

A Case of Thrombus in Transit: Role of POCUS in Early Diagnosis of Pulmonary Thromboembolism

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Abstract Pulmonary embolism is a cause of significant morbidity and mortality. Thrombus in transit is defined on ultrasound as mobile echogenic material, temporarily located in the right heart chambers making its way to the pulmonary vasculature, which is highly diagnostic of pulmonary embolism. Point-of-care ultrasound (POCUS) places significant role in early diagnosis of thrombus in transit. Point-of-care ultrasound also avoids the need for subsequent computed tomography angiogram for diagnosis of pulmonary embolism. We present the case of 53-year-old male who presented with shortness of breath and was noted to have sinus tachycardia; thrombus in transit was diagnosed by point-of-care ultrasound and was subsequently confirmed through computer tomography angiogram of the pulmonary artery.

Keywords: thrombus in transit, point-of-care ultrasound, pulmonary embolism, SIQ3T3

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1. Introduction

Pulmonary embolus (PE), an obstruction of the pulmonary artery or one of its main branches supplying the lung parenchyma, account for four-hundred thousand deaths annually [1,2]. Presentation of a PE can vary greatly, ranging from asymptomatic to sudden death. Two of the diagnostic modalities for PE are computed tomography angiography (CTA) of the pulmonary vasculature and ventilation-perfusion scan. However, transthoracic echocardiograms (TTE) and point-of-care ultrasound (POCUS) have both been found to visualize thrombi "in transit"; presenting as an intra-cardiac mass within the right heart. These radiological findings have no outlined therapeutic guidelines and subsequently are associated with an upwards of forty percent mortality rate [3].

2. Case Presentation

We present a case of a 53-year-old male with medical history of hypertension, type II diabetes mellitus, and hyperlipidemia who presented with shortness of breath and dyspnea on exertion. Patient, whom previously had no

exertional limitations, had now developed an exercise tolerance to less than one block gradually over the course of one week associated with dry cough. Vitals signs on presentation were blood pressure of 92/54 mmHg, heart rate 82, temperature of 98.2 degrees Fahrenheit, respiratory rate 25 with oxygen saturation 96% on room air. Patient was noted to have a completely normal physical exam. A d-dimer level was not taken, and an initial troponin level was elevated to 0.049, and trended up to 0.059, however, there were no ischemic changes on electrocardiogram (EKG).

Initial work-up in ED with bedside ultrasound revealed right atrial thrombus in transit with flattening of the interventricular septum during diastole. This imaging finding is highly specific for imminent pulmonary embolus, which escalated patient's subsequent care. Shortly thereafter, computed tomography pulmonary angiography (CTA) showed bilateral large central pulmonary emboli in bilateral main pulmonary arteries extending to the bilateral lobar pulmonary arteries and segmental and bilateral sub segmental branches. Submassive pulmonary embolism was recognized and the patient was admitted to the medical intensive care unit (MICU) for administration of tissue plasminogen activator (tPA). A heparin drip was started to therapeutic partial thromboplastin time, and patient was then transitioned to apixaban four days after initial presentation. On hospital

day five, patient was discharged on apixaban five milligrams twice daily for six months.

3. Discussion

Thrombus in transit is defined on ultrasound as mobile echogenic material temporarily present in the right heart chambers on the way to the pulmonary vasculature which is highly diagnostic of pulmonary embolus [4]. Right heart thrombi present on imaging in the absence of any associated conditions; such as atrial fibrillation, structural heart disease, or catheters, are almost exclusively

associated with the presence or development of pulmonary embolus [7,8]. Although a rare finding, the ability to visualize thrombus in the right heart is associated with poor prognosis due to the inevitability of embolization to the lung's arterial supply. Its mortality rate of 44.7 % is due to the obstructive shock that occurs once the thrombus occludes the pulmonary arteries [5]. This finding of thrombus in transit on TTE or POCUS can be present with or without other signs of right heart strain; such as interventricular septum bowing into the left ventricle or right ventricular systolic dysfunction [6]. As can be seen below, a mobile, echogenic figure in the right atrium passing through to the right ventricle.

