

A Right Ventricle Type-B Thrombus with Massive Pulmonary Thrombo-Embolism: Crucial Role of Echocardiography

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Abstract: *Right sided heart thrombi may develop within the right heart chambers or they may be peripheral venous clots that on their way to the lungs, accidentally lodge in a patent foramen ovale, tricuspid chordae or Chiari's network. They have an association with high risk pulmonary embolism. Three patterns of right heart thrombi have been described. Type A thrombi are mainly localized in the right atrium, have a worm-like shape and are extremely mobile. Type B thrombi attach to the atrial or ventricular wall and are nonmobile. Type C thrombi are rare and are highly mobile. We describe a case of a young male with a massive pulmonary embolism where transthoracic echocardiography revealed type B thrombus in right ventricle.*

Keywords: Type B RV Thrombus, Acute Pulmonary embolism, 2-D Echo, Shortness of breath, Right heart thrombi

1. Background

Right sided heart thrombi can be found in 4-18% of patients presenting with acute pulmonary embolism.^{1,2} They may develop within the right heart chambers or originate from peripheral venous clots that eventually get stuck in right heart structures on their way to the lungs. These pleomorphic thrombi frequently move back and forth through the tricuspid orifice and may cause cardiovascular collapse when entrapment occurs.^{3,4} Diagnosing right sided heart thrombi is essential to guide treatment decisions and for prognostication in critical care settings.

2. Case

A 26 year old young male presented to the emergency department with history of acute dyspnea, syncope and diaphoresis. On examination, he was tachypneic (respiratory rate 25 per minute), with a feeble pulse (rate 120 beats per minute with regular rhythm). Blood Pressure was 90 mm Hg systolic in right upper limb. Cardiovascular system examination revealed a loud P2. Auscultation of lungs revealed normal breath sounds. He had no risk factors or clinical evidence of deep vein thrombosis (DVT). Chest X-Ray was unremarkable with clear lung fields and no cardiomegaly. ECG showed features suggestive of pulmonary embolism – Sinus tachycardia, S₁T₃ and RV strain pattern (Fig. 1). Transthoracic echocardiography revealed a thrombus attached to free wall of right ventricle along with features suggestive of acute PTE (RA, RV dilatation with Mc Connell's sign (akinesia of the RV mid free wall with normal motion at the apex), RV dysfunction–TAPSE 1.1cm & PASP of 60 mm Hg) (Fig. 2A–2D).

CT scan could not be obtained as the condition of the patient was unstable. He was treated with streptokinase (250,000 units bolus over 30 minutes followed by 100,000 unit/hour

infusion), unfractionated heparin & ionotropes. However he succumbed after 6 hrs of initiation of thrombolysis.

3. Discussion

In 1989, the European Working Group on Echocardiography identified three patterns of right heart thrombi.² Type A thrombi have a worm like shape, are extremely mobile and mostly represent peripheral venous clots which temporarily lodge into the right heart. Due to their extreme mobility these clots are at high risk for severe and often fatal pulmonary embolism with early mortality of 44%.^{2,3} Type B thrombi which are morphologically similar to the left heart thrombi attach to the right atrial or ventricular wall indicating that these thrombi mostly develop within the right heart. Patients with type B thrombi seem to be a low risk group with thrombus related mortality of 4%.³ Type C thrombi are rare, share a similar appearance to a myxoma and are highly mobile.

The presence of a right heart thrombus in PE is relevant for the prognosis as it predicts a higher mortality rate.⁴ In addition to echocardiography, computed tomography is the main diagnostic approach for the detection of PE. However, diagnosis of PE may be accepted on the basis of solitary direct or indirect echocardiographic findings, when CT cannot not be performed due to patient's unstable condition.^{3,4} It is important to emphasize here that in resource poor ICU settings of developing world, expertise and infrastructure for 2-D Echocardiography may not be always available and facilities for CT scan are even more remote.

