

CASE REPORT

Thrombus in transit associated with fatal pulmonary thromboembolism in an elderly Ethiopian man following a surgical procedure: A case report

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Key Clinical Message

Early detection, timely management, and exploration of alternative treatment options are crucial for patients with high-risk pulmonary thromboembolism, particularly those with thrombus in transit. Furthermore, prophylactic measures against thromboembolic events should be highly considered for patients with predisposing conditions for venous thromboembolism, including surgical procedures.

Abstract

A thrombus in transit refers to a thrombus that is temporarily lodged in the right-side chambers of the heart with a high risk of embolization to the pulmonary artery. A 75-year-old man presented to the emergency department with a sudden onset of retrosternal chest pain for an hour associated with shortness of breath, which developed a week after transurethral resection of the prostate was done for the indication of benign prostatic hyperplasia. The physical examination was remarkable for tachycardia, tachypnea, hypoxia, and raised jugular venous pressure. Echocardiography revealed a serpiginous echogenic density in the right atrium, protruding through the tricuspid valve and extending to the right ventricle. He was put on facemask oxygen, and he received anticoagulation with unfractionated heparin, followed by thrombolytic therapy with streptokinase. However, the patient experienced cardiac arrest during the administration of thrombolytic therapy, and he died despite all the efforts, most likely due to a massive pulmonary thromboembolism resulting from the thrombus in transit. This case report has brought attention to the rare occurrence of a thrombus in transit complicated by fatal pulmonary thromboembolism. It has also highlighted the significant mortality risk that this condition carries, even with thrombolytic therapy.

KEYWORDS

Ethiopia, pulmonary embolism, surgical procedure, thrombus in transit

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1 | INTRODUCTION

Venous thromboembolism (VTE), presenting as deep vein thrombosis or pulmonary thromboembolism (PTE), is the third most common acute cardiovascular disorder worldwide, next to myocardial infarction and stroke.¹ Among the common risk factors for VTE are immobility, recent or past surgery, obesity, pregnancy, antiphospholipid syndrome, and antithrombin deficiency.²

A thrombus in transit (TIT) refers to a thrombus that is temporarily lodged in the right-side chambers of the heart with a high risk of embolization to the pulmonary artery.³ According to the International Cooperative Pulmonary Embolism and the RIETE (Registro Informatizado Enfermedad TromboEmbolica) registries, the prevalence of right heart thrombi among patients with PTE was 4% and 2.4%, respectively.^{4,5} In another study of 100 patients with PTE, 12% had a mobile right cardiac thrombus.⁶ The risk of mortality in patients with PTE associated with thrombus in transit was shown to be significantly higher than that of isolated PTE.⁶⁻⁹

The treatment modalities for thrombus in transit include anticoagulation, thrombolysis, catheter-directed thrombolysis, and surgical thrombectomy; however, the best treatment option remains unknown.¹⁰ Here, we report a case of a thrombus in transit associated with a fatal pulmonary embolism in an elderly Ethiopian man following a surgical procedure.

2 | CASE HISTORY

A 75-year-old black Ethiopian man presented to the emergency department with sudden onset, retrosternal, and non-radiating chest pain for an hour duration associated with shortness of breath (SOB). He has been a known hypertensive patient for 30 years, taking nifedipine 20 mg PO once daily. A week before his current presentation, he underwent transurethral resection of the prostate for the indication of benign prostatic hyperplasia. He did not have leg swelling, fever, or cough. He had no recent history of trauma. He had no other comorbid conditions.

2.1 | Physical examination

He appeared distressed, and vital signs revealed a blood pressure of 110/80 mmHg in both arms with narrow pulse pressure, tachycardia with a heart rate of 120 beats per minute, tachypnea with a respiratory rate of 40 breaths per minute, and hypoxia with an oxygen saturation of 86% on a non-rebreather face mask delivering 20 liters

per minute. The chest examination was non-remarkable. The cardiovascular examination revealed raised jugular venous pressure with normal heart sounds and without murmurs or gallops. There was no hepatomegaly, ascites, or peripheral edema. The central nervous system examination demonstrated the patient to be alert and oriented.

