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A Case Report of Intraatrial Thrombus with Echogenic Blood Stasis Examined by Transesophageal Echocardiography

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ABSTRACT

Using transesophageal echocardiography (TEE), intraatrial thrombus was visualized clearly with fine mistlike echoes which are reported to be detected when the blood flow is stagnant or ceased. The echoes showed slow, clockwise, circular movement in the left atrium, and were confirmed to show the real flow with two-dimensional color Doppler TEE. They were different from those echoes seen as contrast echoes which are more coarse, more echogenic, and accompanied with slight side lobes.

TEE demonstrated slight mitral regurgitation which was not detected with conventional echocardiography conducted preoperatively. It is not certain whether such slight regurgitation has some clinical significance or not. However, accompanied with drainage flow from the pulmonary veins, the trivial regurgitation seemed to cause slow circulatory movement in the left atrium and turbulant flow around the left auricle. As we previously reported, the blood in the left atrium is strongly stirred in the cases or marked mitral regurgitation. This might explain the reason why the intraatrial thrombus is rarer in the case of mitral regurgitation than in pure mitral stenosis.

Key words: *Intraatrial thrombus, Mitral stenosis, Transesophageal echocardiography*

Thrombosis is one of the most serious complications of mitral stenosis. Stagnation of blood flow in the dilated left atrium, often accompanied by atrial fibrillation, is considered to be an important factor of thrombogenesis[4]. On the other hand, blood becomes echogenic when it is stagnant, namely in cardiac arrest or myocardial infarction[2].

We experienced a case which showed a similar echoes and thrombus in the left atrium, observed with transesophageal echocardiography, so we are going to report it.

CASE REPORT

A 53 years old female was admitted to the Hiroshima University Hospital on September 1, 1987 for the operation of mitral stenosis (MS). She had been suffered from MS with atrial fibrillation (Af) for 30 years, cerebral embolism when she was 43 and 48 years old, and myocardial infarction when 48 years old. She had no history of hepatic disease, esophageal varices, or other disease in the mouth and esophagus.

Preoperative echocardiographic study provided evidences of severe MS without regurgitation, mild tricuspid regurgitation, and dilation of the left atrium (LA) in which thrombus was found.

Table 1. Results of cardiac catheterization

site	pressure
Right atrium	7/ 1
Right ventricle	50/ 0
Pulmonary artery	58/25
PCWP	38/25 (35)
Left Ventricle	140/ 5 (60)
LVEDP	4
Aorta	142/84
Cardiac output	2.28 L/min

Pressures shows systolic/diastolic (mean) pressures in mmHg.
PCWP: pulmonary capillary wedge pressure,
LVEDP: left ventricular end-diastolic pressure.

Cardiac catheterization showed increased pulmonary capillary wedge pressure and pulmonary arterial pressure and decreased cardiac output (Table 1).

Mitral valve replacement (MVR) and tricuspid annuloplasty was performed on september 16. After the induction of general anesthesia, a probe of transesophageal echocardiography (TEE),

