

## Witnessed migration of a giant, free-floating thrombus into the right atrium during echocardiography, leading to fatal pulmonary embolism

Ölümcül pulmoner emboliye yol açan serbest yüzen dev trombüsün sağ atriyauma geçişinin ekokardiyografik olarak izlenmesi

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Free-floating right heart thrombus can be seen in 4% to 18% of patients presenting with acute pulmonary embolism. A 76-year-old man was admitted to the intensive coronary care unit due to resting dyspnea and pleuritic pain of sudden onset, raising a high suspicion of acute pulmonary embolism. A recent coronary angiogram showed a 50% stenosis in the proximal left anterior descending coronary artery. He had diabetes and hypertension for more than 10 years, but no history of venous thromboembolism. Bed-side transthoracic echocardiography revealed dilated right heart chambers, and a huge (78x12 mm) mobile mass in the inferior vena cava. We witnessed the migration of the thrombus from the inferior vena cava to the right atrium. The thrombus then totally lodged in the right atrial cavity and protruded into the right ventricle. Surgical removal of the thrombus was decided. However, during induction of anesthesia, cardiac arrest developed. All resuscitation efforts including open heart massage were unsuccessful. The thrombotic material removed from the right atrium was 150 mm in length. Pathological examination showed the mass to be a thrombus.

**Key words:** Echocardiography; heart atria; pulmonary embolism; thrombosis/complications.

Free-floating right heart thrombus is a relatively rare phenomenon and can be seen in 4% to 18% of patients presenting with acute pulmonary embolism.<sup>[1-3]</sup> It is mainly diagnosed by transthoracic echocardiography. Echocardiographic examination provides rapid diagnosis and has an important prognostic value because of the high risk for severe pulmonary embolism whose mortality rate exceeds 40%.<sup>[4]</sup>

Serbest yüzen sağ kalp trombüsleri akut pulmoner embolili hastaların %4-%8'inde görülebilir. Yetmiş altı yaşında bir erkek hasta, akut pulmoner emboli şüphesini uyandıran, ani başlangıçlı nefes darlığı ve plörotik ağrı nedeniyle koroner yoğun bakım ünitesine yatırıldı. Yakın zaman önce yapılan koroner anjiyografide sol ön inen koroner arter proksimalinde %50 darlık saptanmıştı. On yıldan fazla süredir diyabet ve hipertansiyon olan hastada venöz tromboemboli ile ilgili bir olay olmamıştı. Yatak başında yapılan transtorasik ekokardiyografide sağ kalp boşluklarında genişleme ve inferior vena kavada hareketli dev bir kitle (78x12 mm) görüldü. Ekokardiyografi sırasında trombüsün inferior vena kavadan sağ atriyauma geçtiği, atriyum boşluğuna tam olarak yerleştiği, ve sağ ventriküle doğru uzanım gösterdiği izlendi. Trombüsün cerrahi olarak çıkarılmasına karar verildi. Ancak, anestezi induksiyonu sırasında hastada kardiyak arrest gelişti. Açık kalp mesajı da dahil tüm resüsitasyon girişimleri yarar sağlamadı. Sağ atriyaumdan çıkarılan trombüsün uzunluğu 150 mm idi. Kitlenin trombüs olduğu patolojik incelemeyle de doğrulandı.