Right heart thrombi are associated with high-risk PE, defined by hypotension, shock or RV dysfunction, which has a high mortality, particularly during the first few hours.²⁻⁶ Therefore it is important to commence effective therapy as soon as possible. While therapeutic strategies for the

treatment of high-risk PE are well defined, the optimal therapy for right heart thrombus in PE, whether thrombolysis, heparin alone or embolectomy - remains controversial.⁵ Thrombolysis was the preferred option in various studies.^{1,5,6} Also with thrombolytic therapy there is advantage of simultaneous thrombolysis of cardiac and pulmonary arterial thrombi as well as of deep vein thrombosis, which may be responsible for recurrent embolisms.^{5,6}

4. Conclusions

Our patient was diagnosed with massive PE based on clinical features and echocardiography showing right heart failure and a Type-B right heart thrombus. Patients with type B thrombi seem to be a low risk group with thrombus related mortality. However, our patient had presented with massive pulmonary embolism. Echocardiography was the only possible diagnostic approach due to hemodynamic instability. Transthoracic echocardiography is a fast, practical and sensitive approach for the detection of right ventricular dysfunction and right heart thrombus. Therefore it should be performed as soon as possible in unstable patients with suspected PE. The present case underscores the association of Type-B right heart thrombus with high mortality & the important role of transthoracic echocardiography for the diagnosis and management of PE.

5. Abbreviations

PE: Pulmonary Embolism
PASP: Pulmonary Artery Systolic Pressure
TAPSE: Tricuspid annular plane systolic excursion

6. Consent

Written informed consent was obtained from the next of kin of the patient for publication of this Case report and any accompanying images.

7. Competing Interests

None

8. Authors' Contributions

All authors were involved in preparing the manuscript, critically reviewing and approving it.

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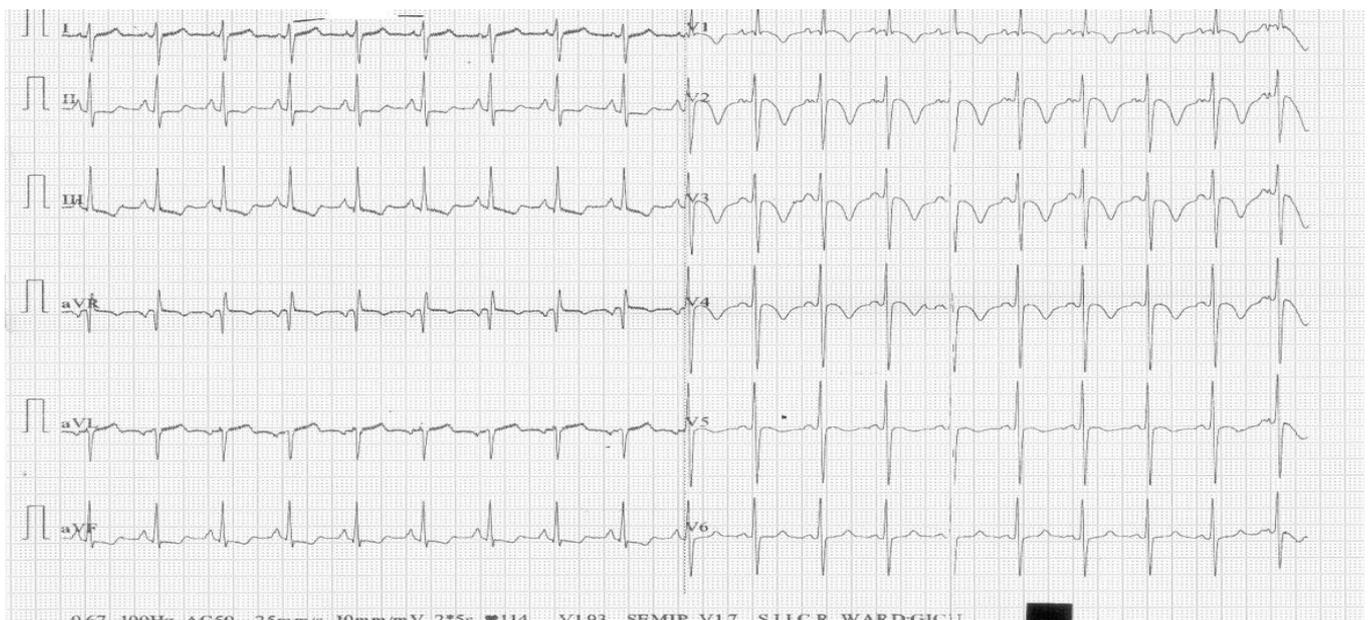


Figure 1: ECG of the patient showing Sinus tachycardia, S₁T₃ & RV strain pattern.

