

CASE REPORT

Imaging

Use of point-of-care ultrasound to diagnose an alternate cause of flank pain in a patient with presumed renal colic

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Abstract

This is a case of a 34-year-old male patient who presented to the emergency department (ED) with severe left flank pain. Due to the patient's cardiac history, elevated troponin, lactic acidosis, and lack of renal calculi on a noncontrast CT, focused cardiac ultrasound was performed, which showed left ventricle thrombus. The patient was later found to have bi-interventricular thrombi causing both pulmonary embolism and renal infarction. This is an uncommon diagnosis in the ED, where point-of-care ultrasound helped in diagnosing and guiding the management and disposition of this case.

1 | BACKGROUND

Patients who present to the emergency department (ED) are sometimes in life-threatening conditions that require immediate actions to save lives. Point-of-care ultrasonography (POCUS) is a useful tool that provides physicians with accurate clinical information to reach the diagnosis.¹

POCUS is an important tool for emergency physicians, because POCUS has positively impacted several parameters in the ED, including diagnostic accuracy, procedural guidance, and patient safety.² Kobel et al³ found that POCUS changed the initial diagnosis in 14% of patients with chest pain and dyspnea who were primarily in the ICU. Furthermore, in patients whose diagnosis remained unchanged, POCUS reinforced the initial diagnosis in 48% of the cases.³

2 | CASE PRESENTATION

A 34-year-old male patient had a significant medical history of diabetes mellitus (DM), ischemic heart disease (IHD), and postpercutaneous coronary intervention (PCI) 2 years prior. He is a heavy smoker and reported amphetamine and cannabis abuse. He presented to the ED complaining of severe left flank pain radiating to the left groin for the past 2 hours. His pain was associated with nausea, vomiting, dysuria, and dark urine. He also reported mild right shoulder pain. There was no history of fever, hematuria, frequency, urgency, or changes in bowel habits. The patient denied any history of trauma.

On examination, the patient was afebrile with a blood pressure (BP) of 155/113 mm Hg, a heart rate of 104 b/min, and other vital signs within the normal limits. Chest auscultation revealed bilateral basal lung crepitations. The cardiac exam was normal, with no murmurs. His

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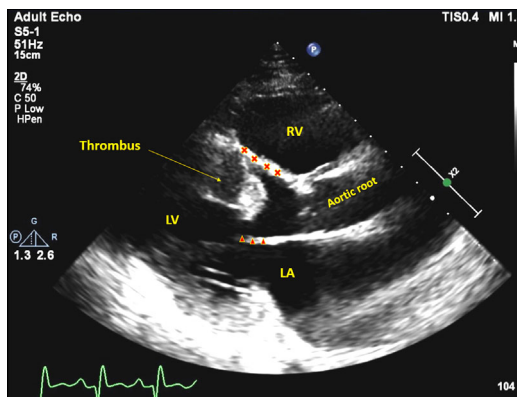


FIGURE 1 Parasternal long axis (PSLA) showing a large left ventricle thrombus. (crosses “X” pointing to the interventricular septum, arrowheads ► indicating the anterior leaflet of the mitral valve and right atrial wall, RV: right ventricle, LV: left ventricle, LA: left atrium). (Images were taken by an ultrasound technician where they were saved in the hospital picture archiving and communication system)

abdomen was soft and lax with marked left costophrenic angle tenderness. There was mild bilateral lower limb edema up to both knees. The remainder of the physical examination was unremarkable.

A provisional diagnosis of renal colic was the first impression. However, other serious diagnoses were also considered given the patient’s complicated past medical history. Due to his ill appearance, cardiac history, lung findings, and peripheral edema, electrocardiogram (ECG) was ordered, and blood investigations were sent for complete blood count (CBC), complete metabolic panel, cardiac enzymes, coagulation profile, venous blood gas (VBG), and urine analysis. A CT of the abdomen and pelvis with no contrast was ordered to look for kidney stones. His flank pain improved initially with analgesia consisting of lornoxicam and morphine.

ECG showed sinus tachycardia without any acute ischemic changes. The chest X-ray was normal. Initial investigations showed normal CBC, renal profile (blood urea nitrogen: 14.5 mg/dL, creatinine: 0.9 mg/dL) and electrolytes. VBG revealed that the patient’s lactic acid level was high, at 6 mmol/L, and his standard troponin i was high, at 0.675 ng/mL (normal range: 0–0.06 ng/mL). Cardiology was consulted for non-ST elevation myocardial infarction. CT-KUB was negative for stones, and there were no signs of obstructive uropathy. However, the patient’s pain restarted and became severe again.

Therefore, with his severe flank pain, non-ST elevation myocardial infarction, and high venous lactate level, other alternative diagnoses were sought. A thrombus to the renal artery was highly suspected for this patient, but this diagnosis could not be made with the noncontrast CT that was already performed.

