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**Article type:** Clinical image

**Received:** January 11, 2019.

**Accepted:** January 31, 2019.

**Published online:** February 8, 2019.

**ISSN:** 1897-9483

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# **Saddle pulmonary embolism diagnosed by bedside transthoracic echocardiogram**

## **Short title: Massive PA thrombus detected by bedside ECHO**

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**Conflict of interest: none declared**

Acute pulmonary embolism (PE), the most dangerous form of venous thromboembolism contributes highly to the global disease burden [1,2]. The estimated early mortality risk in PE is used to stratify diagnostic and therapeutic strategies [3]. PE can also be classified depending on clot size and localization. Particular type of PE is a saddle embolism with 2.6% to 5.4% prevalence. Importantly, saddle PE is not a synonym for massive PE, which is dedicated to patients with hemodynamic compromise. However, it is associated with higher risk of delayed decompensation due to clot migration and in-hospital mortality [4,5].

A 61-year-old female presented in emergency department with one week history of a mild exertional dyspnea and left calf pain. Two days before admission general practitioner recommended enoxaparin due to suspicion of deep vein thrombosis. On admission patient was stable with no resting dyspnea. The physical examination revealed a mild tenderness of left popliteal fossa with negative Homans' sign, without any edema. Electrocardiogram showed sinus rhythm, 90 beats per minute, without any pathology. According to the Wells rule (score= 2) and revised Geneva score (score=3) patient was classified to intermediate clinical probability of PE. However, transthoracic echocardiography (TTE) displayed a mobile thrombus at the bifurcation of the pulmonary artery (Fig 1 A). Doppler right ventricle outflow tract spectrum showed short acceleration time and early systolic notching (Fig 1 D). The right ventricle size and function was normal. Ultrasonography revealed also popliteal vein thrombosis. According to the guidelines, early mortality risk was assessed by the simplified Pulmonary Embolism Severity Index (score=0) and biomarkers level (elevated high-sensitive cardiac troponin and N-terminal pro-brain natriuretic peptide) as intermediate-low. A computed tomography angiography confirmed saddle embolus with thrombotic material in both main pulmonary arteries (Fig 1 B). Despite of formally non-massive PE presentation, the patient was immediately admitted to the intensive care unit. Therapeutic dose of enoxaparin and subsequently rivaroxaban treatment was used. After seven days TTE did not show the

thrombus (Fig 1 C) and Doppler right ventricle outflow tract spectrum changed to normal (Fig 1 D).

According to the European Society of Cardiology guidelines, the role of TTE in diagnostic algorithm is limited to suspected PE with shock or hypotension. It is not routinely recommended in stable, low risk patients due to the low negative predictive value. In a case of a hemodynamically compromised patient, search for signs of right ventricle pressure overload/dysfunction and mobile right heart thrombi is helpful in emergency primary reperfusion management. Presented case showed the specific situation when TTE made an immediate diagnosis of PE and changed the risk assessment. Large PE was then fully confirmed by the computed tomography scan. Quick bedside TTE in patients with good acoustic window may provide direct diagnosis and qualify patients to potentially higher risk group. It may also be a feasible tool of treatment monitoring.