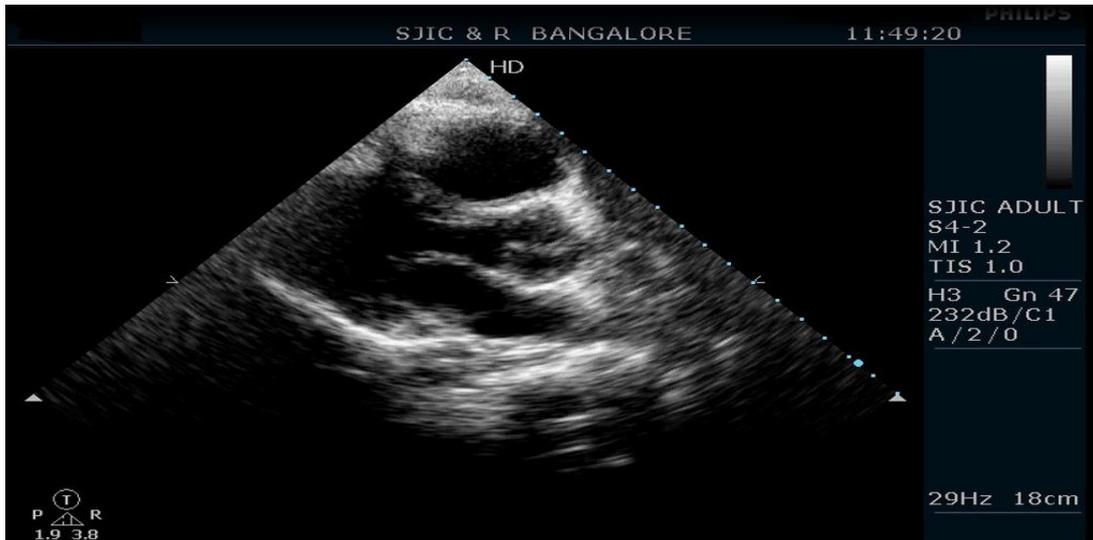


Figure 2A: Parasternal long axis view showing RV dilatation.

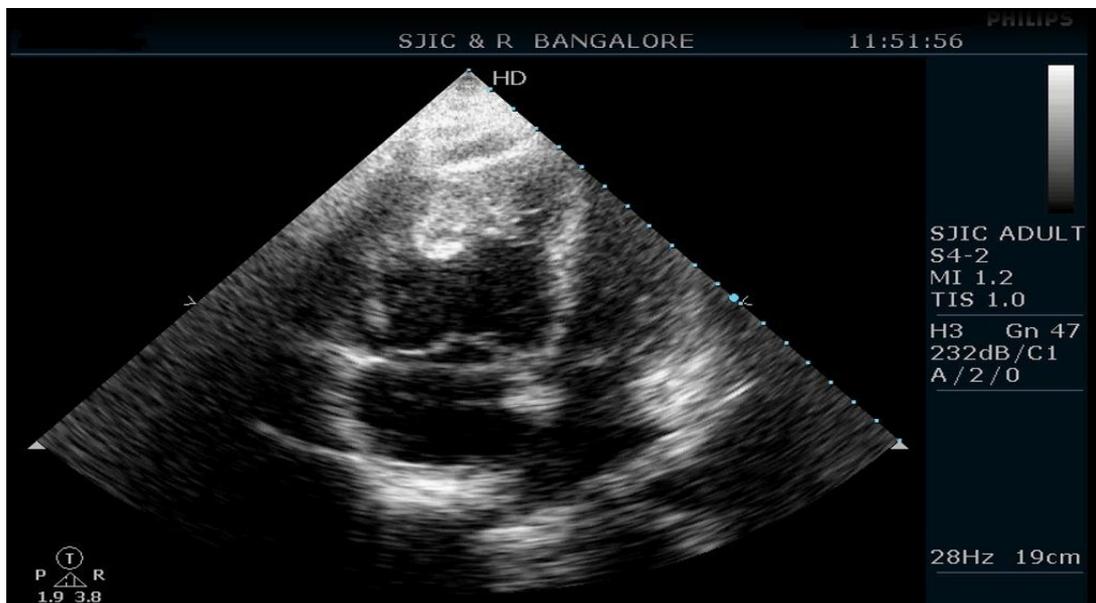


Figure 2B: Apical four chamber view showing a hypoechoic mass attached to the RV free wall, suggestive of Type-B thrombus with RA, RV dilatation & Mc Connell's sign.

