

Right Heart Thrombus-in-Transit: Detection and Migration during Transthoracic Echocardiography – Case Report

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Introduction

The Right Heart Thrombus-in-Transit (RHTT) is generally in transit between deep veins of the lower limbs to pulmonary arteries and is relatively unstable¹⁻³. During this process, the migratory thrombus may lead to pulmonary embolism (PE), within 24 hours³.

We present the case of an elderly woman, admitted with dyspnea, and subject to transthoracic echocardiography (TTE) as initial imaging workup, which detected the presence of thrombus inside the right atrium (RA) and, less than one minute afterwards, the disappearance of this thrombus. The findings of this examination allowed the early treatment of a high-risk patient. A pulmonary scintigraphy performed later confirmed the diagnosis of PE.

Case Report

Eighty-seven year-old (87) patient, female sex, white, knowingly having systemic arterial hypertension, heart failure (HF) and chronic kidney disease not requiring dialysis, was taken to the emergency room complaining of dyspnea, with around 10 days of evolution, initially upon stress levels below the usual ones, worsening to dyspnea at rest, in addition to orthopnea, and lower limb edema. In physical examination, she was tachydyspneic, hypoxemic, with pulmonary basal crackles on auscultation and edema ++/4+ on the lower limbs, with heart rate of 86 beats per minute in regular rhythm, blood pressure of 110 x 60 mmHg, respiratory rate of 30 breaths per minute and saturation of O₂ at 86% in room air. ECG revealed sinus rhythm, diffuse and nonspecific abnormalities of the ventricular repolarization, in addition to signs of left atrial overload.

Given the suspicion of HF decompensation, the relevant treatment was started and laboratory tests were requested, chest radiography and TTE, to further elucidate and evaluate possible differential diagnoses. The TTE revealed dilation of heart chambers, with diffuse diffused hypokinesia of the left ventricle (LV) and significant systolic dysfunction (ejection fraction of 33%),

Keywords

Thromboembolism; Echocardiography; Diagnostic Imaging; Pulmonary Embolism/mortality; Heart atria.

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* Video at the end of the article.

LV diastolic dysfunction rated in grade III (restrictive pattern), hypocontractile right ventricular, in addition to pulmonary hypertension, with pulmonary artery systolic pressure estimated at 50 mmHg, using the tricuspid regurgitation. Furthermore, the presence of filiform structure with wide movement was noted, suggesting thrombus inside the right atrium (Figure 1, Video 1*). Around 60 seconds after registering the mobile structure in the RA in 4-chamber apical window, a new registration in the same window was documented, without the presence of the said structure in the RA (Figure 2, Video 2*), which suggests migration of RHTT during the test.

After these findings, the anticoagulation therapy was started with heparin forthwith and optimized treatment of HF.

Chest radiography was subsequently carried out, on bed, showing signs of cephalization of flow bilaterally, decreased pulmonary expandability, unclear left-side costophrenic sinus and shallow right-side costophrenic sinus, glass opacity in the middle third of the right lung, and increase of cardiac area. During the follow-up period, a pulmonary scintigraphy was performed, revealing heterogeneous perfusion, with focal deficits located in the median lobe, basal posterior region and apex of the right lung, in addition to the apex and base of the left lung, suggesting high probability of PE (Figure 3).

With the treatment, the patient presented progressive clinical improvement, being discharged 13 days after admission, using Varfarin.

Discussion

The thrombi in the heart right chambers identified by echocardiography may be classified according to the morphology, cause and clinical meaning⁴. The B-type thrombus generally develops secondary to intracardiac or intravascular devices, and is adherent, commonly small and round. The pulmonary embolism happens to 40% of the patients, associated with good prognosis and mortality rate of 4%⁴⁻⁶. Type-A thrombus is a peripheral venous coagulum which accidentally affects the right heart when heading for the lungs^{7,8}, has a shape similar to a “worm,” is extremely mobile and is associated with the occurrence of massive and submassive pulmonary embolism in 98% of the cases⁵ and a very bad prognosis⁷. It is the type known as Right Heart Thrombus-in-Transit (RHTT)^{1,8}.

