

Left Atrial and Ventricular Ball Thrombi Complicating Rheumatic Heart Disease with Combined Mitral and Aortic Stenosis

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A 42-year-old woman with chronic mitral stenosis was admitted for progressive dyspnea, palpitation, and weakness of lower extremities. Echocardiography revealed rheumatic, thickened, and stenotic mitral and aortic valves, and two free-floating ball thrombi were detected in the left atrium and ventricle, respectively. She died suddenly the next day, probably due to mitral or aortic outflow obstruction by the ball thrombi. We believe that the occurrence of free-floating ball thrombi in both the left atrium and left ventricle concomitantly has never been reported. (ECHOCARDIOGRAPHY, Volume 18, February 2001)

rheumatic heart disease, mitral stenosis, aortic stenosis, ball thrombus

Thrombus in the left atrium is common in mitral valve disease, particularly in the atrial appendage in patients with atrial fibrillation.¹ Free-floating ball thrombus occurs very rarely,² but it is an important and potentially fatal complication because it can produce sudden circulatory arrest by obstructing the mitral orifice,³ or cause severe cerebral or peripheral embolic events.^{4,5}

We report the clinical and echocardiographic findings in a young patient who had a ball thrombus in the left atrium together with another ball thrombus in the left ventricle concomitantly. She died suddenly, probably due to mitral or aortic outflow obstruction by the ball thrombi.

Case Report

A 42-year-old woman was admitted with increasing dyspnea on minimal exertion, paroxysmal nocturnal dyspnea, orthopnea, cough, palpitations, ankle edema, and weakness of lower extremities for 1 week. She had a history of rheumatic mitral stenosis for 10 years and exertional dyspnea and palpitation for 3 years.

On examination, the patient was breathless on minimal exertion and mildly cyanosed. Her

blood pressure was 92/40 mmHg, pulse 100/minute, respiration 24/minute, and temperature 37.5°C. She had bilateral basal crepitations. The apical impulse was displaced to the anterior axillary line in the sixth intercostal space. The first heart sound was loud, and there was an opening snap and loud apical mid-diastolic murmur. The abdomen was soft and nontender. The liver and spleen were not felt. The patient had bilateral ankle edema, and peripheral pulses of her lower extremities were markedly diminished. The remainder of the physical examination was normal. The electrocardiogram showed atrial fibrillation. The chest radiograph showed cardiomegaly, left atrial enlargement, dilated pulmonary arteries, and pulmonary venous congestion.

Echocardiography was performed (Fig. 1). The mitral valve was rheumatic, thickened, and stenotic, with a valve gradient of 15 mmHg and an estimated valve area of 1.8 cm². Only trivial mitral regurgitation was noted and left ventricular systolic function was preserved. The left atrium was enlarged (4.5 cm) and contained a discrete, spherical, free-floating thrombus approximately 3.5 cm in diameter. The thrombus was smooth, homogenous, and well demarcated, with increased echodensity associated with trivial left atrial smoke without a discrete attachment or evidence of tissue invasion and infiltration. The aortic valve was also thickened and stenotic, with a valve gradient of 57 mmHg and an estimated valve area of 1

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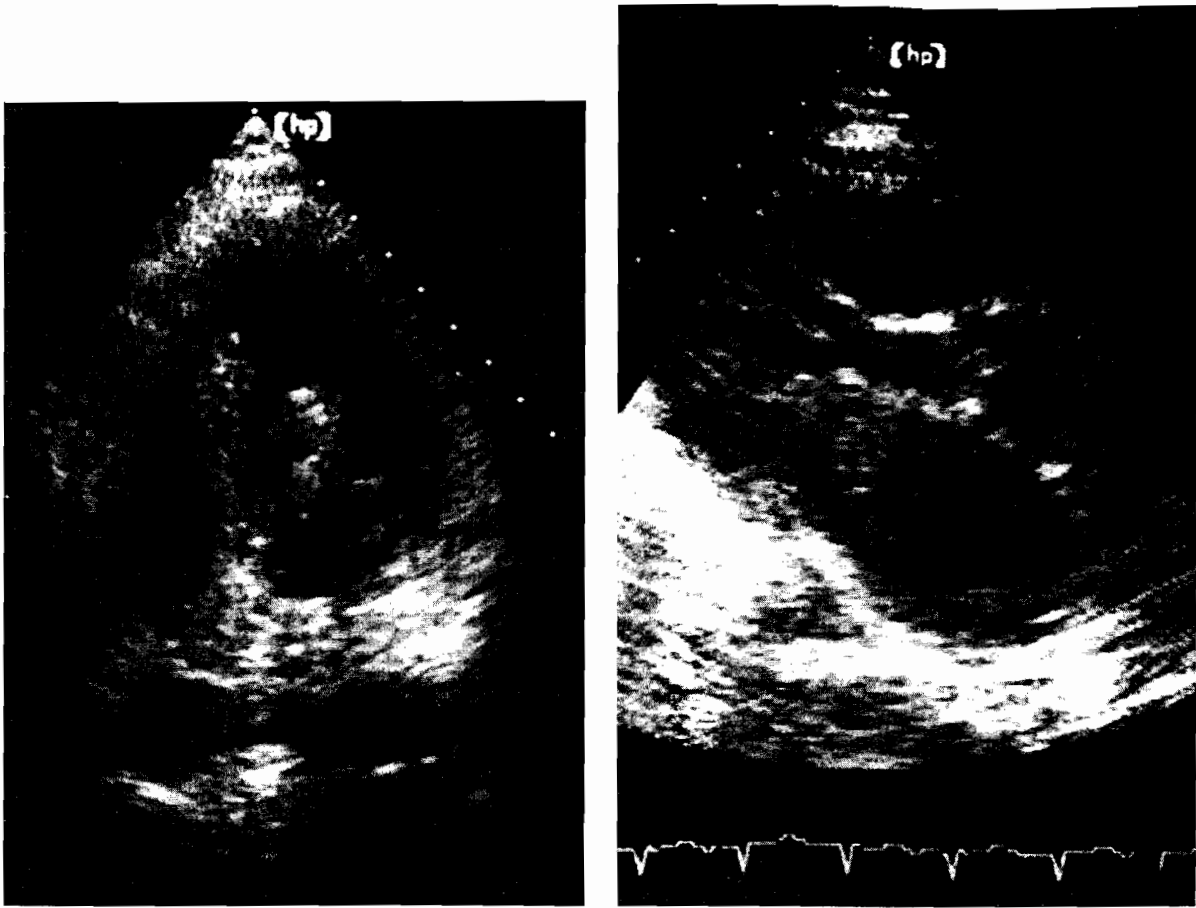


