Right Heart Emboli-in-Transit. Case Report and Literature Review

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Emboli in transit in right atrium are rare. When they occur, they are associated to high rate of pulmonary embolism and mortality. This is a case report on an embolus in transit in right chambers, with clinical suspicion of pulmonary thromboembolism. Diagnosis was obtained through transesophageal echocardiography. The patient had a positive response post-anticoagulation. The team discussed presentation forms, treatment and condition development.

Introduction

Pulmonary thromboembolism (PTE) - a condition not commonly diagnosed - reports high mortality rate[1]. Echocardiographic detection of the embolus in transit in right heart chambers helps in identifying a high risk group of patients whose mortality rate ranges from 29% to 100%. That is quite high when compared to the general mortality rate from PTE in general - from 8% to 10%[2].

This is a case report on a right atrium embolus in transit. The different strategies currently being used have been discussed.

Case report

A 57-year-old, hypertensive female patient, body weight 85 kg, on regular use of Enalapril (10 mg b.i.d.), was admitted at a Hospital Center due to a syncope episode and a number of episodes of precordial pain and acute dyspnea with spontaneous resolution.

Transthoracic echocardiogram and cinecoronariogaphy were normal. One day after hospital discharge the patient was submitted to a new transthoracic echocardiogram that revealed mass in transit inside right atrium. The patient was referred to our unit to be evaluated. After new hospital admittance, a transeophageal echocardiogram was performed. It revealed heart chambers within normal size and pulmonary blood pressure at approximately 35 mmHg, calculated by minimal tricuspid regurgitation. A fusiform, elongated, highly mobile structure could be observed inside the right atrium. With approximately 35 mm in extension and erratically following a serpinginous course, the structure clearly adhered to remaining Eustachius valve to bifurcate after moving approximately 1 cm, protruding towards right ventricle in diastole and presenting texture similar to that of cardiac muscle. (Fig 1 and 2).

On exam day the patient presented edema and pain in lower limbs. Diagnosis was deep venous thrombosis (DVT) of recent onset in left lower limb (superficial femoral, popliteal, fibular, solear and gastrocnemial veins) and absence of thrombus and/or signs of phlebitis in superficial venous system on ultra-sound. The study also showed venous stasis in the ileofemoral venous transition, probably due to a large uterine myoma (14mm x 12mm). The administration of anti-hypertensive medication with Enalapril 10 mg b.i.d. was kept. Anticoagulation was started with heparin. Pulmonary scintigram was performed, which showed small, diffiuse hypoperfusion areas.

After 5 days a new transesophageal echocardiogram was performed. No thrombi or intracardiac masses were identified. The patient was submitted to percutaneous implant of inferior vena cava (IVC) filter through right femoral catheter. Oral anticoagulation was started, as well as surgical resection of uterine tumor.

After 2 years under treatment, the patient is asymptomatic, on antihypertensives and oral anticoagulation.

Discussion

Echocardiography has documented thrombi in right chambers in approximately 4% to 20% of patients with acute PTE. Prevalence is, therefore, higher than the 3% to 12% observed in autopsy studies, probably due to the diagnosis reached for non-fatal cases[3-6]. Total mortality rate among those patients is approximately 28%, which is higher than in-hospital mortality rate from acute PTE (reported to be 2.5%) treated predominantly with IV heparin. It is not yet clear whether the presence of thombi in the left chambers actually contributes for poorer development or if it is a mere marker for the presence of massive PTE[3,4].

Most typically, right chambers thrombi are located in the right atrium, and following their morphology, they may be ranked as following: a) long and narrow, following a serpiginous course, filiform and extremely mobile, frequently associated to deep venous thrombosis (DVT) of lower limbs, and rarely to a heart condition. PTE rate ranges between

