Acute Pulmonary Thromboembolism with Associated Right Atrial Thrombus Extending Across Patent Foramen Ovale

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Abstract

Acute Pulmonary Thromboembolism (PTE) can be associated with free floating thrombi in right heart with substantial increase in mortality. Rarely a right atrial thrombus can extend into left atrium through a patent foramen ovale. These thrombi require prompt diagnosis and treatment due to associated risk of pulmonary and systemic embolism. We report an unusual case of floating thrombus in right atrium extending across a patent foramen ovale in a patient of acute pulmonary embolism, diagnosed on transthoracic echocardiography and computed tomography.

Keywords: Pulmonary thromboembolism; Atrial thrombus; Transthoracic echocardiography

Introduction

Floating thrombi in right heart can be seen in 7% to 18% cases of pulmonary embolism [1-3]. As echocardiographic examination is not routinely done in all cases of pulmonary embolism, it can be assumed that the exact incidence is underreported [4]. Prompt diagnosis of these free floating thrombi is of utmost importance as they can embolize at any moment and thus require emergency treatment. Rarely these thrombi can extend into left atrium across a patent foramen ovale [5,6]. We report an unusual case of acute pulmonary embolism with presence of a floating thrombus in right atrium with extension into left atrium through a patent foramen ovale.

Case Presentation

A 54 years old male patient presented in emergency department of our institute with chief complaints of sudden onset shortness of breath (NYHA class IV) for last eight hours. On examination patient had tachycardia (pulse rate of 120 beats per min) and tachypnea (respiratory rate of 28/min) with hypotension (blood pressure: 90/62 mmHg). Electrocardiography (ECG) showed sinus tachycardia with non-specific ST/T changes. Troponin-I and D-Dimer values were raised. Transthoracic echocardiographic examination showed dilated right atrium (RA), right ventricle (RV) and main pulmonary artery. There was RV systolic dysfunction [Tricuspid Annular Plane Systolic Excursion (TAPSE) =16] and moderate tricuspid regurgitation (TR gradient =75 mmHg). A large right atrial thrombus was seen (Figure 1A-1C) which was oscillating into right ventricle in diastole via tricuspid valve (Figure 1B). Another thrombus was seen in left atrium (Figure 2A) with presence of a defect in interatrial septum likely suggestive of patent foramen ovale (Figure 1C). However continuity of thrombus across right and left atrium was not demonstrated on echocardiographic examination.

Followed by this, patient underwent non ECG gated CT pulmonary angiography, which demonstrated a large partially occlusive thrombus in main pulmonary artery extending into right and left pulmonary arteries (Figure 2A). A linear hypodense filling defect was seen in right atrium and ventricle (Figure 2B) suggestive of thrombus. In addition filling defect was also noted in left atrium (Figure 2C). On coronal reformatted images, continuity of thrombus across right and left atrium was demonstrated through a defect in interatrial septum (Figure 2D). Doppler ultrasound for bilateral lower limbs did not show any evidence of deep venous thrombosis.

Based upon echocardiography and CT findings, a diagnosis of floating right atrial thrombus with extension across a patent foramen ovale with acute PTE was made. Patient was started on intravenous anticoagulation (low molecular weight heparin) and referred to higher center for surgical embolectomy, in view of high risk of systemic embolization. However, repeat transthoracic...
Transthoracic echocardiography images showing floating echogenic thrombus (white arrow) in right atrium (RA). The thrombus was seen oscillating into right ventricle (RV) through tricuspid valve in diastole (1B). In addition a defect was seen in interatrial septum (black arrow) with presence of echogenic thrombus (curved arrow in D) in left atrium (LA).

Floating right heart thrombus is a therapeutic emergency and surgery embolectomy [10], but there is no consensus on ideal treatment. Thrombolytic and anticoagulant therapy is simple, rapid, non invasive and widely available. However, it may cause a fixed thrombus to dislodge, leading to pulmonary embolism and may also lead to paradoxical systemic embolism in a case of entrapped thrombus in patent foramen ovale (as in our case). Also, thrombolytic therapy is associated with risk of significant bleeding. Surgical embolectomy on the other hand is invasive and associated with inherent delay, complications of general anesthesia and inability to remove thrombus beyond central pulmonary arteries. However a patent foramen ovale can be repaired at the time of surgery thereby reducing the risk of paradoxical embolism.

To conclude, right heart thrombi can be seen in association with acute pulmonary embolism and in extremely rare cases can extend across patent foramen ovale. A diagnosis can be made on transthoracic echocardiography. Treatment options include anticoagulation, thrombolysis and surgery or a combination of above.

**References**


**Figure 1 (A-D):** Transthoracic echocardiography images showing floating echogenic thrombus (white arrow) in right atrium (RA). The thrombus was seen oscillating into right ventricle (RV) through tricuspid valve in diastole (1B). In addition a defect was seen in interatrial septum (black arrow) with presence of echogenic thrombus (curved arrow in D) in left atrium (LA).

**Figure 2 (A-D):** CT pulmonary angiography axial maximum intensity projection (MIP) images demonstrating partially occlusive thrombus in main pulmonary artery (white arrow) extending into right and left pulmonary arteries (A, D). A linear hypodense thrombus was seen in RA and RV (black arrow in B) as well as in LA (black arrow in C). On coronal reformatted images continuity of thrombus in RA and LA was demonstrated (black arrow in D) through a defect in interatrial septum.