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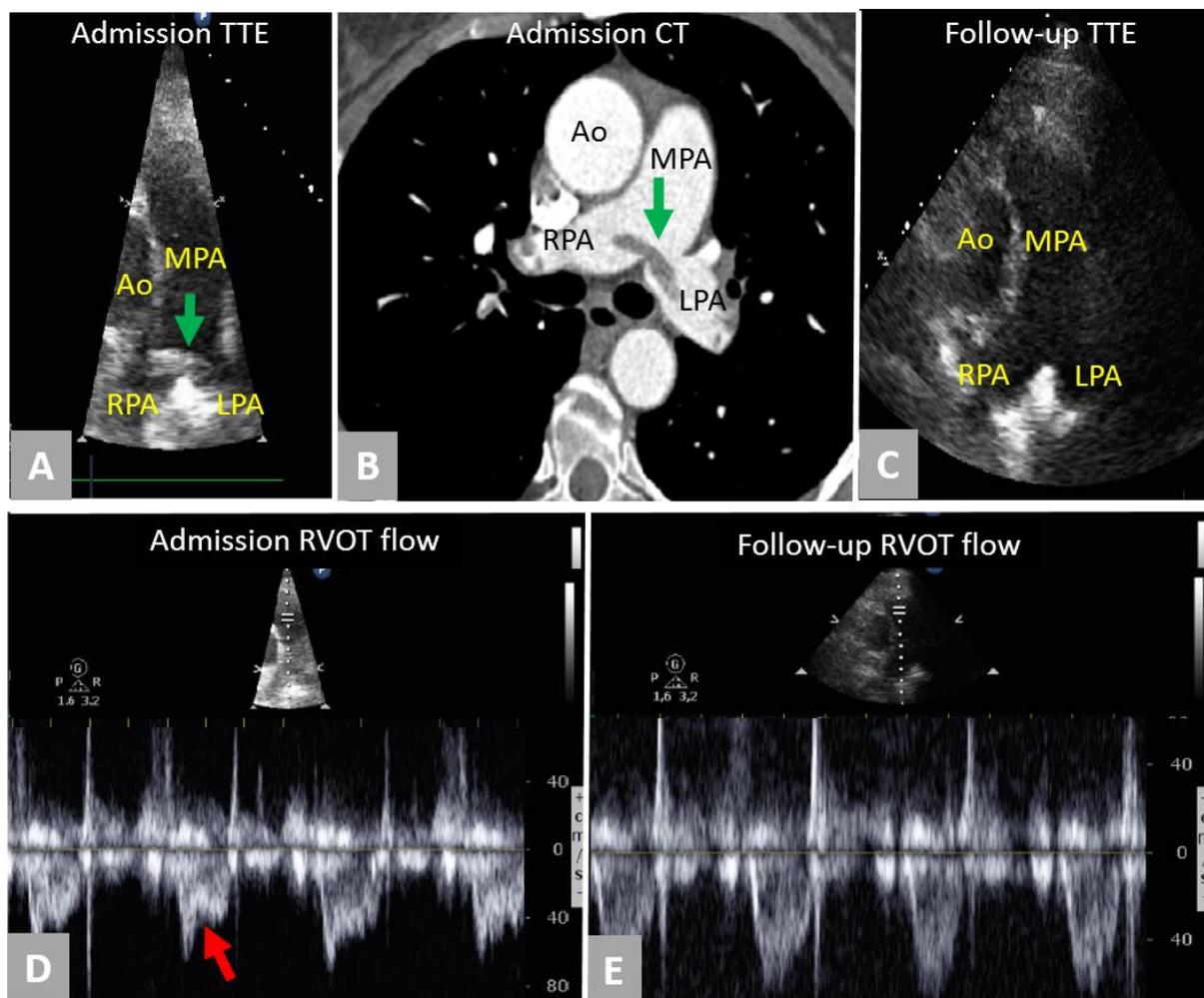


Figure 1. **A:** Transthoracic echocardiography showing a thrombus at the bifurcation of main pulmonary artery (green arrow). **B:** Computed tomography confirming the saddle pulmonary embolism and the thrombotic material in left and right pulmonary arteries. **C:** Follow-up

transthoracic echocardiography – no thrombus visible at main pulmonary artery bifurcation.

**D:** Doppler spectrum recorded in the right ventricle outflow tract at admission showing decreased acceleration time and early systolic notching (red arrow). **E:** Follow-up Doppler study documenting normalization of right ventricle outflow tract spectrum.

### **Abbreviations**

Ao - aorta

LPA - left pulmonary artery

MPA - main pulmonary artery

PA - pulmonary embolism

RPA - right pulmonary artery

TTE - transthoracic echocardiography