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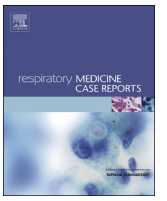

Case Report

Fixed right ventricular collapse: A loculated pericardial effusion due to metastatic pulmonary adenocarcinoma

Madeline Smoot [a, *], Jean Luis Reinoso [b], Adam Austin [b]

[a] Department of Medicine, University of Florida, Gainesville, FL, USA
[b] Division of Pulmonary, Critical Care and Sleep Medicine, University of Florida, Gainesville, FL, USA

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ABSTRACT

Pericardial effusions can occur as either circumferential or loculated when referencing their anatomic distribution in the pericardium. These effusions can result from multiple different etiologies, including malignancy, infection, trauma, connective tissue disease, acute pericarditis drug induced, or idiopathic. Loculated pericardial effusions can be difficult to manage. Even small loculated effusions can result in hemodynamic compromise. Oftentimes in the acute setting, point of care ultrasound can be used to evaluate pericardial effusions directly at the bedside. We present a case of a malignant loculated pericardial effusion and offer insight into management and clinical evaluation using point of care ultrasound.

1. Background

Pericardial effusion results from abnormal fluid collection in the pericardial sac. Although it could be asymptomatic, the typical presentation consists of shortness of breath, chest pain or pressure, hemodynamic lability, and sometimes is accompanied by a subjective sense of doom as perceived by the patient. Point of care ultrasound is a useful tool that can be employed directly at the bedside for evaluation of a pericardial effusion. Clinical management of pericardial effusions can vary based on what type (e.g., circumferential vs. loculated), etiology of, and patient prognosis.

2. Case description

A 61-year-old man with hypertension and paroxysmal atrial fibrillation presented for shortness of breath and generalized fatigue. The patient was recently admitted to an outside hospital for shortness of breath and found to have bilateral pulmonary embolism, a right sided pleural effusion, and a pericardial effusion. He was diagnosed with lung adenocarcinoma based on his pleural cytology and underwent a pericardial window with an indwelling catheter for malignant pericardial effusion 8 weeks prior to presentation at our hospital. After discharge he developed progressive shortness of breath over 24 h and presented to the emergency department. Upon presentation the patient was hypotensive with blood pressure of 86/63 and in moderate distress. Initial laboratory studies were significant for a white blood cell count of $12.5 \times 10^3/mm^3$, troponin of 146 pg/ml, and BNP of 401 pg/ml. A chest x-ray done on arrival showed right sided pleural effusion with right sided reticular pattern. Bedside echocardiography was performed to assess hemodynamics, which demonstrated a loculated pericardial effusion (Fig. 1, Suppl 1-3).

The patient's loculated pericardial effusion demonstrated right ventricular collapse concerning for pericardial tamponade (Suppl 1-3). Other findings include inferior vena cava plethora with a diameter of 2.47cm without variation indicating elevated right atrial

* Corresponding author. Department of Medicine, University of Florida, Gainesville, FL, 32610, USA.
E-mail address: Madeline.Smoot@medicine.ufl.edu (M. Smoot).

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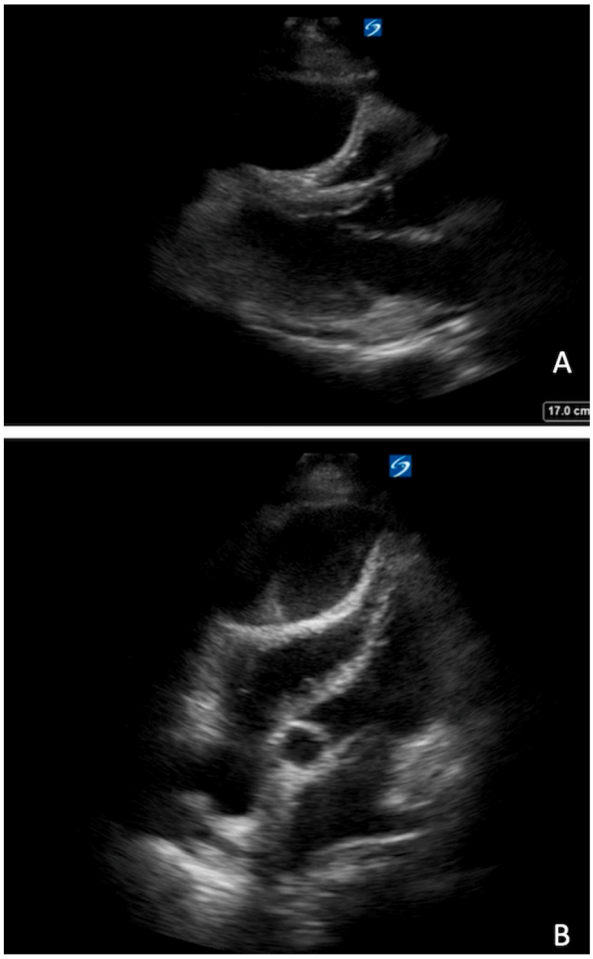

Fig. 1. Point of Care Ultrasound (POCUS) demonstrating right ventricular collapse and constriction with loculated pericardial effusion (A-parasternal long axis; B-apical five chamber view).

pressure. Drainage of loculated effusion was recommended by either pericardiocentesis or pericardial window. There was an extensive discussion with the patient about risks and benefits of any procedures to drain pericardial fluid. Given his prognosis in the setting of the recent diagnosis of metastatic adenocarcinoma of the lung, the patient declined procedural intervention and opted for discharge home under hospice care.

3. Discussion

Cardiac tamponade is a medical emergency that can be reversed if recognition and appropriate intervention is carried out in a timely manner. It occurs when intrapericardial pressure exceeds the intracardiac pressures due to a circumferential or localized collection of fluid within the pericardium [1,2]. Pericardial effusions may result from malignancy, infection, trauma, connective tissue disease, acute pericarditis drug induced, or idiopathic [3]. In those patients with malignant pericardial effusion, fluid can accumulate due to direct extension, metastatic spread or as a complication of treatment [4].

Point of care ultrasound (POCUS) can be a fast and sensitive way to assess a patient with suspected tamponade physiology. Some of the findings seen on POCUS include pericardial effusion, diastolic right ventricular collapse, systolic right atrial collapse, and plethoric inferior vena cava (IVC) with minimal respiratory variation [2]. The most sensitive echocardiographic finding is IVC dilatation with a sensitivity of 97% but a low specificity of 40% [5]. Right atrium systolic collapse more than 1/3 of the cardiac cycle has a variable sensitivity ranging from 50% in early tamponade and 100% in late tamponade[5]· Right ventricular early diastolic collapse has a sensitivity between 48 and 60% but carries a high specificity 75–90% [2].

While there are other long term therapies for specifically malignant pericardial effusions, such as chemotherapy for the underlying malignancy and talc pleurodesis, in an acute tamponade physiology one must proceed directly to pericardiocentesis or pericardial drain. A loculated malignant pericardial effusion poses a unique challenge. Surgical drainage is generally preferred in the setting of loculated effusion as effective decompression of the pericardial space may not be achieved simply with placement of a pericardial drain or pericardiocentesis in the setting of loculation.

Loculated effusions may result in different hemodynamics than standard circumferential pericardial effusions [6]. For example, a loculated effusion may cause regional cardiac tamponade whereas a circumferential pericardial effusion causes global tamponade. Additionally, loculated pericardial effusions may not cause even compression of the cardiac chambers and can result in compression on one chamber more than another [6,7].

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Declaration of competing interest

On behalf of all authors, the corresponding author declares that there are no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rmcr.2022.101805.

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