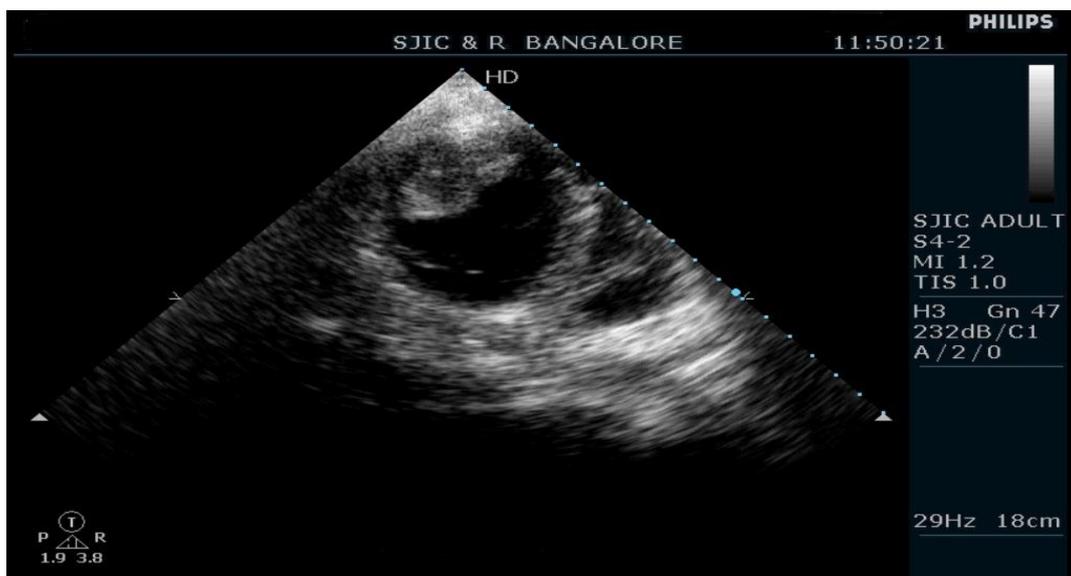


Figure 2C: Parasternal short axis view at the mitral valve level showing a hypoechoic mass attached to the RV free wall, suggestive of Type-B thrombus with RV dilatation & eccentricity index of >1 in both diastole and systole.

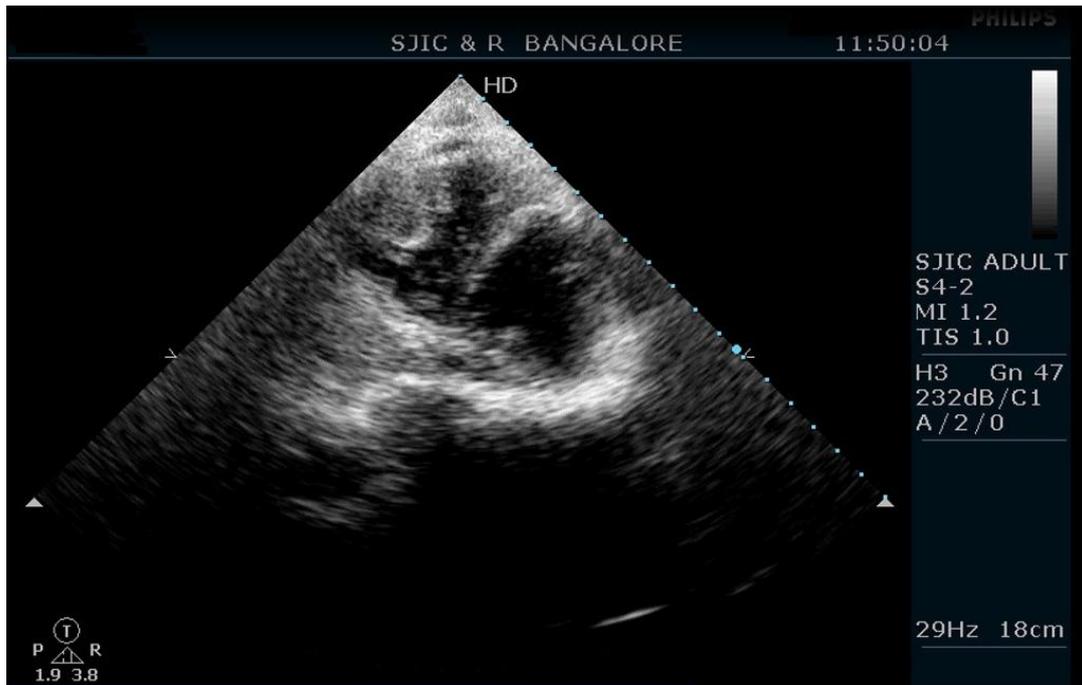


Figure 2D: Parasternal short axis view at the papillary muscle level showing a hypoechoic mass attached to the RV free wall, suggestive of Type-B thrombus.