

## Sub-Massive Pulmonary Embolism with Large Intra-Cardiac Bi-Atrial Thrombi Successfully Treated with Systemic Thrombolytic Therapy

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### Abstract

Herein we report a case of 46-year-old male patient who was presented with chest pain and dyspnea and was diagnosed with sub-massive pulmonary embolism (PE) and intra-cardiac bi-atrial thrombus, echocardiography showed decreased right ventricular systolic function. Following treatment with 100 mg tissue plasminogen activator (tPA), the patient reported clinical improvement, in addition to improved ventricular function as assessed by echocardiography. In the present report, we describe a case of sub-massive PE with intra-cardiac bi-atrial thrombus successfully managed with thrombolytic treatment without occurrence of adverse events.

**Keywords:** PE; Intra-cardiac thrombi; Thrombolysis; Adverse effects

### Case Report

#### Introduction

Patients with pulmonary embolism are evaluated and classified into three separate groups to determine the appropriate treatment. Patients with acute massive PE, presenting with hemodynamic instability, have an indication for thrombolytic treatment. Patients with sub-massive PE, although hemodynamically stable, may be considered for thrombolytic treatment if signs of right ventricular (RV) dysfunction are present. Hemodynamically stable patients without signs of RV dysfunction have no indication for thrombolytic therapy and are treated with anticoagulation only [1]. Right atrial thrombi are encountered in approximately 18% of cases with acute massive PE, and are associated with higher mortality, most likely due to high risk of fragmentation and recurrent pulmonary emboli [2,3]. However, thrombolytic treatment was associated with an improved survival when compared to anticoagulation therapy or surgery in right heart thromboembolic disease [4]. This is further supported by several case reports, in which thrombolytic treatment was noted to dissolve right atrial thrombi without adverse effects [5,6].

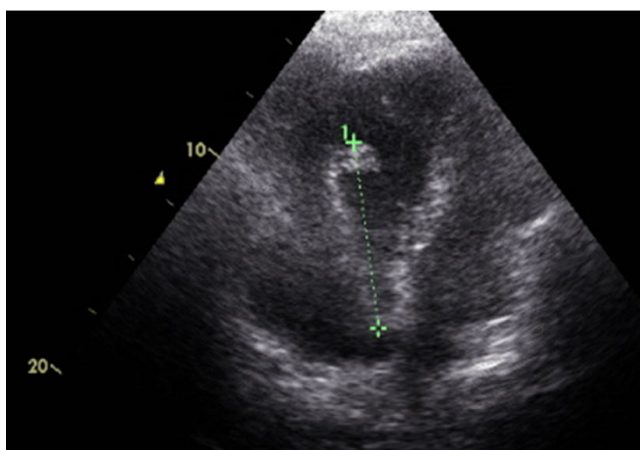
Treatment for left atrial thrombi is debatable. A thrombus in the left atrium is associated with potentially catastrophic consequences due to the risk of fragmentation and subsequent systemic embolization which could cause stroke, myocardial infarction and visceral or limb ischemia. Partial or total occlusion of the mitral valve orifice that may cause syncope or pulmonary congestion was also reported [7]. Currently, there are no consensus guidelines for the treatment of left atrial thrombus, however based on professional societies recommendation for prosthetic valve thrombosis (PVT) treatment, thrombolytic therapy can be considered as a first line treatment for left atrial thrombi.

Herein, we report a case of sub-massive PE concomitantly diagnosed with intra-cardiac bi-atrial thrombi who was successfully treated with thrombolytic therapy.

46 years old male presented to the emergency department with chest pain and dyspnea that begun one day prior to his admission. The patient's medical history was notable for obesity, Klinefelter's syndrome and two previous thromboembolic events. On arrival, the patient's blood pressure was 134/96 mmHg, tachycardia of 110 bpm, body temperature 36.7 Celsius, tachypnea of 26 breaths per minute and room air O<sub>2</sub> saturation was 94%. On examination, he had mildly elevated jugular venous pressure, normal heart sounds without murmurs or pericardial friction rub. Lungs were clear to auscultation. Upper and lower limb pulses were equal bilaterally. The rest of the physical examination was unremarkable. Electrocardiography showed sinus tachycardia, inverted T wave in the precordial leads and S1Q3T3 pattern. Chest X-ray was normal. Blood tests revealed white cell count of 16,700 per cubic millimeter (range 4,000-10,000 per cubic millimeter). Blood gas analysis showed respiratory alkalosis, D-Dimer level was more than 15 mcg per milliliter (normal range 0-0.5 mcg per milliliter). C reactive protein (CRP) level was 2.2 mg% (normal values <0.5). Serum electrolytes, creatinine, creatine phosphokinase (CPK) and high sensitivity -troponin T levels were normal. Pulmonary CTA revealed bilateral central and peripheral pulmonary embolism (PE) and large thrombotic masses in both atria (Figure 1). Echocardiography showed severely dilated right ventricle, moderately to severely decreased right ventricular systolic function with diastolic and systolic septal flattening with sparing of the apex consistent with McConnell's sign. In addition, there were large mobile thrombi in both left and right atria extending to the ventricles (Figures 2-4). The patient was treated with 100 mg of tissue plasminogen activator (tPA), given as an initial dose of 10 mg bolus and 90 mg over two hours, without side effects. There were no embolic or bleeding complications. Shortly after thrombolysis the patient reported significant relief in shortness of breath, O<sub>2</sub> saturation on room air improved and heart rate slowed. Echocardiography performed two hours following the end of thrombolysis showed resolution of the thrombi in both atria.