RHTT is uncommon, but can cause high morbidity connected to massive and submassive pulmonary embolism or paradoxical embolism, associated with a high risk of mortality^{1,2,8,9}. A number of cases show in-hospital mortality of 44.7% connected to sudden PE^{1,8}. The global mortality

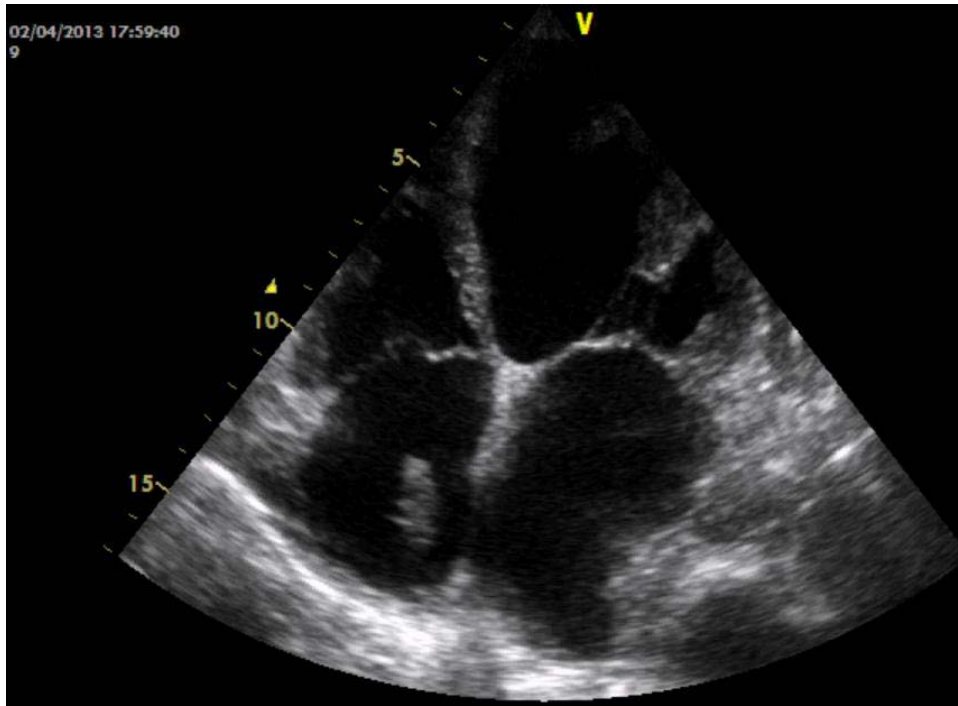


Figure 1 – Presence of thrombus inside the right atrium.

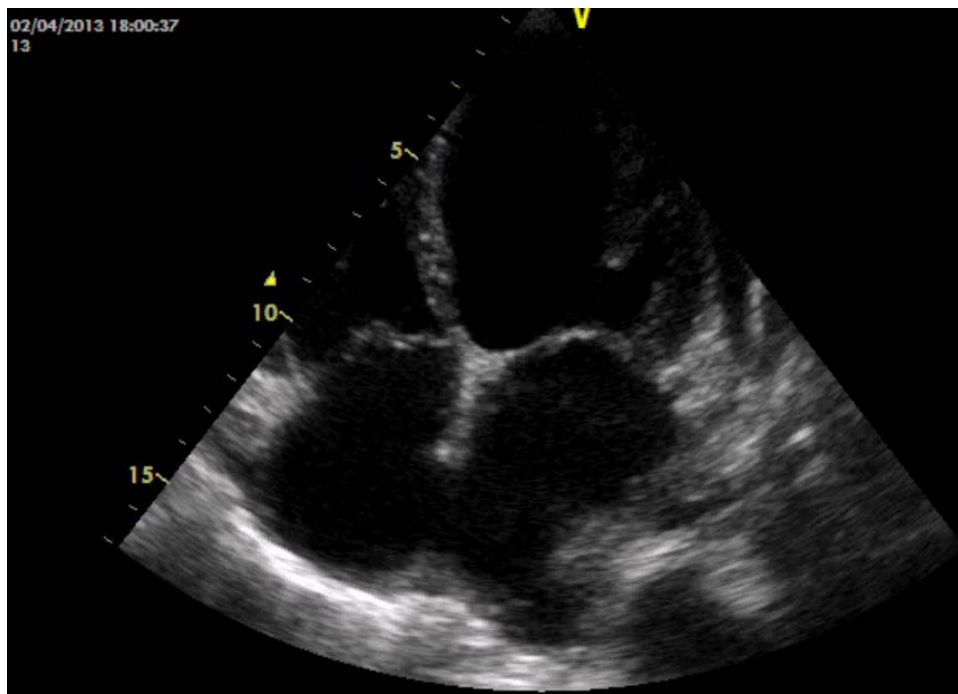


Figure 2 – Disappearance of thrombus 57 seconds after its identification.

