Case Reports

Visualization of Right Atrial Thrombus Associated with Constrictive Pericarditis by Indium-111 Oxine Platelet Imaging

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A right atrial thrombus is not often seen and only a few reports of visualization have been described. We report a 44-yr-old man who had a large atrial thrombus associated with constrictive pericarditis. Two-dimensional echocardiography and computed tomography showed a large right atrial mass. Indium-111 oxine platelet deposition was demonstrated on the surface of thrombus by platelet imaging. Platelet imaging was useful for differential diagnosis from cardiac tumor, and as an indication for surgical treatment, since right atrial thrombus may have a high risk of pulmonary embolism or severe right heart failure.


Detection of intracardiac thrombi is very important in determining the application of anticoagulant therapy or surgical treatment, since patients with such thrombi are at risk for systemic embolism (1). At present, two-dimensional echocardiography, computed tomography and indium-111 (111In) oxine platelet imaging can be used for the noninvasive diagnosis of intracardiac thrombi (2-4). Left-sided cardiac thrombi are often associated with myocardial infarction, dilated cardiomyopathy or mitral valve disease. On the other hand, right-sided cardiac thrombi are less often seen and only a few case reports of right atrial thrombi have been described in the literature (5-7). We encountered a patient who had a large right atrial thrombus associated with constrictive pericarditis, which was differentiated from cardiac tumor by [111In]oxine platelet imaging.

CASE REPORT

A 44-yr-old man was admitted to our hospital with a 4-yr history of progressive dyspnea on exertion. On admission, physical examination revealed an irregular pulse at 52/min and a blood pressure of 114/74 mmHg. A grade 3 diastolic rumbling murmur was audible best at the apex. Moderate pitting edema and hepatomegaly were also noted. The electrocardiogram showed a negative T in II, III, aVF, and nonspecific ST depression in V4-V6 with atrial fibrillation. The chest x-ray showed marked cardiomegaly. Pleural thickening and calcification were also observed. Laboratory findings were almost normal except for elevation of serum GPT (54U/l) and GOT (51U/l) and alkaline phosphatase (125U/l). Intracutaneous tuberculin test was positive (32 × 50 mm).

Cardiac Imaging

Two-dimensional echocardiography was performed using a Toshiba SSH-11A pulsed array sector scanner. Both ventricular dimensions were normal, while both atria were dilated. A large mass was demonstrated in the right atrium in the sagittal view (Fig. 1). Computed tomography was performed using a CT/TX2 8800 scanner. All computed tomograms were obtained without gating. Sustained enhancement was obtained with a rapid intravenous infusion of 30% meglumine iothalamate (200 ml). A large filling defect was demonstrated in the right atrium from the appendage to the level of the diaphragm. Calcification was also demonstrated inside the right atrial thrombus (Fig. 2).

Indium-111 oxine was used for platelet labeling. Blood collection, platelet separation, and labeling were performed according to the method of Heaton et al. (8). Platelet imaging was performed in the anterior and left anterior oblique view using an Anger camera, 72 hr after intravenous injection of 800 μCi of [111In]oxine platelet. Indium-111 oxine platelet deposition was demonstrated at the surface of right atrial thrombus (Fig. 3).
FIGURE 1
Two-dimensional echocardiogram in sagittal approach revealed large echo mass in the right atrium. Th = thrombus RA = right atrium, LA = left atrium.

Cardiac catheterization and contrast angiography were performed using the Siemens Angioscope. Intracardiac pressures were as follows: right atrium-12 mmHg, right ventricle-30/5 mmHg, pulmonary artery-31/13 mmHg, and left ventricle-120/16 mmHg. In addition, a dip and plateau pattern (fluid filled tip) was demonstrated in both ventricles. Right atrial angiogram showed a filling defect. Left ventriculography revealed normal wall motion and normal ejection fraction.

Surgical Findings
The patient was diagnosed as having a large atrial thrombus associated with constrictive pericarditis. In consideration of the risk of pulmonary embolism, or right heart failure, removal of the right atrial thrombus and pericardectomy were performed. The atrial thrombus, which was partially organized was demonstrated (Fig. 4).

DISCUSSION
Intracardiac thrombi of the left ventricle are often associated with myocardial infarction and dilated cardiomyopathy, while those of the left atrium are associated with mitral valve disease. It is important to detect intracardiac thrombi, since thrombus formation may lead to systemic embolization in these patients (1). In comparison with left-sided cardiac thrombi, right atrial thrombi are less frequent. A few reports in patients with a permanent transvenous pacemaker (5), atrial venous alimentation (6), or ventriculo-atrial shunt (7) have been described. Right atrial thrombus with constrictive pericarditis, however, has not been reported. In this case, thrombus formation was considered to be due to

FIGURE 2
A: Calcification at the right atrium (small arrows) was shown by plain computed tomogram. B: A large filling defect (large arrows) was shown in the right atrium by contrast computed tomogram.
intracardiac blood stasis secondary to decreased diастolic compliance (9), as well as to atrial fibrillation. Right atrial thrombus also have a high risk of pulmonary thromboembolism, or severe right heart failure and may lead to death. Thus, detection of a right atrial thrombus is as important to determine surgical treatment as detection of left-sided cardiac thrombi.

Echocardiography and computed tomography are widely used for such anatomic diagnosis as thrombus size (2,3). However, the cardiac tumor produces a filling defect or tumor echo pattern same as cardiac thrombi (10). It is difficult to differentiate thrombus from tumor by these methods. On the other hand, platelet imaging, which detects ongoing platelet deposition on the thrombus surface, can directly establish thrombus formation and indicate its activity (4). In this case, $[^{111}\text{In}]$oxine platelet deposition was specific for the presence of right atrial thrombus and useful to direct surgical removal of the thrombus. In conclusion, a rare case with right atrial thrombus associated with constrictive pericarditis was evaluated with platelet imaging and compared with echocardiography and computed tomography. Platelet imaging was useful to differentiate a large thrombus from cardiac tumor.

**FIGURE 3**

$[^{111}\text{In}]$oxine platelet deposition (arrows) was demonstrated at the surface of right atrial thrombus by platelet imaging. ANT = anterior view; LAO = left anterior oblique view.

**FIGURE 4**

Surgically excised right atrial thrombus, partially organized.
NOTES

* General Electric, Milwaukee, WI.
† Ohio Nuclear 410S.
‡ Searle-Siemens Medical Systems, Inc., Des Plaines, IL.

REFERENCES