**Figure 1:** Pulmonary computed tomography angiogram (CTA) showing right pulmonary artery thrombus and clots in both atria.

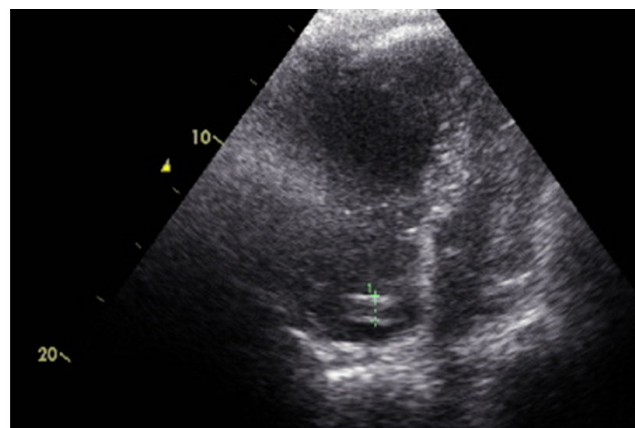


**Figure 2:** Echocardiography demonstrating right ventricular thrombus.

## Discussion

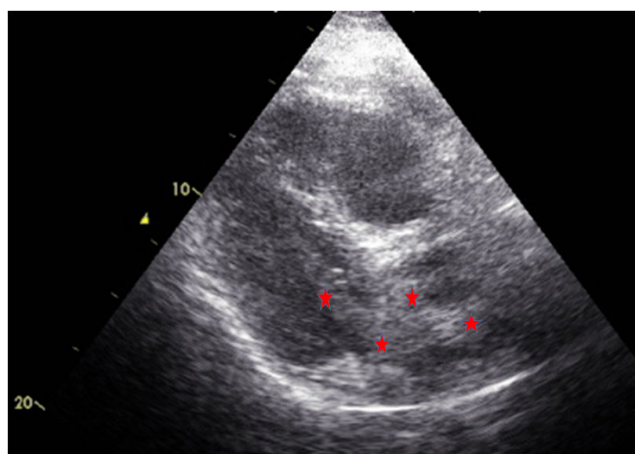
This patient has an unusual presentation of a frequent diagnosis, with a challenging therapeutic decision. Our patient presented with sub-massive PE, as he was hemodynamically stable but had echocardiographic evidence of RV dysfunction and a large clot burden. Therefore, thrombolysis could be considered. However, the unexpected finding of a left atrial thrombus had to be taken into consideration. Several previous case reports have shown improved survival in patients with right atrial thrombus administered thrombolytic treatment [6], however, recommended treatment in left atrial thrombus still lacking. Unfortunately, there are no prospective trials assessing mortality and morbidity in this scenario, and therefore we must draw conclusions from similar conditions. For example, in a study evaluating thrombolytic treatment for stroke, 5 out of 183 patients were diagnosed with left-sided cardiac thrombi. The study demonstrated no increased risk for cerebral or systemic embolization in these patients who received thrombolytic treatment [8]. Another condition involving

thrombolytic treatment for left sided cardiac thrombus is left-sided prosthetic valve thrombosis (PVT).



**Figure 3:** Echocardiography demonstrating right atrial thrombus.

However, as demonstrated on a retrospective study, thrombolytic treatment compared with surgery had a higher rate of embolic episodes (15% versus 0.7%) [9]. The risk of systemic embolism in PVT was linked to thrombus size as reviewed by Shapira et al. In their report, they concluded that the size of the thrombus is probably the most important determinant of thrombolysis-related complications [10]. Based on this data, the Society for Heart Valve Disease recommended thrombolytic therapy as the first-line treatment for all patients with left-sided PVT, and the American College of Chest Physicians recommend the use of thrombolysis as first-line treatment for all patients with left-sided prosthetic valve thrombosis with a low thrombus burden (<0.8 cm) [11].



**Figure 4:** Echocardiography demonstrating left atrial thrombus extending to left ventricle.

In our patient, the LA thrombus was large (48 mm in length) and most likely it was secondary to patent foramen ovale (PFO) that was not shown by transthoracic echocardiography, despite that transesophageal echocardiography or bubble study were not performed to confirm the diagnosis of PFO. Nevertheless,

thrombolysis was chosen to maximize the benefit of this treatment on right ventricular physiology while considering the possibility of a systemic complication (which did not occur). In conclusion, thrombolytic therapy can be considered in patients who present with concomitant left and right sided cardiac thrombi in the setting of large PE.

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