IMJ
Official Journal of the Irish Medical Organisation

Ir Med J; May 2025; Vol 118; No. 5; P80
May 29th, 2025

From Crisis to Recovery: Thrombolysis for Massive Pulmonary Embolism and Clot in Transit

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Abstract

Presentation

A 40-year-old man presented with acute dyspnea, chest tightness, and hemodynamic instability. Initial examination showed severe hypoxemia and tachycardia, indicating significant cardiopulmonary distress.

Diagnosis

Urgent diagnostic imaging, including a CT Pulmonary Angiography and echocardiogram, confirmed bilateral massive pulmonary emboli and a large right heart thrombus in transit. These findings underlined a critical right ventricular strain.

Treatment

The patient received high-flow oxygen and systemic thrombolysis using alteplase, followed by intravenous heparin. The patient made a swift recovery following thrombolysis, transitioning successfully to long-term oral anticoagulation with apixaban.

Discussion

This case highlights the crucial role of rapid diagnosis and aggressive thrombolytic therapy in managing severe pulmonary embolism with right heart thrombi, significantly enhancing recovery and survival prospects. Early thrombolysis, coupled with effective anticoagulation, proved essential in this life-threatening situation.

Introduction

Acute pulmonary embolism (PE), particularly when complicated by right heart thrombi in transit (TIT), is a cardiovascular emergency with a high mortality risk. These thrombi, which originate from deep vein thrombosis (DVT), pass through the right heart into the pulmonary arteries, obstructing circulation and increasing the risk of submassive or massive PE. Prompt identification and treatment are essential to prevent collapse and death [3]. Right heart thrombi occur in 4% to 18% of PE cases [1] and can raise mortality rates to as high as 44% [2,4].

This case report discusses a 40-year-old man with extensive bilateral PE, right ventricular strain, and a thrombus in transit (TIT), underscoring the importance of early detection and intervention in preventing fatal outcomes [4,5].

Case Report

A 40-year-old man presented to the Emergency Department with sudden, severe shortness of breath and chest tightness while seated. On arrival, his blood pressure was 90/57 mmHg, oxygen saturation was 80% on room air, and his heart rate was 158 beats per minute. Arterial blood gas analysis showed metabolic alkalosis with a pH of 7.49 (normal range: 7.35 – 7.45) and bicarbonate level of 34 mmol/l (normal range: 22 – 30). His past medical history included asthma and bilateral varicose veins. There was no prior history of venous thromboembolism (VTE) or relevant family history.

In the Emergency Department he was administered 6 liters of oxygen to maintain an oxygen saturation above 94%. An urgent Computed Tomography Pulmonary Angiography (CTPA) revealed bilateral massive pulmonary emboli. The bedside echocardiogram showed right ventricular dilatation with a large thrombus in transit (TIT) crossing the tricuspid valve (Figure 1). This indicated severe right heart strain. Given his critical condition, the patient was immediately started on an intravenous heparin infusion of 1500 units/hour after receiving a loading dose of 10,000 units.

Despite initial management, his oxygen saturation remained low, necessitating high-flow oxygen therapy delivered via Airvo at 40% concentration. His hemodynamic instability persisted, prompting the decision to administer systemic thrombolysis. He received 81 mg of intravenous alteplase with a 10% bolus followed by an infusion over two hours.

He was subsequently admitted to the Intensive Care Unit for observation and oxygen weaning. He was weaned from 40% to 24% Fraction of Inspired Oxygen (FiO2) 24 hours following thrombolysis and maintained saturation on room air above 95% two days after thrombolysis with normotensive blood pressure readings. A bedside doppler ultrasound showed bilateral lower limb proximal Deep Vein Thrombosis (DVT). Repeat echocardiogram one week after thrombolysis showed resolution of the right atrial clot with no right heart strain and a left ventricular ejection fraction over 55% (Figure 2). A CT abdomen and pelvis ruled out occult malignancy and vasculitis screening was negative for anti–liver-kidney microsomal antibody (Anti-LKM), smooth muscle antibody, mitochondrial antibody, antineutrophil cytoplasmic antibodies (ANCA), and antinuclear antibody (ANA). Cardiolipin antibody and Beta-2 Glycoprotein-1 IgG levels were within the normal range, as were complement 3 and 4 levels.

The patient was transitioned from intravenous heparin to therapeutic enoxaparin (90 mg twice daily) 24 hours after thrombolysis. Three days after admission, he was transferred to ward-based care, where he was started on oral anticoagulation with apixaban (5 mg twice

daily). He remained stable throughout the remainder of his hospital stay and was discharged 12 days after admission with follow-up arranged in the anticoagulation clinic. Ongoing outpatient reviews with the respiratory and haematology teams were planned to determine the long-term duration of anticoagulation therapy.

