

# Point-of Care Ultrasound in Pericardial Tamponade: Amateurs and Axis Views

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## Introduction

Even in the hands of a novice, point-of-care ultrasound (POCUS) is a quick, useful tool for urgent evaluation of a patient who appears to be in cardiopulmonary distress. This vignette describes the case of a 53-year-old male and the rudimentary POCUS evaluation that led to a quick diagnosis of cardiac tamponade and expedited treatment.

## Case Presentation

- A 53-year-old male with a past medical history of hypothyroidism presented to the intensive care unit (ICU) in acute blast crisis with a white blood count of 177k. On presentation, he had respiratory failure of unclear etiology requiring 6 liters nasal cannula.
- A chest x-ray and CT chest were concerning for pulmonary edema. Diuretics were prescribed. The patient's oxygen requirements decreased, and his symptoms improved.
- After two sessions of emergent leukapheresis, his white blood cell count decreased to 33K. A bone marrow biopsy revealed findings consistent with acute myeloid leukemia.
- A transthoracic echocardiogram (TTE) done on the second day of his admission revealed normal left ventricular and right ventricular systolic function and a small pericardial effusion
- Overnight between his second and third day of admission, the patient began to complain of chest discomfort and increasing anxiety. The next morning, he became tachycardic to 150s with associated diaphoresis, however his blood pressure remained stable. His heart sounds were faint, and his lungs were clear.
- While awaiting arrival of stat EKG, CXR, lab results, two internal medicine residents who had recently participated in a short cardiac POCUS training session decided to perform focused cardiac ultrasound. Utilizing the parasternal axis view, the residents were able to identify a large pericardial effusion and diastolic collapse of the right ventricle.
- Due to concern for cardiac tamponade, the ICU attending was notified and a subxiphoid view was obtained which further evaluated the effusion and confirmed tamponade physiology.
- Cardiology was notified and the recorded ultrasound videos allowed for expedited confirmation of tamponade and rapid activation of the cardiac catheterization lab for emergent pericardiocentesis and drain placement.
- Pericardiocentesis was successfully performed before the patient could become hemodynamically unstable. A repeat formal TTE confirmed resolution of the effusion.

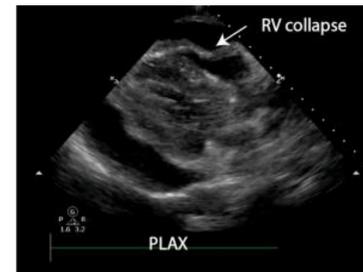


Figure 1. An example of right ventricular collapse as seen on parasternal long axis view<sup>4</sup>



Figure 2. A subxiphoid view obtained at bedside revealing pericardial effusion and right ventricular collapse during diastole

## Discussion

- Point-of-Care Ultrasound (POCUS) has established itself as an important tool for expedited identification of pathology in the hands of a trained physician.<sup>1</sup> The evidence for its utility for focused cardiac examination has been well established in emergency departments and ICUs.<sup>2</sup>
- Acceptance of POCUS by general internal medicine physicians had at first been slow, but it has increased in recent years as physicians have recognized its ability to augment the physical exam in a non-invasive way.<sup>3</sup> Internal medicine residency programs all over the country either have or are in the process of creating POCUS curriculums to establish their trainees as confident practitioners of this device.
- The internal medicine residents who established the diagnosis in this case had recently undergone a short training on cardiac POCUS that consisted of three segments: discussion of the cardiac anatomy as seen in different windows including parasternal long-axis, parasternal short-axis, apical four-chamber, and subxiphoid views; a presentation on identifying commonly seen pathology; and an applied practice session on a healthy volunteer. The applied practice session focused primarily on the parasternal long-axis view due to its advantage in identifying pericardial effusion, evaluating overall cardiac function, and comparing ventricle sizes in the same window.
- While the residents had only undergone a short training and had practiced on a healthy volunteer, they were able to quickly identify the effusion, recognize the physiology as abnormal, and alert the ICU attending, substantially shortening the time to intervention.
- This case is an example of the positive outcomes that can accompany the inclusion of a structured Cardiac POCUS curriculum in the training of internal medicine residents.

## Conclusion

This case serves to illustrate the utility of point-of-care ultrasound for rapid evaluation of patients with worsening symptoms and vitals signs concerning for hemodynamic pathology. POCUS performed by IM residents led to rapid recognition of a serious condition and facilitated appropriate escalation and management. The importance of a basic POCUS curriculum cannot be understated in shortening the time to recognition of life-threatening scenarios and ensuring activation of appropriate interventions.

## References

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