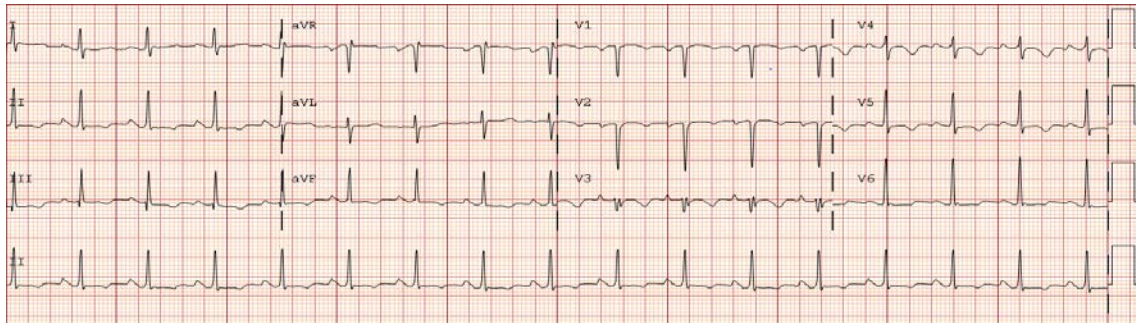


Image 1. EKG showing normal sinus rhythm, possible anterior infarct (q waves), inferior infarct. Also note S1Q3T3 pattern



Image 2. A point of care ultrasound showing thrombus in transit (yellow arrow). Also dilated right ventricle can be appreciated

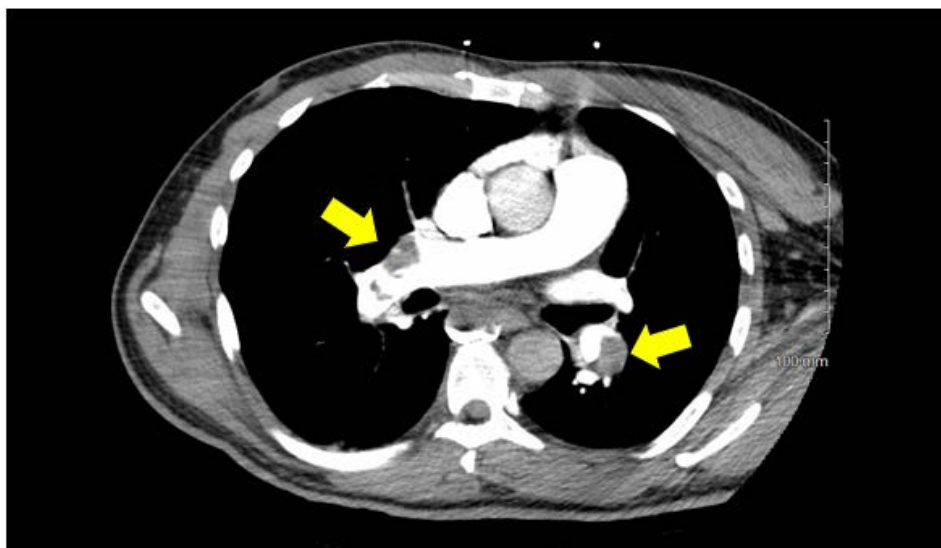


Image 3. CT angiogram of the chest revealing bilateral pulmonary embolism

Since there are no clinical guidelines for the acute treatment and management of thrombus in transit, care should be initiated based on patient's symptomology, hemodynamic stability, known efficacy of different treatment modalities, and at the discretion of the physician. As in the case with our patient, the immediate administration of systemic thrombolytics was able to abort the potential catastrophic outcomes associated with thrombus in transit. Fortunately, the patient had no history of prior bleeding or other contraindication to thrombolytics, his clinical course for uneventful. Other treatment modalities that can be considered include surgical embolectomy and intravenous anticoagulation [8]. As of now, we are lacking studies proving statistical significant benefit of one treatment modality over another. It has been shown, however, that surgical reperfusion therapy versus anticoagulation did not have a difference in adverse outcomes (i.e. bleeding, mortality) [7,8].

4. Conclusion

The finding of a thrombus in transit, is associated with poor prognosis however, mortality cannot be directly attributed to the thrombus as further pathologic derangements are most likely to explain the poor outcomes. Until guidelines for the management of thrombus in transit become established, clinicians will face the challenge of choosing the most appropriate intervention for this clinical scenario that carries a high mortality if effective intervention is delayed. With the advances in ultrasonography and enhanced imaging definition, thrombus in transit can be promptly detected and managed with antifibrinolytics leading to patient survival and improved outcomes.

Case Continues

The patient returned several months later with similar presentation. Complained of chest pain and dyspnea on exertion. Vital signs in emergency department were blood pressure 96/72, heart rate 94, respiratory rate 19, and oxygen saturation of 90% on room air. Patient had

EKG done showing classical presentation of S1Q3T3, pathognomonic sign for pulmonary embolus. CTA of pulmonary vasculature showed bilateral large pulmonary emboli within distal main pulmonary artery branches. Ultrasound of peripheral veins in ED showed non-compressible right femoral vein. Patient was immediately started on lovenox eighty miligrams every twelve hours, and was transferred to another institution for percutaneous thrombectomy.

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