Case Report

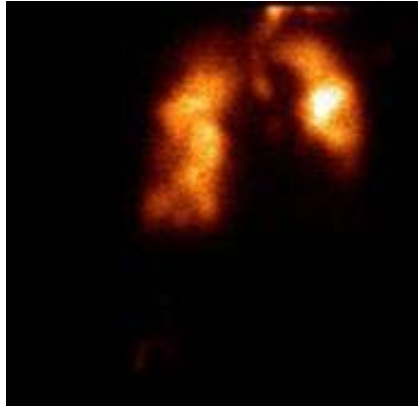


Figure 3—Pulmonary Scintigraphy indicating high probability of pulmonary embolism.

rate in patients with RHTT has been reported as 28%, reaching 100% in untreated patients^{8, 10}. The said rates are substantially higher than the mortality rates of 8% to 10% of PE in general¹¹.

In patients with pulmonary embolism, the identification of thrombi in the right chambers has been reported in 7% to 18% of the cases^{1, 12, 13}. Owing to the unstable nature of coagula, which may migrate at any time¹⁻³, the performance of echocardiographic studies more frequently led to increased knowledge in patients with massive or submassive PE⁵⁻⁷. However, only rarely, as in our case, the moment of thrombus migration through the right chambers to the pulmonary arteries may be detected.

The clinical presentation of patients may range from light respiratory thrombi up to cardiogenic shock and sudden death⁸. Any delay to start the treatment may be fatal^{1, 3}, thus demanding extreme therapeutic emergency^{1, 12}.

TTE stands as a simple and non-invasive method of investigation that may be carried out bedside at an intensive

care unit, and is generally sufficient to diagnose RHTT⁸. Sometimes, serial echocardiograms may show floating thrombi which could not be seen in the initial evaluation and, therefore, may be useful, especially when the patient's clinical condition is deteriorating¹⁴. However, TTE may underestimate the thrombus size.

The transesophageal echocardiography (TEE) may be useful in some cases and allows detecting thrombi inside right heart chambers and in the pulmonary artery and its proximal branches, showing higher sensitivity and clearer definition regarding the size and shape of coagula⁶.

The computed tomography is a good non-invasive alternative for diagnosing thrombi in pulmonary branches and right chambers, with high accuracy³. Nonetheless, this is a technique which requires the use of contrast and, on account of this, is not ideal for the case reported, as the patient has chronic kidney disease.

In accordance with several authors^{12, 15}, once the diagnosis of RHTT entails that an echocardiography is made, an immediate treatment should be administered, which includes administration of heparin, thrombolysis or surgical embolectomy. The percutaneous treatment of thrombi, with aspiration or fragmentation, is still under study^{3, 5, 9}. In the case at hand, a conservative treatment was adopted, including anticoagulation with heparin, considering the age and comorbidities of the patient, and also thrombus migration from the right atrium.

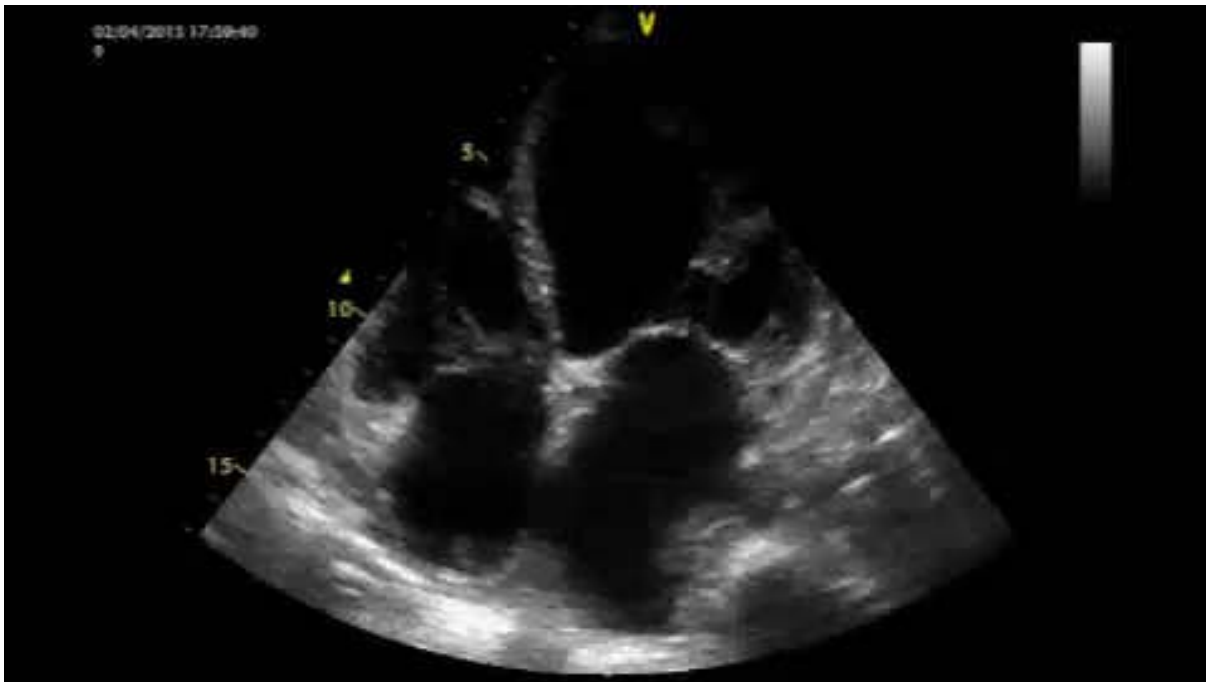
The conclusion we have drawn is that RHTT is a severe form of venous thromboembolism, associated with high risk of mortality, which should be quickly diagnosed for the treatment to be immediately administered. The echocardiography is an important tool for detecting thrombus inside the right heart, the evolution of hemodynamic and functional repercussions of PE and also for following up treatment effectiveness. Therefore, it may be considered a fundamental investigation, which should be carried out with all patients with suspected or proven pulmonary embolism.

