

A Case of Ball Valve Thrombus

S. THANIKACHALAM, M.D., D.M., G. SENGOTTUVEL, M.D.,
SUSAN GEORGE, M.D., D.N.B., M. SAMPATH KUMAR, M.D.,
R. V. SHIVAKUMAR, M.D., K. R. BALAKRISHNAN, M.S., M.CH.,
and J. S. N. MURTHY, M.D., D.N.B.

Sri Ramachandra Medical College and Research Institute, Porur, Chennai, Tamil Nadu, India

Ball valve thrombus is a very rare cardiac pathological entity; most case reports are postmortem. It is always associated with a very tight rheumatic mitral stenosis. The antemortem diagnosis of ball valve thrombus has become easy with the advent of echocardiography and even easier with biplane or multiplane transesophageal echocardiography, including the three-dimensional acquisition of images. We present the case of a patient with a ball valve thrombus diagnosed during routine echocardiographic examination as a prelude to surgery. (ECHOCARDIOGRAPHY, Volume 16, February 1999)

left atrial ball valve thrombus, transesophageal echocardiography, ball valve thrombus, three-dimensional image of ball valve thrombus

Three decades ago, before the advent of echocardiography, the diagnosis of ball valve thrombus was based only on autopsy findings. The diagnosis has been made easy with the use of transthoracic and transesophageal modalities of investigations.¹⁻³ To our knowledge, this is the first case report of a ball valve thrombus diagnosed with three-dimensional imaging.

Case Report

A 48-year-old man presented with the history of progressive dyspnea over 7 years and paroxysmal nocturnal dyspnea and orthopnea of 2 months' duration. There was no history of rheumatic fever. Physical examination revealed an apprehensive, orthopneic man. His pulse was haphazardly irregular with pulse deficit of 18/min. His peripheral arterial pulses were well felt. His blood pressure was 110/80 mmHg, and his mean jugular venous pressure was not elevated.

Cardiovascular examination revealed an

apex beat in the fifth left intercostal space 1 in. lateral to the midclavicular line; it was of the right ventricular type. There was moderate parasternal heave with palpable pulmonary valve closure. The first heart sound was of varying intensity, and the second heart sound had close split with an accentuated pulmonary component. There were presystolic and mid-diastolic murmurs over the apex. The opening snap was low pitched and close to the second heart sound. Abdominal and respiratory systems were normal.

A 12-lead surface electrocardiogram showed atrial fibrillation, right-axis deviation, and moderate right ventricular hypertrophy. The chest roentgenogram showed a cardiothoracic ratio of 0.6 with marked left atrial enlargement, severe pulmonary venous hypertension, and moderate pulmonary arterial hypertension.

Echocardiography was done with a Hewlett Packard Sonos 2500 instrument. Both transthoracic and multiplane transesophageal studies revealed severe mitral stenosis with a valve area of 1 cm² and a mitral valve score of 8. The peak and mean gradients across the stenotic valve were 25 and 17.5 mmHg, respectively. Color Doppler images indicated mild mitral regurgitation. There was a large (2.7 × 2 cm)

Address for correspondence and reprint requests: Dr. S. Thanikachalam, M.D., D.M., Department of Cardiology, Cardiac Care Centre, Sri Ramachandra Medical College and Research Institute, Porur, Chennai, Tamil Nadu, India. Fax: 91-44-4826990.

