

**Case report:**

**Focus Assessed Transthoracic Echocardiography (FATE) to facilitate the diagnosis of low risk Pulmonary Embolism in Emergency Department**

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**Abstract**

A diagnosis of Pulmonary Embolism (PE) is difficult that may be missed because of non specific clinical presentation. However, early diagnosis is fundamental, since immediate treatment is highly effective. Thus, with the availability of ultrasound machine in Emergency Department (ED) can help Emergency Physician to diagnose PE by using Focus Assessed Transthoracic Echocardiography (FATE) to facilitate the diagnosis of PE in low risk patient before proceed with the gold standard investigation which is CT Pulmonary Angiogram (CTPA). We believed this case was likely to be repeated on some readers' clinical practice and this procedure is an appropriate option to consider in such cases.

**Keywords:** FATE, pulmonary embolism, low risk, Emergency Department.

**Introduction**

Pulmonary embolism (PE) detection during havoc emergency setting is not as simple as other medical emergency condition to diagnose. It requires highly suspicious feeling from physician and skills to detect it. Eventhough, multiple scoring systems available to risk stratify patient to low or high risk of PE but still is not 100% can rule out the PE. Nowadays, with rapid development of advanced training in ultrasound as point-of-care in ED it can help to facilitate the diagnosis and increase the likelihood of patient having PE.

**Case**

A 37-years-old man was brought to Emergency Department (ED) with chief complaint of sudden onset of shortness of breath which occurred while he was praying. He later developed generalized tonic-clonic seizure associated with drooling of saliva and uprolling of eyeballs which lasted for 10 minutes and resolved spontaneously. He regained full consciousness thereafter. However, 5 minutes later,

patient developed second episode of tonic-clonic seizure which lasted for more than 15 minutes. During journey to ED, patient became unconscious, cyanosed with nonpalpable pulse. Thus, cardiopulmonary resuscitation (CPR) was commenced for 10 minutes. On further history, wife claimed he had chest tightness a day prior to this incidence associated with epigastric pain and nausea. He had history of visiting private clinic few times for epigastric pain in the past 2 months and was treated with antacid. He had no other medical illness but he is an active smoker.

On physical examination at ED, he was tachypnoeic with respiratory rate of 52 breath per minutes and oxygen saturation of 80% under 15 L/min oxygen. His blood pressure was 139/90 mmHg and heart rate was 135 beat per minutes. Pupils were 3 mm reactive bilaterally. Cardiovascular examination was normal. Auscultations over the lungs showed reduced air entry at bilateral lower zone. Abdominal examination revealed mild epigastric tenderness and there was no pedal oedema. Patient was then intubated due to respiratory distress.

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## Diagnosis of low risk Pulmonary Embolism in Emergency Department

Blood test showed normal Full Blood Count (FBC), coagulation studies, renal profile and cardiac enzymes. D-dimer was negative with titer of < 0.2mg/L. ECG showed sinus tachycardia with right ventricular strain (Figure 1). Chest radiograph showed cardiomegaly with left atrial enlargement meanwhile Focus Assessed Transthoracic Echocardiography (FATE) showed right atrium and ventricle dilatation (Figure 2 & 3). CTPA confirmed partial thrombosis of superior vena cava, almost complete thrombosis of right pulmonary artery and 30% thrombosis of left pulmonary artery (Figure 3). Venous compression ultrasonography (CUS) showed both Common Femoral vein & Popliteal vein were compressible. Patient was diagnosed with pulmonary embolism and fibrinolytic therapy was initiated. He then admitted to Intensive Care Unit (ICU) for further management.