Figure 1. (Left) Apical two-dimensional echocardiogram showing ball thrombus at left ventricle. (Right) Parasternal two-dimensional echocardiogram showing ball thrombus at left atrium.

cm². There was only trivial aortic regurgitation. The left ventricle was not enlarged (4.6 cm) but contained a spherical free-floating thrombus approximately 4 cm in diameter.

A diagnosis of chronic rheumatic heart disease with combined mitral and aortic valve stenosis complicated by free-floating ball thrombi in the left atrium and ventricle was made. The patient was started on heparin and anti-failure medication. Urgent mitral and aortic valve replacement with thrombectomy was recommended, but consent was refused. The next day the patient collapsed suddenly and rapidly became asystolic. Attempts at resuscitation were unsuccessful.

Discussion

The formation of a free-floating ball thrombus within the left atrium is a rare clinical entity.² It usually occurs in an enlarged left atrium associated with a diseased mitral valve.

To our belief, the occurrence of free-floating ball thrombi in both the left atrium and left ventricle concomitantly has never been reported. Clinically, a free-floating ball thrombus can produce symptoms of heart failure, embolize peripherally, or cause sudden death.³ Our patient illustrates all these problems. She had two free-floating ball thrombi in the heart, symptoms of heart failure and weakness of lower extremities (probably due to peripheral embolization), and ultimately sudden death in a short period of time. Moreover, our patient had many typical findings that predisposed her to a free-floating left atrial thrombus, including atrial fibrillation, chronic mitral stenosis, and lack of regular medical follow-up due to non-compliance. There was no evidence of infection, nor did systemic symptoms or findings suggest the presence of a neoplasm. Therefore, it is suggested that when a ball thrombus is suspected on clinical grounds, echocardiography

should be performed without delay. Once the diagnosis of a free-floating ball thrombus is made, prompt surgical removal is mandatory, as fatal complications often occur shortly thereafter.

Rheumatic mitral valve disease is associated with the development of intracavitary left atrial thrombi.¹ Echocardiography has become the primary tool in the noninvasive diagnosis of such lesions. The major consequence of free-floating thrombi is acute hemodynamic decompensation due to left ventricular inflow obstruction, the so called "hole-in-one thrombus" effect.³ The sudden death of our patient may be due to incarceration of ball thrombus in the mitral orifice, or even a "hole-in-two thrombi" effect, as there were, in fact, two contributory free-floating thrombi in her heart. Moreover, acute systemic emboli occurring in association with a free-floating left atrial thrombus have also been reported.^{4,5} Thromboembolization in patients with free-floating thrombus may be due to the detachment of the thrombus itself, from fragmentation of the ball thrombus as it is traumatized by the valve during ventricular systole, or arise within the atrium independently from the ball thrombus.⁴ Whatever the mechanism, although autopsy was not performed in our patient (as consent was refused by her family), her lower extremity weakness and diminished pulses were most likely due to acute systemic embolization from the heart.

Ball thrombi are thought to originate as a

small mural thrombus that gradually enlarges and forms a projecting mass that remains attached by a pedicle to the atrial wall.⁶ As the thrombus enlarges, the pedicle lengthens and thins until eventually the clot separates or fragments.⁷ We believe that our patient's ball thrombus developed in the left atrium in this manner. We further speculate that the clot fragments from the left atrium embolized to the left ventricle, and because of the obstruction of the left ventricular outflow due to the concurrent existence of aortic stenosis, later evolved into another ball thrombus in the left ventricle.

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