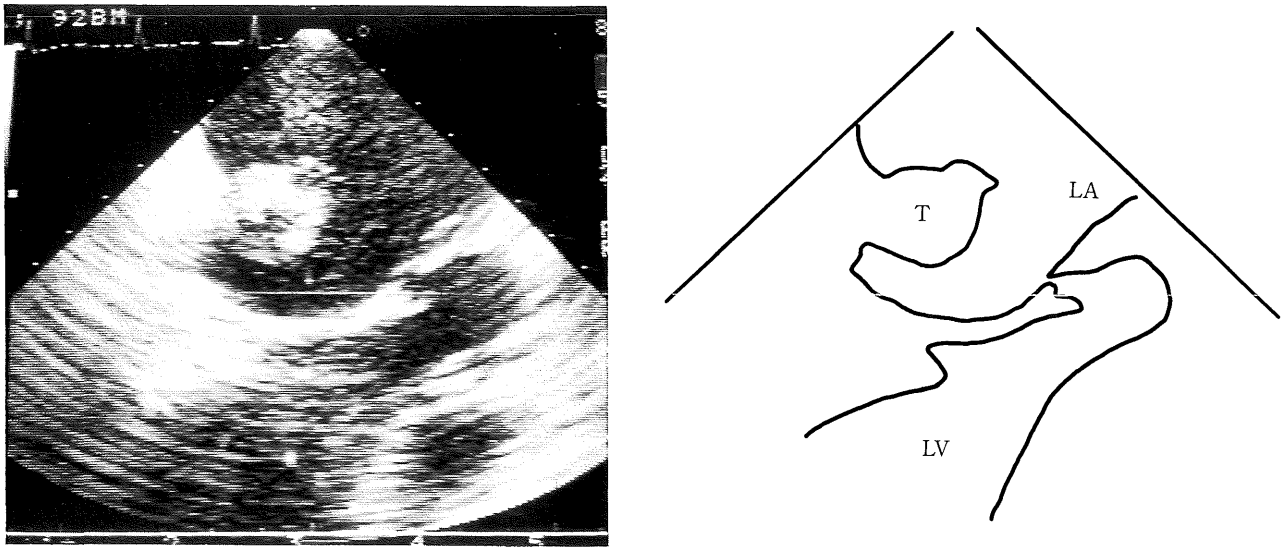

Fig. 1. Two-dimensional transesophageal echocardiogram showing dilated left atrium and polypoid thrombus in it. LA: left atrium, T: thrombus, LV: left ventricle.