2.2 | Differential diagnoses

The first differential diagnosis in our patient could be acute coronary syndrome (ACS) because of the sudden onset of chest pain associated with shortness of breath (SOB) on the background of old age and systemic hypertension. Though elevations of D-dimer and liver enzyme levels are possible with ACS, the absence of the typical electrocardiography (ECG) abnormalities and the normal troponin level would make the diagnosis of ACS unlikely. The second differential diagnosis could be acute cardiac tamponade, supported by the presence of sudden onset of chest pain, and SOB, along with tachypnea, tachycardia, narrow pulse pressure, and raised jugular venous pressure. Elevation of liver enzyme and creatinine levels could rarely be brought on by acute cardiac tamponade, but the absence of known risk factor or possible etiology, the absence of muffled heart sounds, a normal blood pressure record, and a normal ECG finding would make the diagnosis of cardiac tamponade unlikely.

The third differential diagnosis could be acute aortic dissection, supported by his age, sudden onset of retrosternal chest pain, the presence of systemic hypertension, and elevated D-dimer. Though cardiovascular imaging like computed tomographic (CT) angiography was not available for our patient, the absence of radiation of the chest pain to the back or abdomen, the absence of murmurs of aortic regurgitation, the absence of an upper extremity pulse deficit, and the absence of a widened mediastinum on the chest X-ray would decrease the likelihood of acute aortic dissection. The fourth differential diagnosis could be spontaneous pneumothorax, supported by the sudden onset of chest pain and shortness of breath, but the normal chest examination findings and the absence of radiologic signs on the chest X-ray would make it unlikely.

The definitive diagnosis of this patient was thrombus in transit (TIT), which was confirmed by echocardiography, and this was most likely associated with PTE. Almost all the clinical features and laboratory abnormalities were best explained by the TIT associated with PTE, and the surgical procedure might have been a major predisposing factor for the development of TIT.

2.3 | Investigations

Laboratory investigations revealed mild anemia, elevated creatinine, transaminitis, prolonged international normalized ratio (INR), and activated partial thromboplastin time (aPTT), and an elevated D-dimer level [Table 1].

The ECG findings were non-remarkable except sinus tachycardia. The chest X-ray (CXR) revealed an increased cardiothoracic ratio (70%). The bedside echocardiography revealed a serpiginous echogenic density in the right atrium protruding through the tricuspid valve and extending to the right ventricle (Figure 1 and Video 1). It also revealed grossly dilated right cardiac chambers, severe pulmonary hypertension, severe tricuspid regurgitation, reduced right ventricular systolic function with tricuspid annular plane systolic excursion of 10mm, and a plethoric inferior vena cava (IVC), indicating significant venous congestion due to acute cor pulmonale.

Though CT-pulmonary angiography was not done because of the critical state of the patient to transport him to the radiology department, the echocardiography result showed severe pulmonary hypertension with right ventricular dysfunction, which was suggestive of PTE associated with the TIT.

2.4 | Treatment

Cardiac team advice was sought, taking into consideration the potential risk of thrombus dislodgement and subsequent life-threatening massive PTE. Initial anticoagulation with unfractionated heparin (UFH) at 5000 IU IV stat

and then a 1000 IU/hour infusion was started but discontinued later on the same day, and thrombolytic therapy with streptokinase at 250,000 IU over 60 min was initiated with no reaction during the infusion. The other treatment options, like catheter-directed thrombolysis and surgical thrombectomy, were not available.

2.5 | Outcome and follow-up

Tragically, the patient experienced cardiac arrest during the administration of thrombolytic therapy. The critical care team performed cardiopulmonary resuscitation (CPR) per protocol for approximately 30 min, but unfortunately, the patient could not be revived. The possible cause of death was determined to be a massive PTE resulting from the TIT.