Key words

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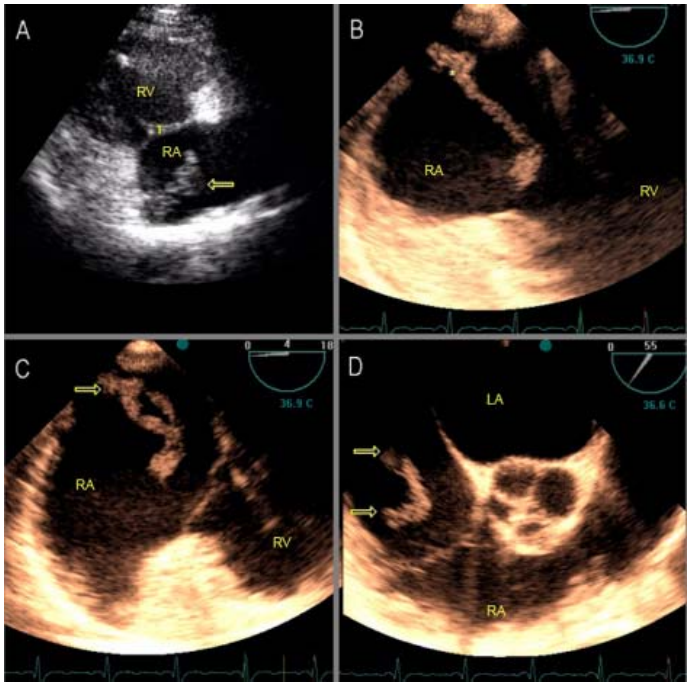

Figure. 1 - Echocardiogram. A - transthoracic; B, C and D - transesophageal, showing in transit structure inside right atrium; LA - Left atrium; RA - Right atrium; RV - Right ventricle.

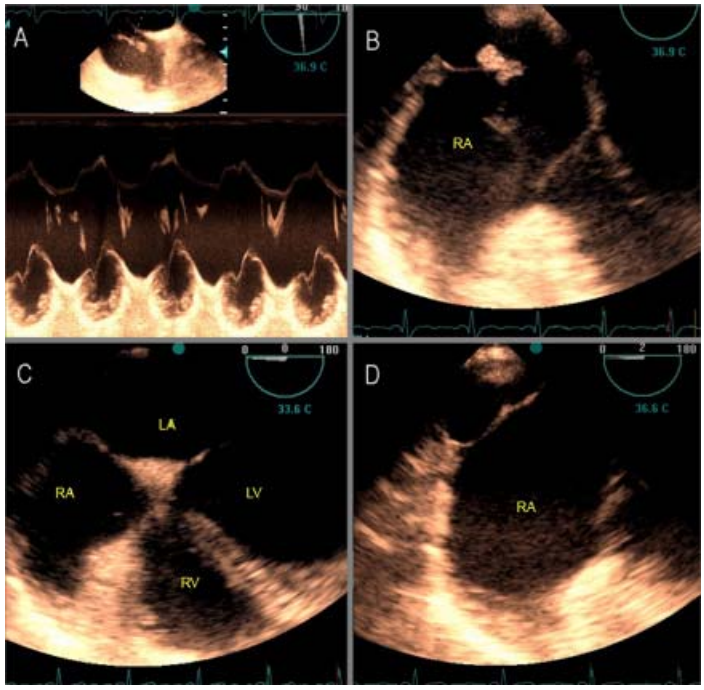

Figure. 2 - Transesophageal echocardiogram, showing: A - M-mode structure with ample movement; B - thrombus adhered to Eustachius valve; C and D - post-treatment showing 4 chambers and Eustachius valve without thrombus, respectively.; LA - Left atrium; LV - Left ventricle; RA - Right atrium; RV - Right ventricle.

79% (documented) and 98% (clinical diagnosis), showing to be more severe at presentation and clinical development; b) similar to left atrium thrombi - less mobile, with variable morphology, but not filiform. More commonly associated with heart disease rather than trombosis, with PTE rates between 38% and 40%, less severe at presentation and clinical development; and c) very mobile, but not filiform, resembling a myoma, with intermediate association to heart condition and deep venous thrombosis (DVT); PTE rate ranging from 62% to 67%[7]. Morphological definitions for Type A thrombus include: serpiginous, fusiform, irregular, pleomorphic, lobular, elongated, erratic, chaotic, etc[8].