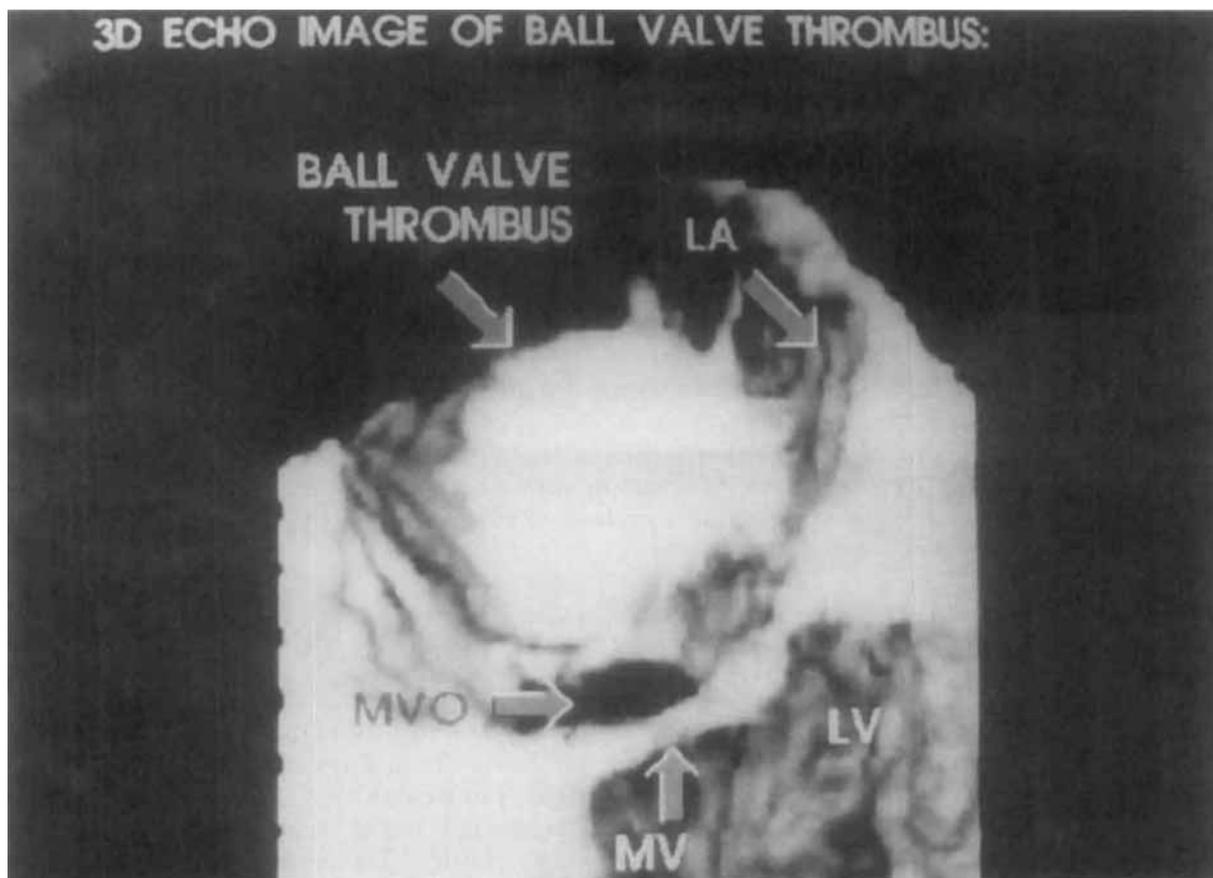


Figure 1. Three-dimensional reconstruction of the left atrium, mitral valve inflow portion of left ventricle, showing a ball valve thrombus within the left atrial cavity. LA = left atrium; LV = left ventricle; MV = mitral valve; MVO = mitral valve orifice.

free, oval-shaped clot moving freely inside the left atrial cavity; this ball valve thrombus intermittently obstructed the stenosed mitral valve orifice. Three additional clots were seen in the left atrial appendage and¹ on the roof of left atrium.

With the tip of multiple transesophageal probe at the midesophageal level, acquisition for three-dimensional (3-D) images was done with respiratory, electrocardiographic gating and by the rotational method. Three-dimensional reconstruction of acquired images was done by a volume-rendering method using a TomTec Scan version 3.1 (Fig. 1).

The (3-D) image revealed left atrial cavity, the stenosed mitral valve orifice, and a free oval-shaped clot—the ball valve thrombus. The ball valve thrombus was seen as an oval mass with

an irregular surface; it was freely moving and often occluded the stenotic mitral valve orifice. The appearance of an irregular surface of the ball valve thrombus could be the result of disparity between the frame rate of acquisition and the spin rate of ball valve thrombus; it could also be due to its erratic direction of movement.

The patient underwent surgery on the same day of the study, and the findings were confirmed. Clots were removed, and mitral valve repair was made.

Discussion

Ball valve thrombus is always associated with mitral stenosis with atrial fibrillation.⁴ This entity is known to be associated with systemic emboli, cerebral and peripheral emboli-

zation,⁵ syncope,⁶ acute pulmonary edema,⁷ and, rarely, myocardial infarction.⁸ In 1955, Read et al.⁹ reviewed the clinical details of 60 cases that were diagnosed postmortem. From 1976 through 1990, 11 cases were reported that were diagnosed with echocardiography.¹⁻³

Because there may not be specific symptoms, as in the present case, to indicate the presence of ball valve thrombus, a high degree of suspicion is necessary, especially in patients with severe mitral stenosis who have chronic atrial fibrillation and a large left atrium. Prompt recognition and management will avert shock and sudden death. The role of routine long-term oral anticoagulation in the high-risk group will prevent this complication. Three-dimensional imaging helps to identify the relation of ball valve thrombus to left atrial cavity and narrowed mitral orifice in real time.

Conclusion

We report the (3-D) imaged appearance of ball valve thrombus in a patient with tight mitral stenosis and atrial fibrillation.

References

1. Balbarini A, Pugliese P, Mariani M: Echocardiographic and surgical findings of a ball-like thrombus floating freely in the left atrium. *J Cardiovasc Surg* 1987;28:135-138.
2. Furukawa K, Katsume H, Matsukubo H, et al: Echocardiographic findings of floating thrombus in left atrium. *Br Heart J* 1980;44:599-601.
3. Sunagawa K, Yasuhiko O, Tanaka S, et al: Left atrial ball thrombus diagnosed by two dimensional echocardiography. *Am Heart J* 1980;100:89-94.
4. Elson J: Free ball thrombus of the left auricle. *Am Heart J* 1934;10:120-123.
5. Wisley D, Lee I, Parker F, et al: Recurrent systemic embolisation from left atrial ball thrombus. *NY State J Med* 1990;9:74-75.
6. Gottdiener JJ, Temeck BK, Patterson RH, et al: Transient occlusion of the mitral valve orifice by a free floating left atrial ball thrombus identification by two dimensional echocardiography. *Am J Cardiol* 1984;53:1730.
7. Smithies F: Cardiac thrombosis: The clinical and pathological features in three cases. *JAMA* 1909;17:1347-1353.
8. Wisely D, Giambartolomei A, Lee I, et al: Left atrial ball thrombus: Review of clinical and echocardiographic manifestations with suggestions for management. *Am Heart J* 1991;121:1784-1790.
9. Read SL, Porter RR, Russl S, et al: Occlusive auricular thrombi. *Circulation* 1955;12:250-258.