3 | DISCUSSION

Despite the high prevalence of pulmonary thromboembolism (PTE), floating right-heart thrombi are uncommon but are probably underdiagnosed.^{11–13} Most of the data regarding thrombus in transit (TIT) have been coming from case reports^{14–16} or small case series.^{17–20} When present, TIT is nearly always diagnosed with echocardiography, and it is a rare phenomenon to capture a right heart thrombus, not attached to any intracardiac structure, while it makes its way from the right atrium to the right ventricle.²¹ It is highly possible that TIT could be underdiagnosed and underreported, especially in low-resource settings like ours, and this is the first case report of TIT in the literature from Ethiopia.

Thrombus in transit is an important clinical entity as it carries an in-hospital mortality rate of up to 50%, usually from a subsequent PTE or, in rare cases, a systemic emboli when an intracardiac shunt is present.^{6–9} The presentation of sudden-onset retrosternal chest pain and shortness of breath, along with the echocardiographic findings of gross right cardiac chamber dilation, severe pulmonary hypertension, and a mobile intracardiac thrombus, strongly supported the diagnosis of a high-risk sub-massive PTE, which was the most likely cause of the subsequent hemodynamic instability and death in our patient despite the prompt initiation of thrombolytic therapy.

A prospective international VTE registry of patients with PTE and associated right heart TIT found no significant reduction in mortality following reperfusion attempts, primarily using thrombolytic treatment.⁵ However, in a retrospective study of 177 patients with right heart TIT and PTE, the mortality rates associated

TABLE 1 Summary of pertinent laboratory tests.

Laboratory tests	Units	Results	Reference ranges
Hemoglobin	g/dL	11.8	13.5–17.5
Creatinine	mg/dL	1.9	0.5–0.9
AST	U/L	193	13–52
ALT	U/L	234	13–54
ALP	U/L	187	90–260
PT	sec	23	10.7–14.3
aPTT	sec	204	21–35
INR	—	1.9	0.8–1.2
D-dimer	mcg/mL	2.53	<0.5
Troponin I	ng/mL	0.1	0–0.3

Abbreviations: ALP, alkaline phosphatase; ALT, alanine transaminase; aPTT, activated partial thromboplastin time; AST, aspartate transferase; PT, prothrombin time.

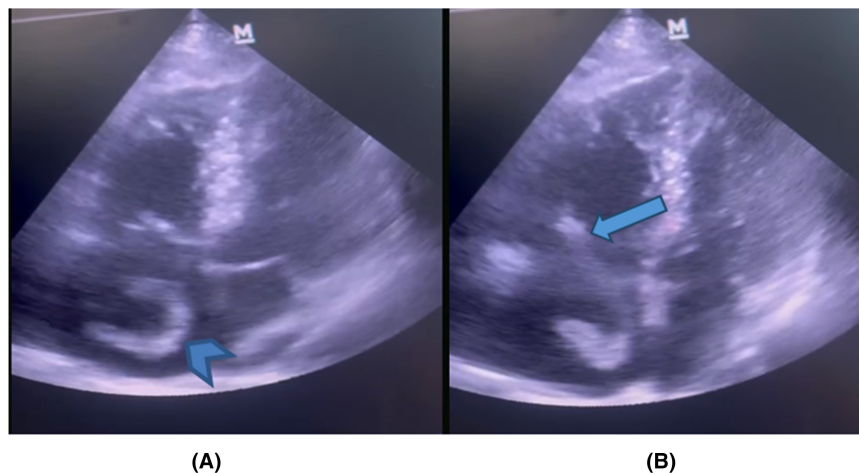
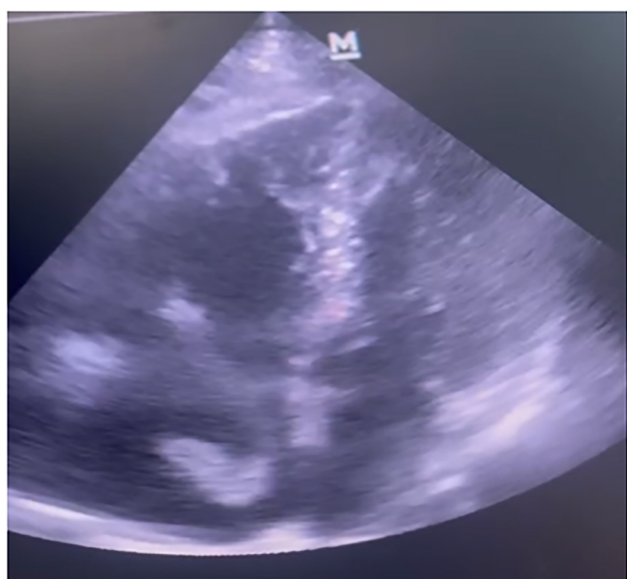


