

# A 78-Year-Old Man With Diffuse Lymphadenopathy, a Pleural Effusion, and Shortness of Breath



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A 78-year-old man with a medical history of COPD, prostate cancer status post radiation and hormonal therapy, coronary artery disease, sick sinus syndrome status post pacemaker, and paroxysmal atrial fibrillation on anticoagulation was admitted to the medical service for a new dry cough, weakness, dyspnea, and a 20-pound unintentional weight loss. The physical examination was notable for cervical and inguinal lymphadenopathy. His chest radiograph was significant for a left pleural effusion. He underwent a cervical lymph node core biopsy that was positive for diffuse large B-cell lymphoma (DLBCL). During his hospital stay, the patient continued to have worsening shortness of a

breath. A repeat chest radiograph was concerning for increasing pleural effusion. The pulmonary service was consulted for consideration of thoracentesis. The patient was afebrile, his heart rate was 99 beats/min, blood pressure 138/89 mm Hg, and oxygen saturation on a 2-L nasal cannula was 92%. The lung examination revealed decreased breath sounds over the left lower lung field. The pulmonary consult team performed a goal-directed ultrasonography examination (Video 1).

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*Question: Based on the patient's history and ultrasound findings, what is the most likely diagnosis?*

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*Answer:* Stage IV DLBCL with pleural masses, malignant pleural effusion, pericardial effusion, and a mass adherent to the right ventricle. There was no evidence for cardiac tamponade.

## Discussion

When evaluating a patient with dyspnea and pleural effusion, point of care ultrasonography (POCUS) can be a valuable tool to further characterize the nature and size of the effusion. In addition, in this scenario, POCUS can also be useful in detecting alternative or additional causes of the patient's symptoms. In the presented case, bedside ultrasonography was extremely beneficial in suggesting a specific etiology of the effusion. In addition, a previously unknown cardiac mass was discovered.

[Video 2](#), ultrasonography of the anterior chest, shows a normal-appearing pleural line with appreciable lung sliding and equally spaced horizontal lines, known as A lines. These findings were seen bilaterally and ruled out a diffuse interstitial process, such as pulmonary edema, as the cause of the patient's dyspnea. A single faint vertical line, or B line, is a normal finding and does not indicate an interstitial syndrome. Bilateral lung sliding found anteriorly in the recumbent patient made a pneumothorax unlikely, although a loculated pneumothorax at a different location could not be ruled out based on that finding.

Images of the left inferior lateral chest, [Video 2](#), show a moderate-sized pleural effusion with linear echogenic septations. A large mass within the pleural space and significant diaphragmatic thickening can also be appreciated. In a case series of 320 patients with effusions, all fluid collections with septations were exudative in nature. Septations did not differentiate between malignant and nonmalignant etiologies, but all patients with pleural nodules had malignant effusions.<sup>1</sup> Given recent diagnosis of lymphoma and the absence of symptoms for an infection in the patient in our study, the ultrasound findings of pleural masses and septations were strongly suggesting a malignant effusion, likely from pleural lymphoma. With CT imaging, pleural involvement by lymphoma is often characterized by single or multiple pleural nodules or by diffuse pleural thickening.<sup>2</sup> Specific appearance of pleural lymphoma with ultrasonography is not well described in the literature.

Cardiac ultrasonography was performed to look for signs of heart failure, which could have been causing pleural effusions, and to rule out other causes of

dyspnea. The subcostal 4-chamber shows a moderately sized anterior pericardial effusion and a large mass adherent to the right ventricle ([Video 2](#)). The left ventricle is normal in size and appears hyperdynamic, indicated by near obliteration of the ventricular cavity at end systole. A pacemaker wire is seen within the right ventricle. The majority of malignant cardiac tumors are due to metastatic disease, with lung, breast, esophagus, and lymphoma among the most common primary sites.<sup>3</sup> Cardiac involvement of non-Hodgkin lymphoma has been detected during autopsy in up to 18% of patients,<sup>4</sup> and the most common cardiac metastatic site of lymphoma is the pericardium.<sup>5</sup> In view of the known diagnosis of DLBCL in the presented patient, the bedside ultrasonography findings were highly suggestive of cardiac lymphoma. These findings were unexpected because cardiac involvement was previously unknown in this patient, exemplifying how POCUS can have a profound impact on patient care.

The presence of pericardial effusion always raises concern for cardiac tamponade. Echocardiographic signs of tamponade include right ventricular (RV) diastolic collapse, right atrial collapse during ventricular systole, reciprocal respiratory changes in RV and left ventricular filling, and dilation of the inferior vena cava (IVC). In the presented case, the RV diastolic volume appeared small, but diastolic RV collapse resulting from tamponade was not clearly seen; however, it may be difficult to appreciate the typical appearance of RV collapse in the presence of the large mass. If the intrapericardial pressure exceeds RV diastolic pressure, RV collapse and tamponade will ensue, but only if the RV free wall is normal in thickness and compliance. The large mass adherent to the RV possibly decreased the compliance of the RV free wall, preventing any increased pericardial pressure to be transmitted to the right ventricle. Right atrial collapse during ventricular systole has a very high sensitivity for tamponade,<sup>6</sup> and its absence, as seen in [Video 2](#), makes tamponade unlikely. A nondilated IVC with > 50% respiratory variation, as shown in [Video 2](#), also argues against the presence of tamponade. IVC collapsibility carries a high negative predictive value for tamponade. Plethora of the IVC has a sensitivity of 97% but only 40% specificity.<sup>7</sup>

Based on the described findings, the patient was diagnosed with stage IV DLBCL with pleural and cardiac involvement. He was treated with chemotherapy with complete response and resolution of the pleural and cardiac masses.

## Reverberations

1. *Ultrasonography can be very helpful in determining the cause of a pleural effusion, obviating the need for needle aspiration in at least some cases.*
2. *Ultrasonography can be used to detect and rule out additional or alternative causes of dyspnea in a patient who presents with pleural effusion.*
3. *Bedside ultrasonography is an excellent tool to detect cardiac involvement in patients with disseminated malignancy.*

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**Additional information:** To analyze this case with the videos, see the online article.

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