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PERIPARTUM CARDIOVASCULAR DISEASE MINI-FOCUS ISSUE

INTERMEDIATE

CASE REPORT: CLINICAL CASE

Primary Lung Adenocarcinoma Presenting as Cardiac Tamponade in a Pregnant Woman

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ABSTRACT

Pericardial effusions are common in pregnancy and often remain asymptomatic. We present a case of cardiac tamponade in a young pregnant female unmasking a diagnosis of primary metastatic lung adenocarcinoma. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2020;2:112-5) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

HISTORY OF PRESENTATION

A 30-year-old G2P1 pregnant woman at 22 weeks' gestation presented from an outside facility with approximately 3 weeks of progressive shortness of breath, nonproductive cough, and dyspnea on exertion that acutely worsened on the day of her presentation. Several days before her presentation, she developed chest pain described as severe, constant, and stabbing with an intensity of 8 to 9 on a scale of 10. The pain was localized to her right upper chest radiating to her scapula and worsened with inspiration. The week prior she had gone to an urgent care center where she was diagnosed with pneumonia by chest x-ray and given antibiotics, which did not improve her symptoms.

LEARNING OBJECTIVES

- To recognize symptoms of cardiac tamponade in pregnant patients.
- To establish an approach in working up cardiac tamponade in pregnant patients.
- To consider rare etiologies of cardiac tamponade in pregnant patients.

On initial examination, she was afebrile with blood pressure of 106/79 mm Hg, heart rate of 122 beats/min, respiratory rate of 22 breaths/min, and oxygen saturation of 97% on 3 l supplemental oxygen. She appeared mildly distressed. The lungs had coarse rhonchi bilaterally and diminished breath sounds noted over the left lung. Her heart rate was regular tachycardic with normal S1 and S2. A holosystolic murmur was auscultated across the precordium. Peripheral pulses were symmetric. The abdomen was soft and nontender with palpable gravid uterus. She had mild 1+ pitting pedal and pretibial edema bilaterally. The remainder of the examination was unremarkable.

PAST MEDICAL HISTORY

Her medical history was notable for 1 previous pregnancy that was uncomplicated and delivered full term. She had no other known medical or surgical history. In her 20s, she smoked a pack of cigarettes daily for 2 years but denied any alcohol or illicit substance use. Her father had a history of coronary artery disease with a myocardial infarction in his late 50s.

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Informed consent was obtained for this case.

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DIFFERENTIAL DIAGNOSIS

The initial differential diagnosis included pulmonary embolism, pleural effusion, acute coronary syndrome, peripartum cardiomyopathy, takotsubo cardiomyopathy, and pericardial effusion.

INVESTIGATIONS

The initial laboratory workup was notable for a white blood cell count of 13,600/mm^3, hemoglobin of 10.8 g/dl, creatinine of 0.42 mg/dl, potassium of 3.9 mmol/l, bicarbonate of 16 mmol/l, lactic acid of 1.4 mmol/l, N-terminal pro-B-type natriuretic peptide of 221 pg/ml, and troponin I < 0.04 ng/ml. Electrocardiography showed a sinus tachycardia rate of 137 beats/min with low-voltage QRS complexes (Figure 1). Fetal ultrasound showed normal gestational growth at 22 weeks. Computed tomography angiography revealed a large pericardial effusion measuring up to 2.9 × 3.1 × 2.5 cm (Figure 2), moderate left pleural effusion, and no evidence of pulmonary embolism. A bedside transthoracic echocardiogram (TTE) confirmed a large pericardial effusion with evidence of tamponade physiology.

MANAGEMENT

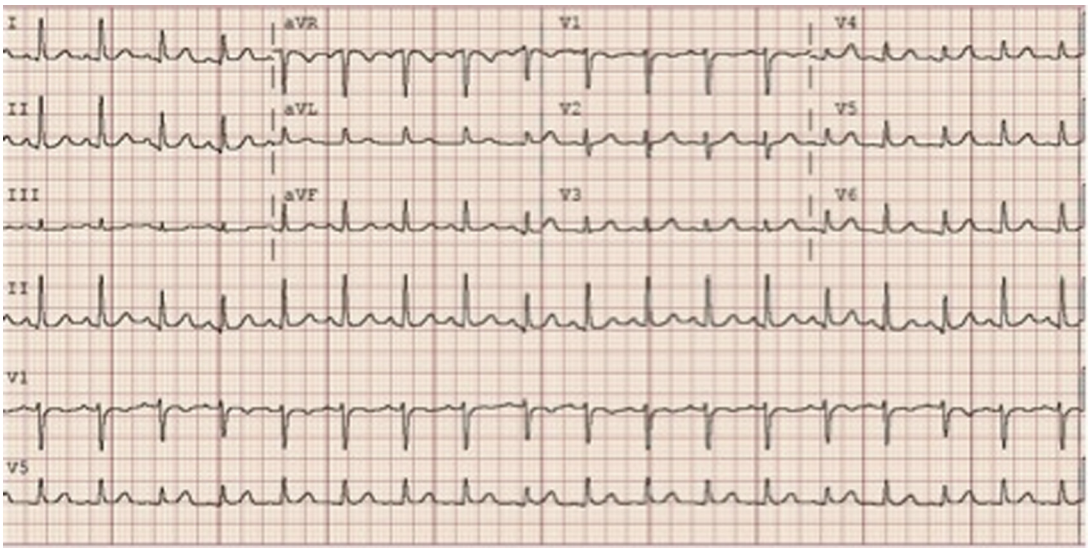
The maternal-fetal medicine team was consulted and recommended close monitoring of fetal heart rates both by Doppler ultrasound and external electronic monitoring. The patient was taken urgently for pericardiocentesis, and 840 ml bloody fluid was removed with follow-up TTE confirming successful drainage of the effusion. Her symptoms and hemodynamics improved subsequently. Fluid studies of both pericardial and pleural fluid were notable for high adenosine deaminase of 9.7 U/l (reference <9.1 U/l) and neoplastic cells consistent with metastatic lung adenocarcinoma. Immunohistochemistry stains later resulted positive for programmed death ligand-1 and negative for anaplastic lymphoma kinase rearrangement, portending a high likelihood of responding to chemotherapy.

