

## Short Report

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# Hypotensive patient presenting with abnormal pre-hospital ischemic ECG

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### Abstract

**Introduction:** ECGs are widely utilized to identify a variety of pre-hospital conditions. Early and accurate identification of cardiac conditions such as ischemia or arrhythmia can facilitate accurate and prompt medical management by the pre-hospital team and the emergency department providers.

**Case presentation:** This case describes a patient with a pre-hospital presentation of chest pressure and a syncopal event in the setting of recent cough and shortness of breath. A pre-hospital Electrocardiogram (ECG) was concerning for ST Segment Elevation Myocardial Infarction (STEMI), however the patient was found to have an alternative diagnosis of a pulmonary emboli with an intraventricular thrombus identified on transthoracic cardiac POCUS.

**Conclusion:** ECGs and Point of Care Ultrasound (POCUS) should be jointly utilized in the patient assessment to consider a broad differential diagnosis. Treatment of the underlying pulmonary emboli led to stabilization of this patient and ultimately led to the patient being discharged from the hospital in stable condition.

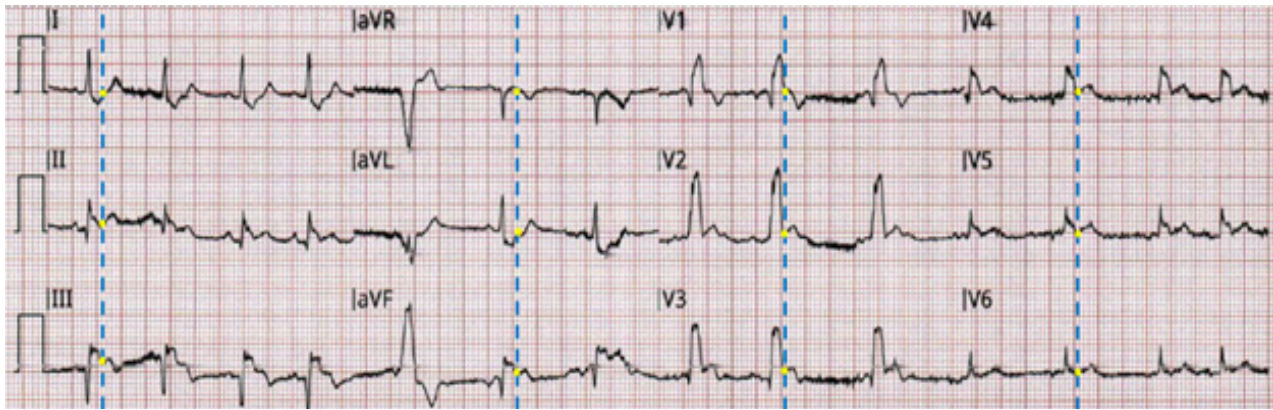
**Keywords:** POCUS; Emergency medicine; Critical care; Pulmonary emboli; STEMI.

### Case presentation

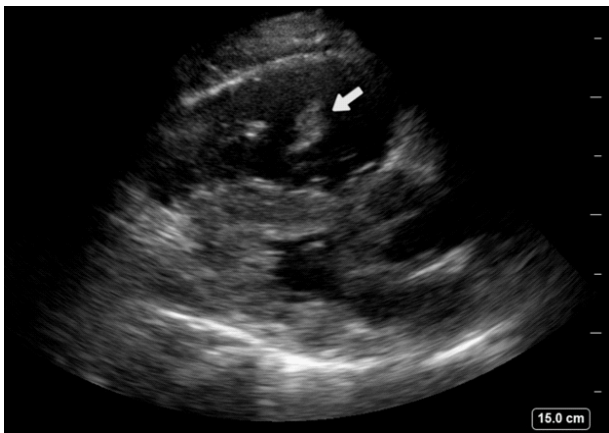
A 65 year old male with no significant past medical history presented to the emergency department via ambulance with concern for chest pressure and a syncopal episode. The medics found the patient cool and diaphoretic with an initial blood pressure 40/22. Further history elicited the patient had a cough for the last 4 weeks with associated shortness of breath. Medics were concerned the initial pre-hospital ECG demonstrated an inferior STEMI pattern (Figure 1). Medics provided 324 mg aspirin but were unable to obtain intravenous access prior to arrival. No sublingual nitroglycerin was administered. The patient had critically abnormal vital signs (HR 107, BP 75/41, oxygen-