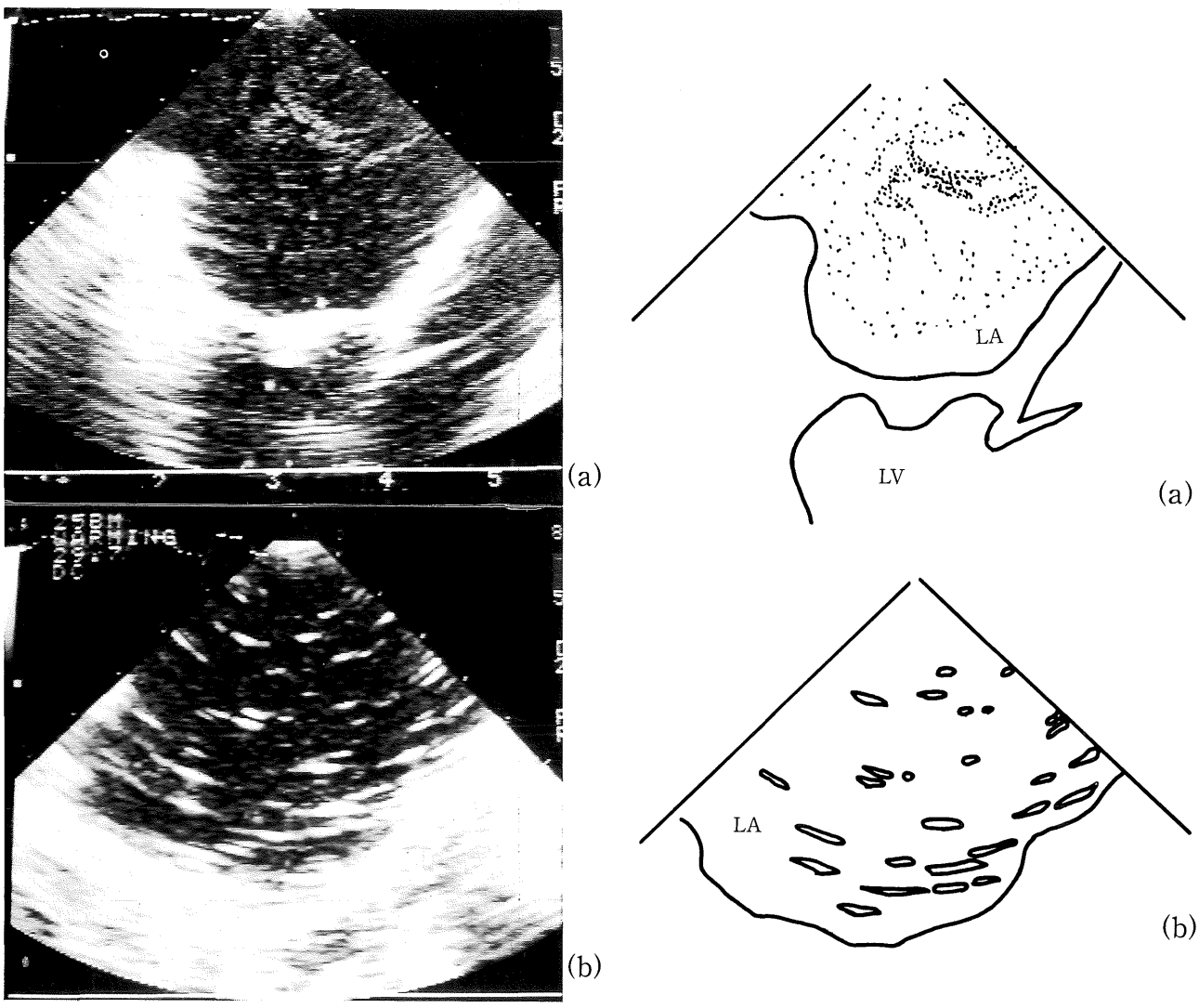

Fig. 2. Two-dimensional transesophageal echocardiogram showing the left atrium with (a) fine mist-like echoes and (b) contrast echoes several seconds after injection of cold water from thermodilution catheter.