**Anahtar sözcükler:** Ekokardiyografi; kalp atriyaumu; pulmoner emboli; trombüs/komplikasyon.

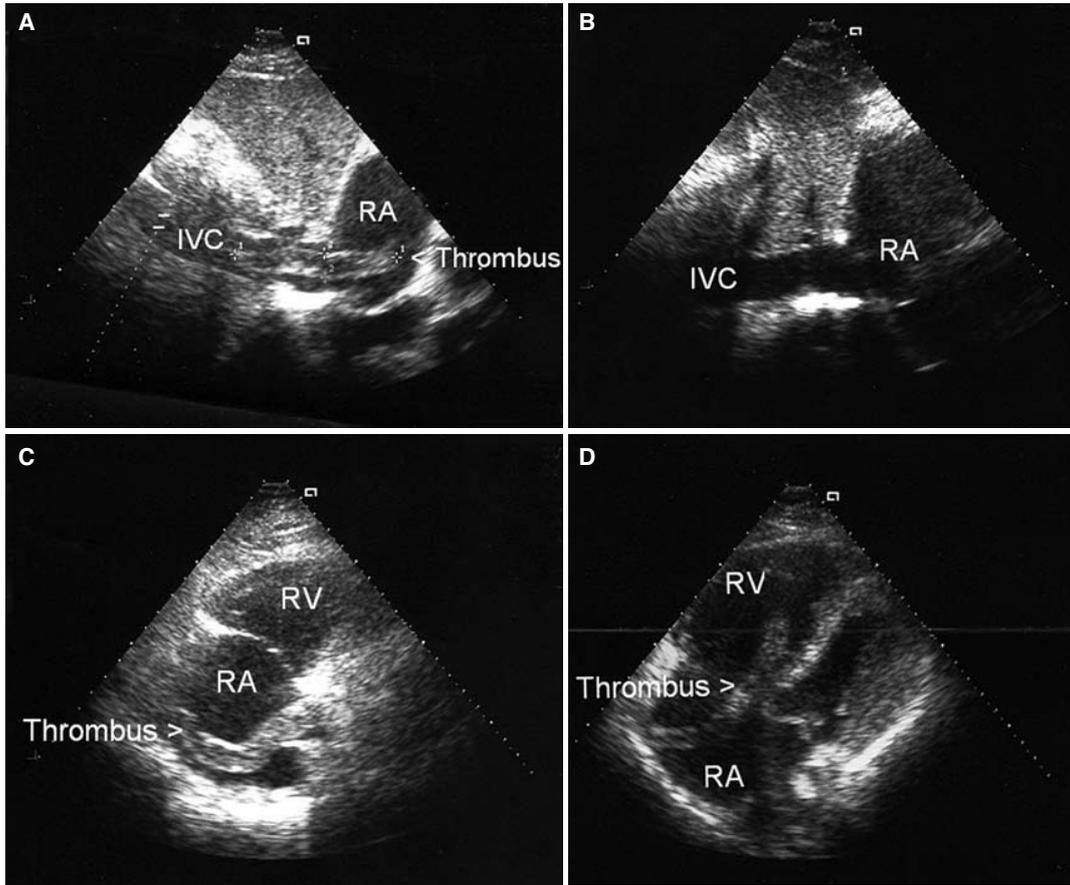
We present a case of massive pulmonary embolism caused by the rapid migration of a giant, free-floating thrombus from the inferior vena cava to the right heart chambers.

### CASE REPORT

A 76-year-old man was admitted to the intensive coronary care unit because of resting dyspnea and

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**Figure 1.** (A) Transthoracic echocardiogram: subcostal view of the giant worm-like thrombus in the inferior vena cava (IVC) with its proximal portion protruding into the right atrium (RA). (B) Subcostal view showing empty inferior vena cava after the migration of the thrombus into the RA. (C) Modified apical four-chamber view demonstrating the thrombus entrapped in the RA. (D) Apical four-chamber view showing protrusion of the thrombus into the right ventricle (RV).

pleuritic pain of sudden onset that developed during hospitalization in the urology department for investigation of existing macroscopic hematuria. He was diagnosed as having benign prostate hypertrophy with no ultrasonographic evidence for renal or hepatic malignancy. He had a two-week history of coronary angiography due to recurrent chest pain, and medical treatment was recommended upon detection of a 50% stenotic lesion in the proximal left anterior descending coronary artery. He had diabetes and hypertension for more than 10 years, but no history of venous thromboembolism.