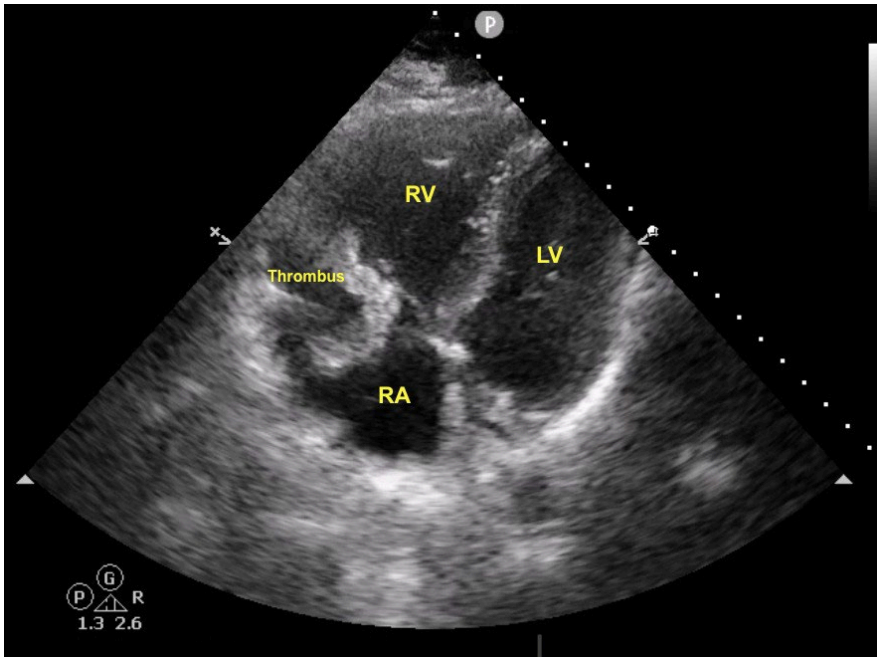

Figure 1: Right atrial emboli with right ventricular dilatation and thrombus in transit crossing the tricuspid valve.

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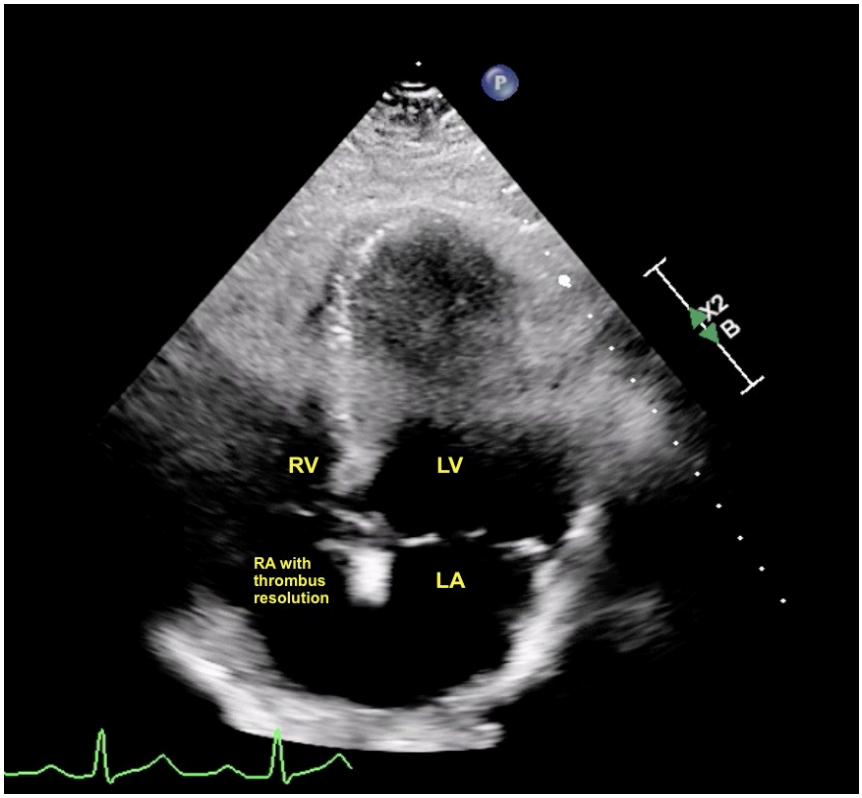

Figure 2: Resolution of the right atrial clot with no right heart strain.

Discussion

Right heart thrombi in transit (TIT) significantly increase the mortality risk in acute PE cases, with rates as high as 44% [2]. Immediate intervention, particularly thrombolytic therapy, is essential for dissolving thrombi and relieving right ventricular strain [3]. Thrombolysis with alteplase is typically recommended in patients with hemodynamic instability, as demonstrated in this case [7]. Alternative options, such as surgical thrombectomy or catheter-based interventions, may be considered when thrombolysis is contraindicated or fails [9]. Recent advancements in these techniques have improved patient outcomes in high-risk cases [6].

Long-term anticoagulation therapy, preferably with direct oral anticoagulants (DOACs) like apixaban, is essential in preventing recurrence. DOACs offer a favourable safety profile and ease of use compared to vitamin K antagonists [8]. This case highlights the importance of early recognition and aggressive intervention, including thrombolysis and anticoagulation, in managing this life-threatening condition and improving patient outcomes.

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Declarations of Conflicts of Interest:

The authors declare that they have no conflicts of interest to disclose.

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