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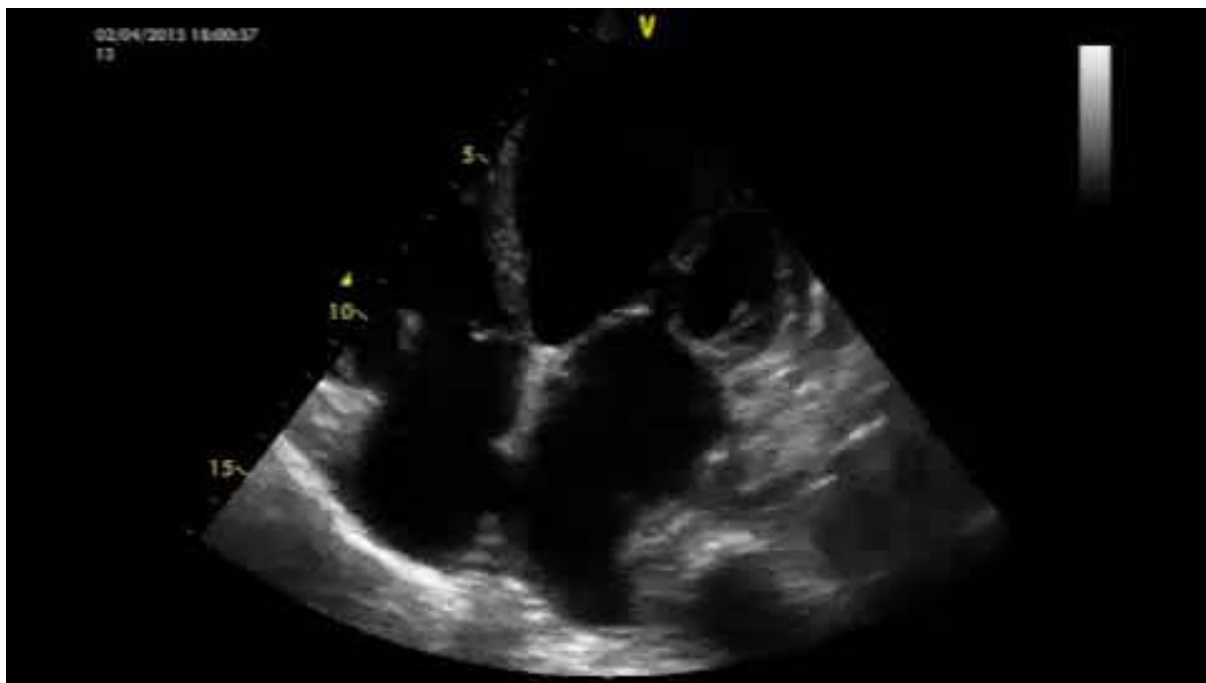
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Case Report



Video 1 – Presence of thrombus inside the right atrium.



Video 2 – Disappearance of thrombus 57 seconds after its identification.