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CASE REPORT

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Right heart thrombus-in-transit with pulmonary embolism in a patient with primary hypercoagulable state

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Abstract

A 25 year-old female with a history of Caesarian section ten weeks ago presented with symptoms suggestive of pulmonary embolism. Transthoracic echocardiography revealed a free-floating large thrombus traversing the right atrial cavity. Transesophageal echocardiography confirmed the presence of an unattached thrombus that originated from the most proximal part of the inferior vena cava. Multi-slice computed tomography of the chest and abdomen revealed the thrombus to start from the intra-hepatic part of the inferior vena cava and extend through the right atrium. It also demonstrated multiple thrombi in the pulmonary vasculature, the largest being in the right main pulmonary artery and its lower lobe branch. The patient was triaged for surgical embolectomy under cardio-pulmonary bypass. Follow-up trans-thoracic and transesophageal echocardiography confirmed adequate removal of the thrombus. By genetic examination, she proved to have factor V 'Leiden' gene and two thrombophilia genes, all of which were positive in the heterozygous state. She had also a high serum homocysteine. (Cardiol J 2010; 17, 4: 408–411)

Key words: thrombus-in-transit, pulmonary embolism, hypercoagulable state

Case description

A 25 year-old female with a history of Caesarian section ten weeks ago presented with pleuritic-type chest pain associated with dry cough, fever and night sweats six weeks ago. Three weeks later, she started to develop exertional dyspnea and her cough became productive of blood-tinged sputum. She presented to our emergency department with severe dyspnea at rest. Examination was remarkable for tachycardia (110 beats/min), tachypnea (24 breaths/min), mild fever (37.4°C), and diminished air entry over lung bases with coarse rales over the right lung base. Cardiac examination was uneventful. Blood picture showed microcytic hypochromic anemia and platelet count 472×10^3. Her chest X-ray showed bilateral pleural effusion, while her blood chemistry, electrocardiogram (ECG), arterial blood gases and lower limb venous duplex were unremarkable. Transthoracic echocardiography revealed a free-floating large thrombus traversing the right atrial cavity (Fig. 1). The thrombus was highly mobile, irregular in contour, homogeneous, measured 6.4 × 1.8 cm and acquired different shapes during examination (serpentine, oval and irregular). It prolapsed into the right ventricular cavity

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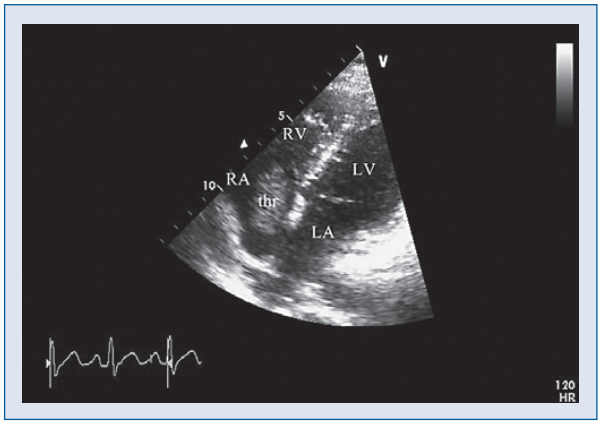

Figure 1. Transthoracic echocardiography, apical 4-chamber view showing a huge oval free-floating thrombus (thr) in the right atrium (RA), and occupying most of the right atrial cavity; LA — left atrium; LV — left ventricle; RV — right ventricle.

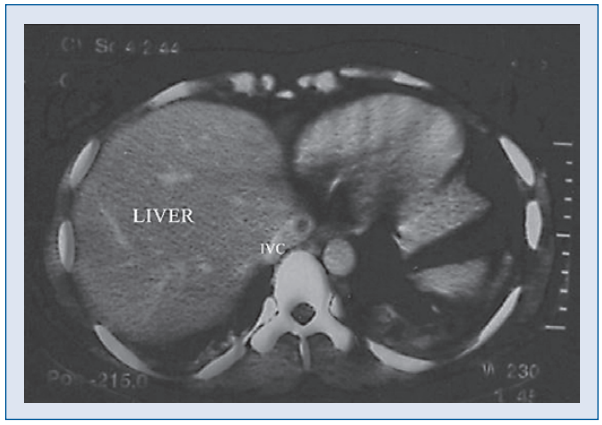

Figure 3. Computerized tomography scan of the upper abdomen, axial cut showing a small filling defect in the intra-hepatic part of the inferior vena cava (IVC).

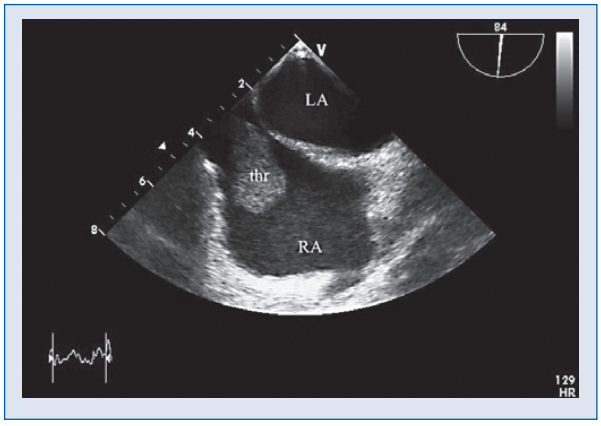

Figure 2. Transesophageal echocardiography, basal short-axis view at mid-esophageal level (angle 84°) showing the thrombus free in the right atrial cavity; LA — left atrium; RA — right atrium; thr — thrombus.