FIGURE 1 Transthoracic rdiographic images of the heart taken using the apical four-chamber view, showing a long, serpiginous echogenic density in the right atrium (arrowhead in A) extending to the right ventricle (arrow in B).



VIDEO 1 An apical four-chamber view of the transthoracic echocardiogram revealed a long, serpiginous echogenic density in the right atrium extending to the right ventricle with severe tricuspid regurgitation.

with thrombolysis, surgical embolectomy, anticoagulant therapy, and no therapy were 11.3%, 23.8%, 28.6%, and 100.0%, respectively.⁹ Besides, a pooled analysis on the comparative efficacy of different modalities for the treatment of right heart TIT showed that the estimated probability of mortality in hemodynamically unstable patients was significantly lower with thrombolysis (18.5%) as compared with surgical embolectomy (29.6%) and anticoagulation (52.3%).⁷ In contrast to the better outcome with thrombolytic therapy observed in the latter studies, our patient did not benefit from the administration of thrombolytic therapy.

Surgical thrombectomy is an alternative therapy for PTE patients with right heart TIT when there is contraindication for thrombolytic therapy, which carries the risk of major bleeding complications, and it is particularly indicated in the presence of rapid hemodynamic deterioration and an underlying right-to-left shunt.^{22–24} Catheter-based interventions, such as percutaneous mechanical thrombectomy or catheter-directed thrombolysis, that aim to rapidly remove or dissolve a thrombus have shown promise in the management of high-risk PTE with thrombus in transit, despite an increased risk of thrombus dislodgement.^{25,26} Surgical thrombectomy or catheter-based interventions were not available in our setting but could have been considered as a potential rescue strategy for our case.

To the best of the authors' knowledge, this is the first case report of a thrombus in transit (TIT) from Ethiopia, and it has highlighted the fatal complication of TIT with massive PTE in an elderly male patient following a surgical procedure.

4 | CONCLUSION

This case report has brought attention to the rare occurrence of a thrombus in transit (TIT) complicated by fatal pulmonary thromboembolism (PTE). It has also highlighted the significant mortality risk that this condition carries, even with thrombolytic therapy. Early detection, timely management, and exploration of alternative treatment options are crucial for patients with high-risk PTE, particularly those with TIT. Besides, preventive strategies against thromboembolic events should be highly considered for patients with predisposing conditions for venous thromboembolism, including surgical procedures.

AUTHOR CONTRIBUTIONS

Mohammed Ahmed: Conceptualization; data curation; validation; writing – original draft; writing – review and editing. **Gashaw Solela:** Data curation; validation; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

Data supporting this case report will be available with the corresponding author upon reasonable request.

ETHICS STATEMENT

The case report meets ethical guidelines and adheres to the local legal requirements.

CONSENT

Written informed consent was obtained from the son of the patient to publish this case report in accordance with the journal's patient consent policy.

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