Type A thrombus patients - as in the present case report - are a high risk group, with early total mortality rate (≤ 8 days) of approximately 42%, being one third of them within 24 hours after PTE diagnosis. However, although PTE has been reported for 40% of Type B thrombus patients, mortality directly related to thrombosis is approximately 4%[1,7]. Another study, on the other hand, reports total mortality rate of 31%, with no significant difference in regard to thrombus motility or adherence to cardiac wall (28% adhered, 38% free), thus suggesting that predictive mortality factors for patients with thrombus in right chambers are exclusively the presence of PTE and the type of treatment used[2].

In the case being reported, clinical data presented by the patient after being diagnosed for deep venous thrombosis (DVT) of lower limbs, and morphological data of echo image led to the diagnosis of embolus in transit in right atrium. The embolus was adhered to the Eustachius valve at inferior vena cava (IVC) entry - a useful data, quite easily visualized on transesophageal study. Although the diagnosis of Type A thrombus had been reached, patient's good clinical condition led to the choice for anticoagulation treatment rather than any other therapeutic regimen that could have been adopted.

Up to this point in time no consensus has been reached on the best therapeutic option for these patients. In the European Cooperative Study[4], mortality rate was reported to be 60% for anticoagulated patients; 40% for those treated with thrombolytics; and 27% for those submitted to surgical procedures, which suggests the surgical approach to the most effective. However, a meta-analysis study carried out by Kinney & Wright[2] showed that survival probabilities for patients with embolus in right chambers - with or without previous PTE - were: 0.70 and 0.92 for those on heparin; 0.62 and 0.89 for those on thrombolytic agents; 0.62 and 0.89 for those submitted to surgical treatment; and 0.19 and 0.53 for those receiving no treatment, respectively. The conclusion was that even showing similar development, heparin should be considered the best option if not faced by imminent, fast clinical deterioration. In that study, only 7 patients did not present cardiac etiology symptoms. However, the patients did have risk factors for PTE (central venous catheter, previous PTE, pacemaker and myocardial acute infarction). A more recent meta-analysis study[3] showed global mortality rate to be 27.1%, being 28.6% for those on heparin, 23.8% for those submitted to surgical treatment, 11.3% for those on thrombolytics, and 100% for those not treated. The last study excluded patients with mural thrombus, or thrombus associated to: pacemaker; catheter; tumor; any other implant or surgical anastomosis, therefore including exclusively embolus in transit patients – probably Type A.

Another study shows mortality rate to be 44.7% among treated patients, with 21.1% on day 1 of hospital admission. Although mortality rate does not show statistically significant difference, it was reported to be 47.1% among patients submitted to surgery, 22.2% among those submitted to thrombolysis; 62.5% among those on heparin; and 50% among those submitted to interventionist techniques for thrombus removal[9].

The ICOPER[4] study reported global mortality rate for PTE patients with and without thrombus in right chambers to be 21% and 11% within 14 days; 29% and 16% within 3 months, respectively, thus suggesting, in a non-significant fashion, the poorer course of patients with intracardiac thrombus. However, mortality rate within 14 days was similar for patients with and without intracardiac thrombus who were submitted to thrombolytics: 20.8% and 17.1% or embolectomy: 25% and 28.6%, respectively, although quite different in patients on heparin, with 23.5% with right chambers thrombus and 8% without right chambers thrombus. That might be explained fairly clearly, but it does suggest that patients with intracardiac thrombus should not receive heparin as ideal treatment. The study did not inform on the morphology of right chamber thrombus - it could be either formed locally of in transit.

As the patient presented deep venous thrombosis (DVT) - a common condition in patients with thrombi in transit[5,9] - treatment was added by an inferior vena cava (IVC) filter and oral anticoagulation.

Although not being conclusive for this patient, the mechanical compression from uterine myomatosis was a key factor for stasis and later venous thrombosis in the lower limbs.

Although the transthoracic study did detect a thrombus in the right atrium of this patient, the precise location could only be confirmed by the transesophageal study. When the two echocardiographic methods are compared, the sensitivitiy of the transthoracic study seems to be from 50% to 60% for intra-atrial thrombus detection, with possible underestimation of thrombus real size. Identifying adherence or retention at the Eustachius valve is a most invaluable piece of information to distinguish other masses that may enter the right atrium from inside inferior vena cava (IVC), such as the metastatic invasions by other tumors, among them: leiomyoma, hypernefrome, or hepatome[10].

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any graduation program.

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