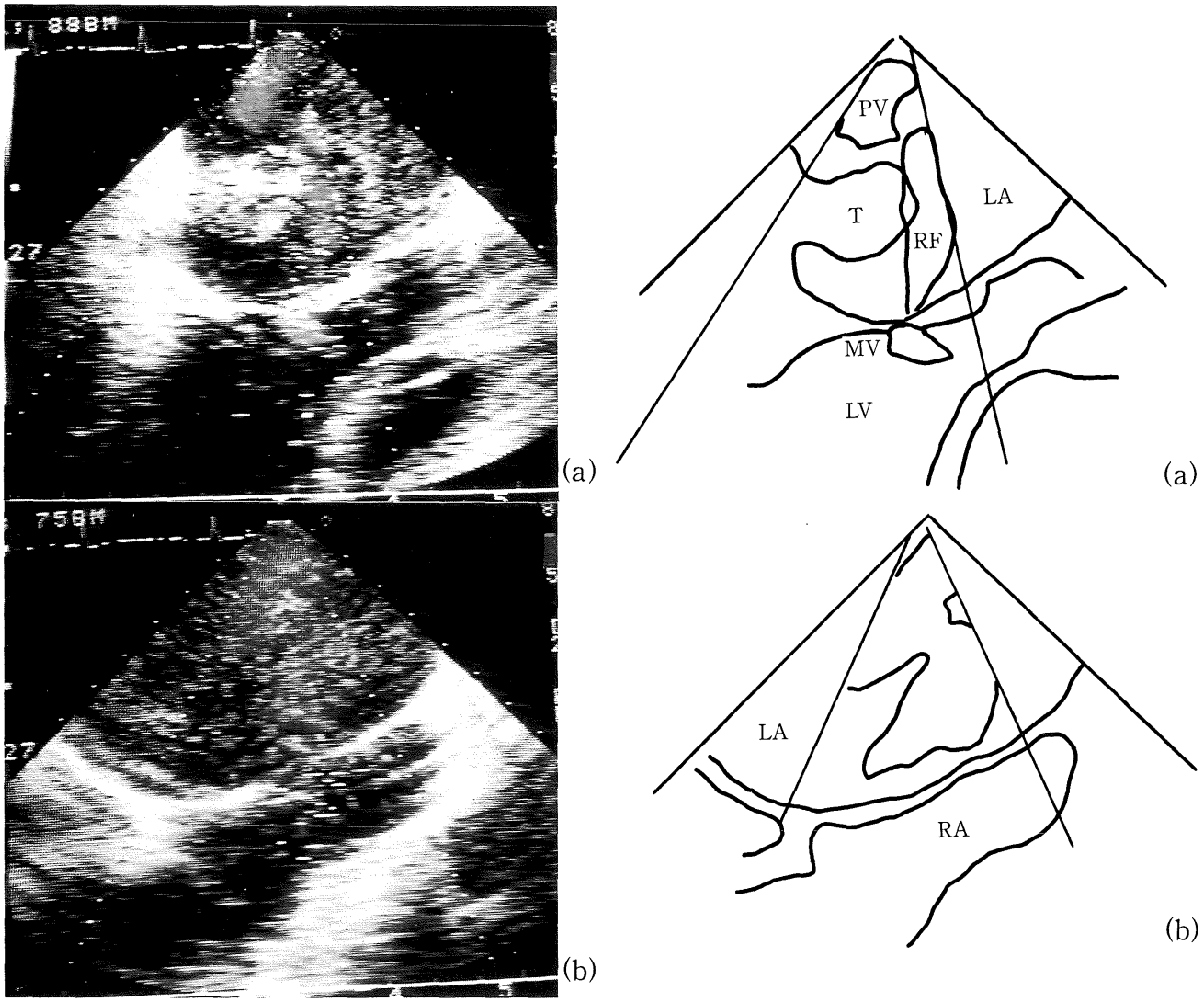

Fig. 3. Two-dimensional color Doppler transesophageal echocardiogram showing (a) flow toward the transducer from the mitral valve and from the left pulmonary vein and (b) flow away from transducer near the intraatrial septum.
LA: left atrium, LV: left ventricle, MV: mitral valve, T: thrombus, LPV: flow from the left pulmonary vein, RF: regurgitant flow, RA: right atrium.

UST-5220VS-5 (Aloka, Tokyo), was inserted into the esophagus. The probe was attached to an ultrasonograph apparatus, SSD-860 (Aloka, Tokyo). The images were recorded on a videotaperecorder, AG-6300 (National, Tokyo).

Using two-dimensional TEE (2D-TEE), dilated left atrium and polypoid thrombus in it were clearly visualized (Fig. 1). The thrombus was attached to the left wall near the left atrial appendage with its stalk. Additionally, fine mistlike echoes — 1 to 2 mm in size — were found, which showed slow, clockwise, circular movement in the LA (Fig. 2a). In the left ventricle and aorta they were not found clearly and could not be differentiated from artifacts. They were not detected in the right atrium or the right ventricle. They were finer than contrast echoes of small bubbles which are more echogenic and bigger in size (3 to 4 mm, Fig. 2b).

With two-dimensional color Doppler TEE (2D-CD-TEE), red flow, which indicates a flow toward the transducer, was seen from the left pulmonary vein toward the posterior wall of the LA and from the mitral valve (MV) toward the left posterior wall of the LA (Fig. 3a). Blue flow, which indicates a flow away from the transducer, was seen near the intraatrial septum (Fig. 3b). These findings were compatible with those provided with 2D-TEE.

After MVR, these echoes disappeared from the LA.

DISCUSSION

Blood flow stasis is considered to be a factor of thrombogenesis[4]. It often occurs in the left atrium (LA) in cases of mitral stenosis (MS), especially when accompanied by atrial fibrillation (Af). On the other hand, when intracardiac blood is stagnant or nonmoving, it becomes more echogenic[2]. However, the incidence of positive echogenic findings in the