ation 81% on 15 liters via non-rebreather mask, rectal temperature 95.1 F) on arrival to the emergency department. The ECG was thought to represent a right bundle branch pattern, and there was no prior ECG available for comparison.

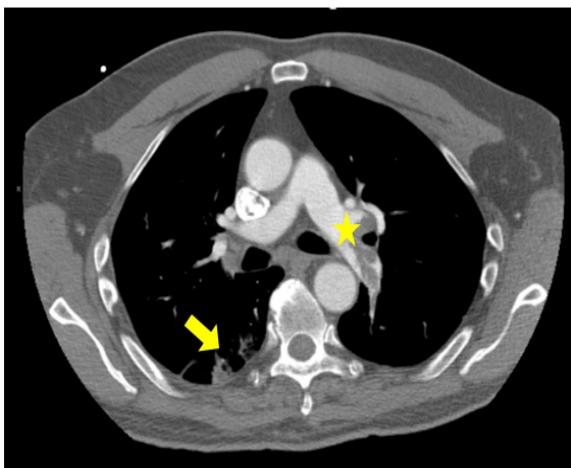
**Figure 1:** Demonstrates an abnormal ECG with evidence of a right Bundle Branch Block (RBBB). There is no prior ECG available for comparison, therefore this was assumed to be a new RBBB. The QRS complex is 154 milliseconds. When assessing the J point (yellow dot) in each of the above leads, there is J point elevation in Lead III and V3 (dashed line in Figure 1) when compared against the T-P baseline. There is also J point depression in aVL. However, this does not meet definition of STEMI as



**Figure 1:** Pre-hospital ECG obtained by medics. Blue dashed line overlaid to demonstrate consistency of J point (yellow dot) assessment.



**Figure 2:** Parasternal long axis point of care ultrasound demonstrating a mobile hyperechoic structure (white arrow) in the right ventricle. There is also right ventricular bowing.



**Figure 3:** Transverse CT scan with contrast showing filling defect (star) in the left pulmonary arteries with right posterior pulmonary infarct (arrow).

there is not J point elevation in two anatomically contiguous leads. Right bundle branch patterns can result from myocardial ischemia, pulmonary emboli, volume overload, pulmonary hypertension, congenital heart defects, or myocarditis among others [1].

### Discussion

The ECG above is concerning for ST segment elevation in several leads of which Acute Coronary Syndrome (ACS) must be considered in the differential diagnosis. However, the overall ECG is not consistent with STEMI criteria. Given the hemodynamic instability, POCUS was utilized to rapidly gain more information. While a new RBBB is not specific for pulmonary emboli, if a RBBB is present in the setting of pulmonary emboli it may be used as a sign of main pulmonary artery obstruction or saddle emboli [2]. In addition, if the patient was indeed hypotensive and had a RBBB with inferior ischemia that did not necessarily meet STEMI criteria on ECG, the providers may have been able to see regional wall motion abnormalities to raise suspicion for myocardial occlusion [3].

This case demonstrates the diagnostic uncertainty with abnormal ECGs. Additional information was gathered by utilizing POCUS and CT imaging to arrive at the correct diagnosis of a pulmonary emboli. There are several pre-hospital STEMI mimics that have been previously documented [4]. Emergency providers should become comfortable with POCUS signs suggestive of pulmonary emboli given that it is an acute life threatening presentation for thousands of patients every year, and during the same POCUS evaluation can rule out several other STEMI mimics [5].

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