On the third day of his hospitalization in the urology department, he suffered from progressive resting dyspnea and pleuritic chest pain of sudden onset. His hemodynamic status deteriorated in a few minutes. Upon consultation with the cardiology department, the patient was transferred to the intensive coronary care unit with a high suspicion of acute pulmonary

embolism. His blood pressure was 70/40 mmHg with a regular pulse rate of 128/min. Biochemical analysis revealed impaired liver function with significantly elevated liver enzymes (AST 689 mg/dl, ALT 735 mg/dl) and INR (4.2). Bed-side transthoracic echocardiography revealed dilated right heart chambers, and a huge (78x12 mm), worm-like, capsulated mass in the inferior vena cava with its proximal portion protruding into the right atrium (Fig. 1a).

During echocardiographic examination, we unexpectedly observed the migration of this highly mobile thrombus from the inferior vena cava to the right atrium. Following migration, the inferior vena cava was visualized empty (Fig. 1b), and the thrombus totally lodged in the right atrial cavity (Fig. 1c), protruding into the right ventricle during the cardiac cycle (Fig. 1d). Surgical removal of the thrombus was decided rather than fibrinolysis due to the increased INR level. The patient was immediately taken to the



**Figure 2.** Gross appearance of the giant thrombus, approximately 150 mm in length, and the smaller fresh thrombus.

operating room. However, cardiac arrest developed during induction of anesthesia. Despite open heart massage following quick median sternotomy and pericardiotomy, all resuscitation efforts were unsuccessful. Thrombotic material, which was 150 mm in length, was removed from the right atrium (Fig. 2). There was also fresh thrombus formation around the thrombotic mass. Pathological examination showed the mass to be a thrombus.

## DISCUSSION

In this report, we presented a case of mobile right heart thrombus leading to massive pulmonary embolism. Many cases of mobile right heart thrombus have been reported in the literature, but this case is interesting in that we witnessed the migration of the huge thrombus from the inferior vena cava to the right atrium on the way to the pulmonary artery.

Free-floating right heart thrombi are observed almost exclusively in patients with severe pulmonary embolism. They can embolize at any moment and have a dismal prognosis with a mortality rate of 20% within 24 hours of diagnosis.<sup>[3,4]</sup> Prognostic factors affecting in-hospital mortality have been reported as severe hypoxemia and occurrence of cardiac arrest.<sup>[3]</sup>

Echocardiography must be performed systematically as soon as pulmonary embolism is suspected. It is a rapid, practical, and sensitive technique for the fast identification of right heart thrombi.<sup>[5]</sup> Two-dimensional echocardiography is usually evocative of free-floating migrant thromboembolus, without the need for differential diagnosis with other masses.

The management of these thrombi remains controversial,<sup>[6]</sup> and there are no data from randomized studies about the most effective treatment strategy in the management of right heart thrombi. Many investigators suggest surgery as the most efficient treatment.<sup>[6]</sup> Thrombolytic therapy is also recommended as the treatment of choice, with some advantages and potential risks.<sup>[5]</sup> Intravenous thrombolysis may dissolve clots at several locations, but has the potential risk for migration of fragments following clot lysis.<sup>[5]</sup> Farfel et al.<sup>[6]</sup> reported that thromboemboli entrapped in the right heart chambers were best handled by surgical therapy. On the other hand, Pierre-Justin et al.<sup>[5]</sup> showed that intravenous thrombolysis was an efficient and safe management strategy, and might constitute first line intervention for mobile right heart thrombi. Chartier et al.<sup>[3]</sup> reported that there was no significant difference between these therapeutic approaches in terms of in-hospital mortality. In our patient, both treatment modalities represented a high risk for mortality. Considering the high probability of bleeding complication due to impaired liver function and increased INR level, and rapid migration of the giant thrombus towards the pulmonary artery, we preferred surgical treatment to fibrinolytic therapy.

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