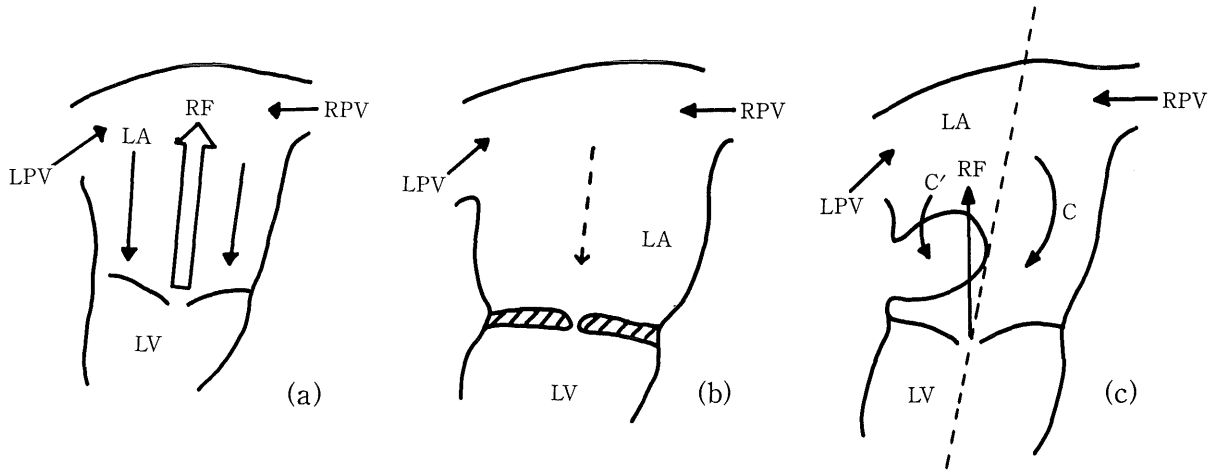

Fig. 4. Shemes of blood flow in (a) mitral regurgitation, (b) pure mitral stenosis, and (c) mitral stenosis with trivial regurgitation. LA: left atrium, LV: left ventricle, RF: regurgitant flow, LPV: left pulmonary vein, RPV: right pulmonary vein, C: clockwise rotation, C': counterclockwise rotation.

dilated LA is very low when the LA is observed with conventional echocardiography (only four cases in 4200 echocardiographic studies)[3]. In the current case, intraatrial echoes were visualized clearly with transesophageal echocardiography (TEE), but not detected with conventional echocardiography. It might be said that TEE can provide clearer visualization of the LA than conventional echocardiography and the intraatrial echoes may be detected with much higher incidence using TEE[5].

The circular movement of the smoky echo detected with two-dimensional TEE (2D-TEE) was compatible with the actual flow, confirmed with two-dimensional color Doppler TEE (2D-CD-TEE). The clinical significance of these findings is uncertain yet, but it may be helpful in explaining the mechanism of thrombogenesis in the LA.

Generally, the incidence of thrombosis is higher in cases of pure MS than in those of mitral regurgitation with or without stenosis (MSR or MR)[1]. In cases preoperatively diagnosed as MSR or MR, significant regurgitant flow was seen with 2D-CD-TEE, which reached the posterior wall of the LA[5]. With such a marked regurgitation, the blood in the LA is supposed to be stirred strongly and the faster circular movements might occur, thus thrombogenesis is thought to be less probable (Fig. 4a).

In pure MS, where no regurgitant flow occurs, only the drainage flow of the right and left pulmonary vein caused flow in the LA, followed by very slow movement of blood. This might enhance formation of thrombus (Fig. 4b).

In the current case, mitral regurgitation had not been detected with conventional echocardiography but was detected with 2D-CD-TEE, and it might cause circular movement of blood in the LA. The regurgitant flow was slow and toward the left posterior wall rather than along the long axis of the heart (Fig. 4c,R), and, combined with slow drainage flow from the left pulmonary vein (Fig. 4c,LPV), might cause a slow clockwise, circular movement (Fig. 4c,C). In addition, it also caused a minor counterclockwise circular flow near the left atrial appendage (Fig. 4c,C'), which might have been a factor of thrombogenesis.

It is not certain why intraatrial echoes disappeared after MVR. Regurgitant flow was found around the prosthetic valve, but they were slower and originated from several sites compared with only one origin before MVR.

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