A multidisciplinary discussion took place between the patient, family members, cardiology, obstetrics, oncology, pulmonology, interventional cardiology, and the intensive care unit team. The patient expressed her desire to forego any treatments or procedures that had potential to adversely affect her baby. She was started on ibuprofen, colchicine, and prednisone; however, she continued to have significant pericardial and pleural fluid drainage. The patient deferred pleural and pericardial drainage catheter placement given the potential risk of premature labor. Repeat computed tomographic imaging and TTE 7 days later showed no fluid reaccumulation, so she was discharged from the hospital with close

ABBREVIATIONS AND ACRONYMS

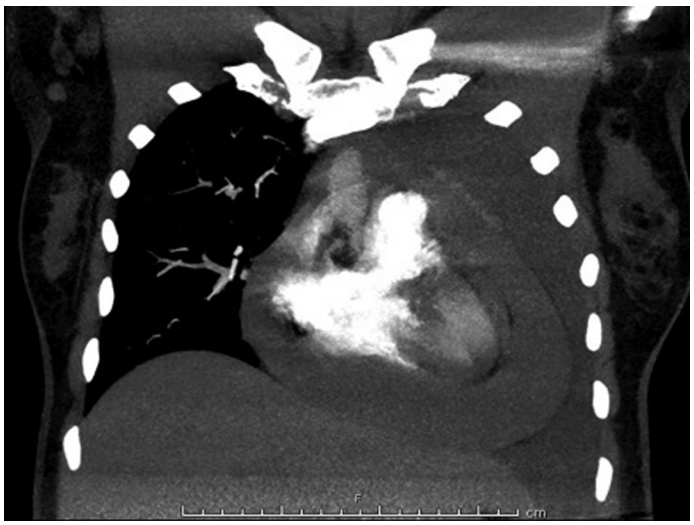
TTE = transthoracic echocardiogram

FIGURE 1 Initial Electrocardiogram on Presentation



Sinus tachycardia and low-voltage QRS complexes from a large pericardial effusion.

FIGURE 2 Chest Computed Tomography Angiography Sagittal View

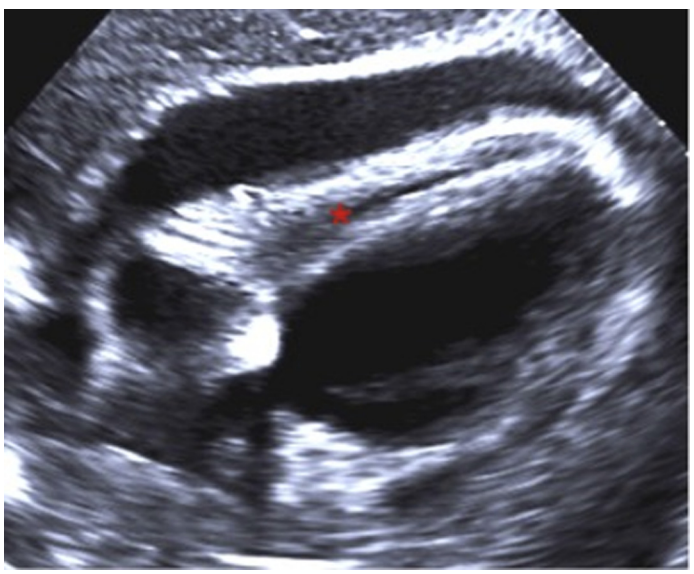


Computed tomography angiography of the chest showing a large circumferential pericardial effusion up to 3.1 cm causing cardiac tamponade.

follow-up. A chemotherapy regimen of carboplatin and pembrolizumab was initiated the following month.