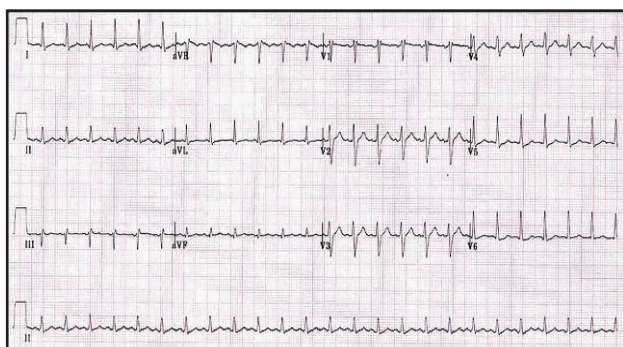


Figure 1- ECG done showed sinus tachycardia with right ventricular strain

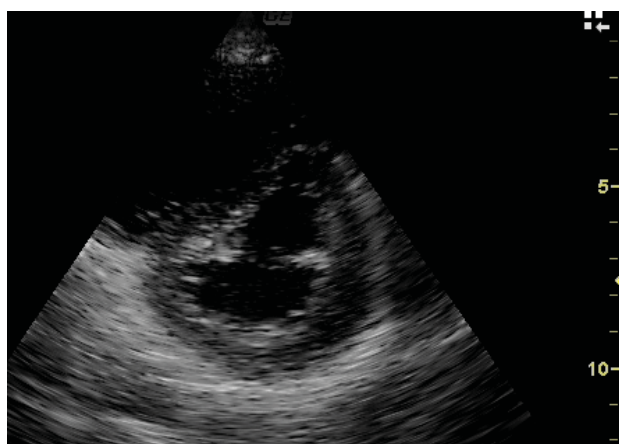


Figure 2: Parasternal short axis view indicate dilated Right Ventricle (RV) with flattening of septal (arrow) 'D' sign



Figure 3; 4-chamber view showed dilated Right Ventricle (RV) and Right Atrium (RA) compressing Left Ventricle and Left Atrium (LV)(LA).

### Discussion

The classic presentation of pulmonary embolism (PE) of hemoptysis, dyspnea, and chest pain are insensitive and nonspecific for a diagnosis of PE, with fewer than 20% having this classic triad<sup>1</sup>. Presentation of sudden onset of dyspnea followed by cardiac arrest will suggest acute coronary syndrome, acute pulmonary edema and PE as the highest in the list. Physical examination finding is not specific or sensitive in PE cases. Studies have shown tachypnea to be the most sensitive clinical sign, however it is absent in 5% to 13% of cases of PE<sup>2</sup>. Tachycardia is even less sensitive, especially in younger patients, with 70% of PE patients, younger than 40 years old and 30% of patients older than 40 having heart rates less than 100 beats/min<sup>3</sup>.

The classical ECG finding  $S_1Q_3T_3$  is lacked in sensitivity and specificity (54% and 62%). The most common ECG abnormality is T-wave inversion in the precordial leads with sinus tachycardia<sup>4</sup>. D-dimer is formed during the degradation of fibrin and is usually elevated in patients with PE. There are reported sensitivities of > 93% (at a cut-off of 500 ng/mL) and thus recommended to rule out the possibility of PE<sup>5</sup>.

This case demonstrated a low score in the pre-test probability of PE. The 5 tools most commonly used include the Wells score, the simplified revised Geneva score the pulmonary embolism rule-out cri-

teria (PERC) rule, the Charlotte (or Kline) rule, and the Pisa model. All 5 tools use very similar criteria, with various weightage and assign point systems used. FATE is becoming an important tool in the assessment of the patient with possible PE<sup>6</sup>. This case showed that the right ventricle was dilated and have reduced function or contractility. The presence of right ventricular enlargement and dysfunction in patients with pulmonary embolus is prognostically important and associated with significantly higher in

hospital mortality. It is also one of the best predictors of poor early outcome<sup>7</sup>.

### **Conclusion**

In summary, performing of FATE as described in this case report is a valuable and relatively safe technique and offers another option for the emergency physician to facilitate the diagnosis of low risk PE. Furthermore, it is a relatively time-saving and non-invasive procedure.

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