distinguish between malignant cause and nonmalignant cause [6]. Pericardial effusions often recur; therefore, opening the pericardial window or performing a pericardiectomy when pericardial fluid re-establishes should be considered with concurrent pericardial biopsy to determine the cause [7] when the patient has symptoms suggestive of malignancy (eg, pericardial effusion, bloody effusion, elevated LDH).

Pericardial fluid cytology may not be conclusive [5], as demonstrated in this patient. Bloody pericardial effusion is suggestive of possible malignant effusion, and benign pericardial fluid cytology should accompany pericardial biopsy, which can provide a histological diagnosis in up to 90% of cases if the specimens are large enough [6]. From the collected results, we quickly decided to perform pericardiectomy on the patient's second hospital day to resolve the shortness of breath caused by constrictive pericarditis and to obtain more accurate histological results.

Unlike pleural or peritoneal mesothelioma, there is no clear relationship between pericardial mesothelioma and asbestos exposure [2]. In this case, the patient had no history of asbestos exposure.

Unfortunately, the patient did not follow up after discharge, so we were unable to monitor her progress. However, lung metastases were suspected on the CT taken on November 24, 2020.

Conclusion

This patient presented with non-specific symptoms accompanied by recurrent multimembrane effusion with benign cytology. Pericardial thickening on chest CT was omitted until 7 months later. Therefore, it is important to be aware of all signs from patients presenting with pericardial effusion, especially imaging findings. Multimodality laboratory and paraclinical findings also help physicians, especially when there is no clear explanation for the patient's condition.

Author's contributions

Bui The Dung: Case file retrieval and case summary preparation. Bui The Dung and Nguyen Minh Duc: preparation of manuscript and editing. All authors read and approved the final manuscript.

Availability of data and materials

Data and materials used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

Patient consent

Written informed consent for patient information to be published in this article was obtained.

REFERENCES

[1] Falkenstern-Ge RF, Kimmich M, Bode-Erdmann S, Friedel G, Ott G, Kohlhäufl M. Pleural mesothelioma presenting as periumbilical metastasis: the first clinical documentation. Case Rep Oncol Med 2013;2013:198729. doi:10.1155/2013/198729.

[2] Nilsson A, Rasmuson T. Primary pericardial mesothelioma: report of a patient and literature review. Case Rep Oncol 2009;2(2):125–32. doi:10.1159/000228894.

[3] Eren NT, Akar AR. Primary pericardial mesothelioma. Curr Treat Options Oncol 2002;3(5):369–73. doi:10.1007/s11864-002-0002-7.

[4] Godar M, Liu J, Zhang P, Xia Y, Yuan Q. Primary pericardial mesothelioma: a rare entity. Case Rep Oncol Med 2013;2013:283601. doi:10.1155/2013/283601.

[5] Rosenbaum AN, Bois MC, Zhang X, Santivasi WL, Freeman WK. Primary malignant pericardial mesothelioma: a clinical case series illustrating the necessity of a multidisciplinary approach. JACC Case Rep 2019;1(2):202–7. doi:10.1016/j.jaccas.2019.06.012.

[6] Kralstein J, Frishman WH. Malignant pericardial diseases: diagnosis and treatment. Cardiol Clin 1987;5(4):583–9.

[7] Adler Y, Charron P, Imazio M, Badano L, Barón-Esquivias G, Bogaert J, et al. 2015 ESC guidelines for the diagnosis and management of pericardial diseases. Rev Esp Cardiol (Engl Ed) 2015;68(12):1126. doi:10.1016/j.rec.2015.10.008.