An emergency physician performed bedside cardiac and renal ultrasound using a Philips CX50 with a low-frequency (5–1 MHz) probe. The focused cardiac ultrasound revealed an intracardiac abnormality inside the left ventricle concerning a mass or thrombus (Figure 1). Color Doppler was added and showed no color signal uptake, suggesting the likelihood of a thrombus rather than a cardiac mass (Figure 2). The

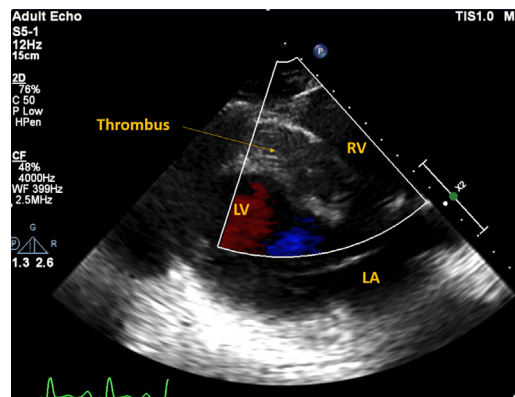


FIGURE 2 Parasternal long axis with color doppler in the left ventricle where the thrombus is showing no color uptake. (RV: right ventricle, LV: left ventricle, LA: left atrium). (Images were taken by an ultrasound technician where they were saved in the hospital picture archiving and communication system)

ejection fraction (EF) was noted to be reduced on visual assessment. There was no pericardial effusion, and the aortic root was noted to be within the normal limit. Scanning of the kidneys showed no hydronephrosis of either kidney.

Cardiology-performed transthoracic echocardiography was obtained, which confirmed our bedside cardiac ultrasound findings, added an EF of 10%–15%, and identified a right ventricle thrombus. CT of the abdomen and pelvis with contrast showed left kidney infarction with a left renal artery-filling defect. The liver was severely congested due to cardiac dysfunction, although there was no sign of bowel ischemia. CT pulmonary angiography showed pulmonary embolism in the posterior segmental branch of the right lower lobar artery.

He was admitted to the cardiac care unit (CCU) and treated with heparin infusion and warfarin targeting INR 2–3. Laboratory investigations for the hypercoagulable state were performed and were within the normal ranges: Protein S was 61%, Protein C was 65%, and antithrombin III was 61%. The patient was discharged after 7 days of hospitalization on warfarin and clopidogrel, and his recommended lifestyle modifications included smoking and drug addiction counseling. He was asked to follow up in the cardiology clinic.

3 | DISCUSSION

This is a case of bi-interventricular thrombus that caused a showering of several thrombi to different organ systems, resulting in left renal artery and pulmonary embolism.

Patients with renal infarction most frequently present to the ED with severe, persistent flank or abdominal pain, as well as an elevated venous lactate level.⁴ Eighty percent of those patients will have abnormal renal profiles and proteinuria, and the diagnoses of 50% of those patients will be missed in the ED.⁴

This patient presented to the ED with some of the classic signs and symptoms of renal infarction: severe and persistent flank pain and elevated venous lactate levels but with a normal renal profile and no proteinuria.

The emergency physician caring for this patient re-evaluated the differential diagnoses and recognized red flags when they were presented, such as the patient's past medical history, pain severity, and elevated troponin and lactate levels.

POCUS has become an essential tool in emergency medicine practice, and it was included in this patient's further assessment to rule out life-threatening conditions. In this case, POCUS solidified the impression and guided further imaging, consultation, and management. This is the first case report in emergency medicine literature where POCUS showed left ventricle thrombus for a patient with suspected left renal infarction. Left ventricle thrombus was easily visualized on the parasternal long axis, parasternal short axis, and apical 4 chamber views. However, the right ventricle thrombus was initially missed by bedside ultrasound, likely due to the difficulty involved in obtaining adequate full views of the right ventricle.

Several studies have shown that POCUS has an impact on physician confidence in reaching the most likely diagnosis, and it helps in the decision making process and thus improves the diagnostic accuracy for emergency physicians.⁵⁻⁸

Acute biventricular thrombus is an infrequently encountered incidence that is rarely recognized at presentation.⁹ This can lead to a delay in initiating the treatment and can cause serious complications and/or death.⁹

There have been some reported cases of biventricular thrombi associated with different presentations with risk factors such as substance abuse, smoking, and patients with hypercoagulable status.^{10,11} Additionally, a medical history of dilated cardiomyopathy, recurrent myocardial infarction, and atrial fibrillation are potential causes of ventricular thrombus.^{12,13}

However, the majority of intracardiac thrombus cases are detected incidentally during routine ECHO, which is part of the workup for other diseases, such as cerebrovascular accident and acute coronary syndrome.¹⁴ Furthermore, cardiac emboli have been found in the lungs, kidneys, spleen, intestines, brain, and extremities.¹⁵

There are no medical guidelines on the treatment of biventricular thrombi. The most appropriate therapeutic option in patients with intracardiac and systemic thrombosis is systemic anticoagulation.¹⁶ Surgical intervention is another option where a study has shown that the risk of systemic embolization was higher in patients on anticoagulant therapy than in those on surgical intervention.¹⁶

4 | CONCLUSION

Acute renal infarction related to emboli from a ventricle thrombus is uncommon and can mimic renal colic. We present a case where POCUS was used to establish the diagnosis of a ventricle thrombus and to expedite care of a patient in our ED. POCUS has become an essential tool for emergency practitioners, and it has shown to be a valuable positive impact on patient outcomes.

CONFLICTS OF INTEREST

The authors have no conflict of interest to disclose.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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