Despite chemotherapy treatment, she continued to experience worsening chest pressure and dyspnea necessitating a planned cesarean section at 31 weeks' gestation. Her clinical course was also complicated by a right lower lobe pulmonary embolism and refractory pleural effusions requiring placement of a pleural drainage catheter. Three weeks after starting chemotherapy, she was readmitted for insidious chest pain of 2 to 3 days' duration. TTE showed concern for effusive-constrictive pericarditis (**Figures 3 and 4**, Video 1); therefore, she was started on colchicine and ibuprofen. Despite optimal medical management, she had recurrence of cardiac tamponade requiring pericardial window and biopsy. Histopathological examination revealed fibroconnective tissue, chronic inflammation, and mesothelial hyperplasia consistent with metastatic adenocarcinoma.

FIGURE 3 Transthoracic Echocardiogram Subcostal View



Large anterior pericardial effusion is seen (**red asterisk** = right ventricle cavity).

DISCUSSION

Pericardial effusions are a relatively common phenomenon in pregnancy. Rates have been reported as high as 15%, 19%, and 44% in each of the first, second, and third trimesters, respectively (1). Typically, pericardial effusions in pregnancy are transudative, small, and clinically silent and resolve spontaneously within 6 weeks after delivery (2,3). Asymptomatic effusions do not necessarily require treatment in the absence of tamponade physiology; however, large effusions should be monitored with serial TTEs every 3 months. Manifestations of tamponade may be masked in pregnancy because of the relative increase in blood volume (4). Also, several symptoms of tamponade including shortness of breath, tachycardia, swelling, and palpitations are commonly reported in unaffected pregnant patients. This makes differentiating the 2 difficult in the absence of imaging.

To our knowledge, this is the first case of primary lung adenocarcinoma in a pregnant patient presenting as cardiac tamponade. A few case reports have associated cardiac tamponade in pregnancy with autoimmune disease (specifically lupus and hypothyroidism), infection (viral and tuberculous), and rarely malignancy (breast cancer and angiosarcoma) (5). Other etiologies to be considered are trauma, dissection, and medication side effects. Patients using immune checkpoint inhibitor chemotherapy agents primarily develop side effects related to excessive immune activation with varying levels of cardiotoxicity (6). Several cases of pericardial effusions and tamponade have been reported in pembrolizumab specifically (a PDL-1 inhibitor) (4,7,8). This case was also complicated by the development of effusive-constrictive

pericarditis that began after she was initiated on chemotherapy.

FOLLOW-UP. Unfortunately, the lung adenocarcinoma progressed despite aggressive chemotherapy treatment. Four months after the initial diagnosis, the patient passed away.

CONCLUSIONS

This case illustrates the complexity of managing cardiac tamponade in a pregnant patient with underlying malignancy. Although most pericardial effusions in pregnancy will remain asymptomatic, providers should remain vigilant of any heralding symptoms of tamponade such as worsening shortness of breath, palpitations, or hemodynamic instability. In our case, the underlying etiology of lung adenocarcinoma became more apparent in the second trimester of pregnancy. Progressive physiological changes during pregnancy in cardiac output and blood volume likely contributed to the formation of malignant effusions while possibly masking symptoms from earlier in the pregnancy. Providers should consider the risks and benefits of various treatment modalities with respect to both the mother and fetus. Emphasis should be placed on minimizing cardiotoxic side effect profiles when choosing chemotherapy agents, especially those in the immune checkpoint inhibitor class. Additional studies are needed to determine the safety of these agents in pregnant patients and further delineate cardiac risk.

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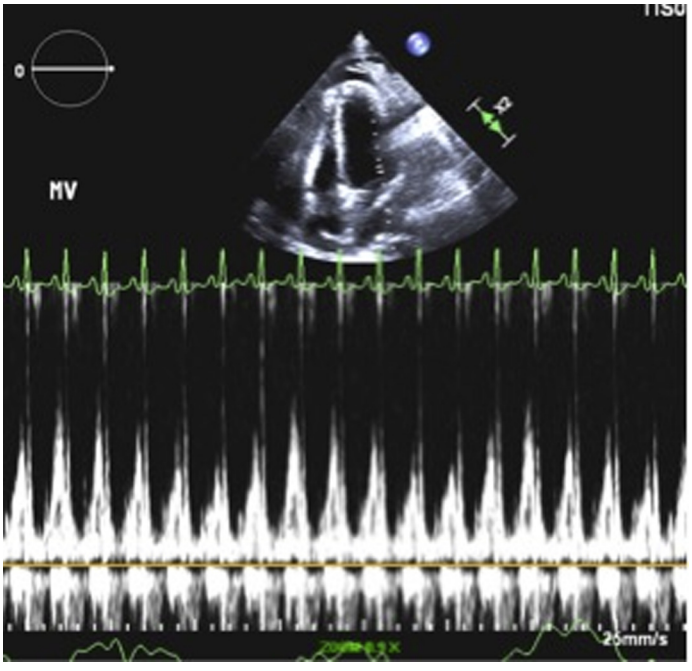
FIGURE 4 Mitral Inflow



Pulsed wave Doppler of mitral inflow demonstrates >25% reduction in ventricular filling with inspiration consistent with constrictive pericarditis. MV = mitral valve.

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KEY WORDS cancer, cardiovascular disease, chest pain, echocardiography, pericardial effusion, pleural effusion

APPENDIX For a supplemental video, please see the online version of this paper.