Images in Cardiology

Pulmonary Embolism in Transit: Rapid Identification of Right Heart Thrombi in Transit Using Echocardiography

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A 54-year-old man presented with a 6-week history of progressive exertional dyspnoea. He had no medical history and had good premorbid function before symptom onset.

Outpatient transthoracic echocardiography (TTE) demonstrated severe global left ventricular (LV) systolic dysfunction, which prompted admission to a tertiary centre for cardiomyopathy workup and initiation of heart failure therapy.

Invasive coronary angiography conducted on day 1 of admission demonstrated no significant coronary artery disease, global severe LV systolic dysfunction, and a normal LV end-diastolic pressure of 13 mm Hg.

Inpatient TTE confirmed a severe nonischaemic dilated cardiomyopathy with biventricular systolic dysfunction, an LV ejective fraction of 18%, an LV end-diastolic diameter of 63 mm, and a large organised ($3.6 \times 1.9 \text{ cm}^2$) thrombus attached to the LV apical inferoseptal wall (Fig. 1). A second, large mobile multilobulated mass was visualised in transit from the inferior vena cava (Fig. 2 and Video 1 , view video online) to the right atrium (RA) (Supplementary Fig. S1A and Video 2 , view video online) and prolapsing through the tricuspid valve into the right ventricle (RV) during diastole (Fig. 2, Supplementary Fig. S1B, and Video 3 , view video online).

Shortly after the TTE, the patient suddenly collapsed and experienced a pulseless electrical activity cardiac arrest. Cardiopulmonary resuscitation was initiated for 38 minutes until extracorporeal membrane oxygenation cannulation was achieved.

Repeat transthoracic echocardiogram was performed 30 minutes after extracorporeal membrane oxygenation cannulation. This demonstrated absence of the previously visualised RA and LV thrombi and a new finding of right heart strain, with a severely dilated RA and RV (RV basal diameter 5.4 cm) and severely reduced RV systolic function (Supplementary Fig. S1C and Video 4 , view video online). The

Figure 1. Apical-4-chamber view. Transthoracic echocardiogram (TTE) demonstrating organised left ventricular (LV) thrombus attached to the apical inferoseptal wall.

inferior vena cava appeared dilated and did not contain residual thrombus (Supplementary Fig. S1D and Video 5 , view video online).

This clinical presentation is in keeping with acute pulmonary embolism in transit with concomitant LV thrombus in a severe nonischaemic dilated cardiomyopathy visualised with real-time transthoracic echocardiography. Bilateral intracardiac thromboembolism occurred despite prophylactic enoxaparin in the context of a severe cardiomyopathy and low cardiac output syndrome, which raises the suspicion of a concomitant hypercoagulable state, possibly due to undiagnosed malignancy or thrombophilia.

These images highlight a unique clinical entity with high fatality, which requires prompt recognition and management to mitigate the risk of right heart failure, cardiogenic shock, and death.

Disclosures

The authors have no conflicts of interest to disclose.

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See page 41 for disclosure information.

Figure 2. (A) Subcostal view. TTE demonstrates thrombus in the inferior vena cava. (B) Apical 4-chamber view. TTE demonstrates thrombus in transit through the tricuspid valve and into the right ventricle (RV).

Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at <https://www.cjcopen.ca/> and at <https://doi.org/10.1016/j.cjco.2018.11.001>.