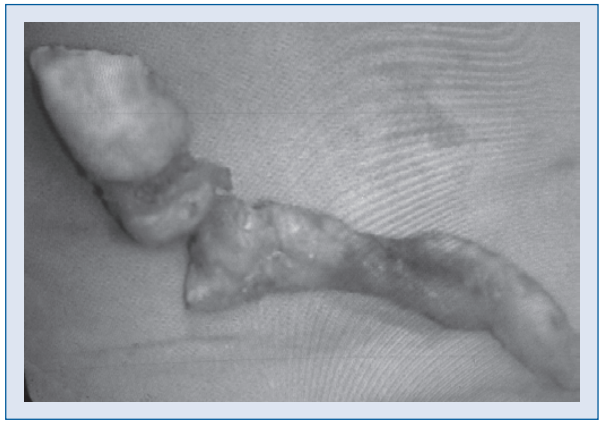

Figure 4. The elongated serpentine thrombus removed by surgical embolectomy.

with each diastole. It caused tricuspid regurgitation (grade I–II/IV) with right ventricular systolic pressure 42 mm Hg. Transesophageal echocardiography confirmed the presence of an unattached thrombus that originated from the most proximal part of the inferior vena cava, extending into the right atrial cavity (Fig. 2). The interatrial septum was intact, with no masses in the left atrium or left atrial appendage. Multi-slice computed tomography of the chest and abdomen revealed the thrombus to start from the intra-hepatic part of the inferior vena cava and extend through the right atrium (Fig. 3). It also demonstrated multiple thrombi in the pulmonary vasculature, the largest being in the right main pulmonary artery and its lower lobe branch.

The thrombus resembled the 'Sword of Damocles' as it presented an imminent risk of massive pulmonary embolism offended by its large size; therefore, the patient was triaged for surgical embolectomy under cardio-pulmonary bypass (Fig. 4). Follow-up transthoracic and transesophageal echocardiography confirmed adequate removal of the thrombus, minimal residual tricuspid regurgitation with right ventricular systolic pressure 25 mm Hg (Fig. 5).

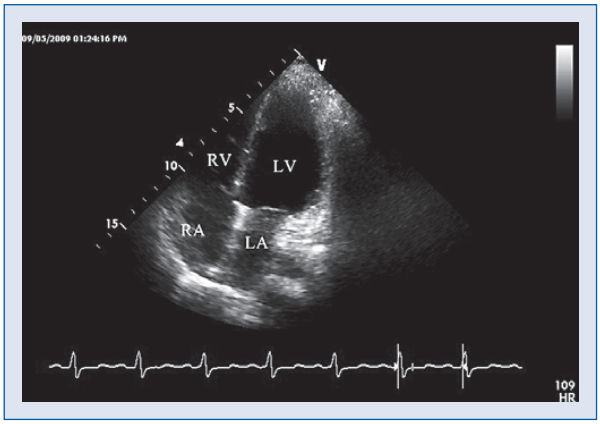

Figure 5. Post-operative transthoracic echocardiography, apical 4-chamber view showing the right atrial cavity free of thrombi; LA — left atrium; LV — left ventricle; RA — right atrium; RV — right ventricle.

By genetic examination, she proved to have factor V 'Leiden' gene (G1691A) and two thrombophilia genes: MTHFR (C677T) and MTHFR (A1298C), all of which were positive in the heterozygous state. She had also serum homocysteine 25.95 μmol/L (reference range 3.7–13.9 μmol/L).

Discussion

Free-floating right atrial thrombi (thrombi-in-transit) are not uncommon in patients with acute massive pulmonary embolism, being encountered in 18% of cases [1]. They are associated with higher mortality [2] apparently due to potential fragmentation and ensuing recurrent pulmonary embolization [3]. Rarely, a free right atrial thrombus can be entrapped in a patent foramen ovale, with the risk of systemic embolization [4, 5]. Obviously, these are venous thrombi that migrate from the deep venous system of the lower extremities or from the pelvic veins in a setting of primary or secondary hypercoagulable state. Previously, one report described its occurrence in a patient with primary anti-phospholipid antibody syndrome [5]. To the best of the authors' knowledge, this is the first case of thrombus-in-transit in association with factor V 'Leiden' and thrombophilia genes (both of which are positive in the heterozygous state), reported to date in the literature.

Bedside echocardiographic assessment is of paramount importance in the emergency diagnosis of acute pulmonary thromboembolism. It can reveal not only signs of right heart overload, but it can also occasionally demonstrate a freely moving thrombus-in-transit [6]. Eventually, serial echocardiographic evaluation is extremely valuable in subsequent follow-up and to confirm the response to treatment [6]. Transesophageal echocardiography can further confirm the free-floating nature of the thrombus [7], delineate its relation to the inferior vena cava (as in our case), and to the interatrial septum [4, 5]. Computed tomography can further demonstrate the thrombus and its relations, as well as the presence of thrombi in the pulmonary vasculature [8].

The treatment of choice for thrombus-in-transit is still a matter of debate. Thrombolytic therapy has induced disappearance of thrombus in some case reports [6, 8, 9]. In most patients with evidence of right ventricular strain, it may effectively serve to reduce pulmonary vascular resistance, improve cardiac index, and decrease mortality risk [10]. However, major bleeding (22%) and cerebral hemorrhage (3%) remain a matter of concern [11]. Surgical embolectomy is the option of choice when the thrombus traverses a patent foramen ovale to the left atrium, since thrombolysis in this case may cause thrombus fragmentation and systemic embolization [11]; or when the thrombus is large in size (as in our case) with a risk of fragmentation and massive pulmonary embolism. Additionally, it remains an option when thrombolysis is contraindicated or ineffective [6]. Finally, one case report has described successful percutaneous removal of thrombus employing a special wire-mesh basket [7].

Acknowledgements

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