Cross-Sectional Echocardiographic Findings of Left Ventricular Thrombi in a Ten-Year-Old Patient with Cardiomyopathy

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SUMMARY

Using cross-sectional echocardiography, left ventricular thrombi were easily found in a 10-year-old boy suffering from congestive heart failure resulting from long-standing endocardial fibroelastosis. Ten days after this procedure, the patient suddenly manifested the signs of acute embolic occlusion of the abdominal aorta and succumbed. Emboli removed from the aorta were histologically confirmed to be organized thrombi. Cross-sectional echocardiography was useful in the antemortem detection of left ventricular thrombi in this pediatric patient.

Additional Indexing Words:
Endocardial fibroelastosis  Left ventricular mural thrombus  M-mode echocardiography

ALTHOUGH left ventricular mural thrombi are occasionally found in the autopsied patients suffering from various heart diseases,1) they are rarely detected antemortem, and few articles have appeared describing their angiographic or echocardiographic findings.2)-6) This study presents M-mode and cross-sectional echocardiographic findings on left ventricular thrombi in a 10-year-old boy with long-standing endocardial fibroelastosis.

CASE REPORT

K. T., a 10-year-old boy, appeared normal until he was 3 months of age, when he was noticed to have hoarseness and anorexia. He had gradually developed overt congestive heart failure. At the age of 5 months, he was diagnosed as having endocardial fibroelastosis and was admitted to the National Children's Hospital. After 4 months of hospitalization, he had returned to fairly sound condition, although he required continuation of digoxin and diuretics. By the age of 6 years, he had
been admitted twice to another hospital because of pneumonia and aggravation of congestive failure. Since enrollment in school, he had lived a very restricted life. Then, in mid March 1978, he had oliguria and orthopnea, and had become very inactive following an upper respiratory infection. On March 27, 1978, he was admitted as an emergency patient to the Jichi Medical School Hospital.

Physical findings on admission:

K.T. was a small, under-nourished child, 119.1 cm in height and 18.5 Kg in weight. His facial appearance was pale and puffy, but not cyanotic. Blood pressure was 98/50 mmHg. His jugular veins were distended, and the prominence of the left-side of his chest was marked. Breathing was shallow and rapid, and moist rales were audible along both sides of the back. On auscultation, the second sound was single and loud, and the fourth sound was accentuated with gallop rhythm. No murmur could be discerned. The liver felt firm with a rounded edge 4.0 cm below the costal margin.

Laboratory findings:

Chest roentgenogram revealed marked cardiomegaly, pulmonary congestion, and pneumonic infiltration in the right lower lobe. An electrocardiogram showed first degree atrioventricular block, right and left atrial hypertrophy, right axis deviation, and left ventricular hypertrophy with strain.

Course after admission:

Although K.T. had made some improvement during his period of hospitalization, on April 6 he suddenly complained of numbness of the legs, which were very cold to the touch. Pulsation of the femoral arteries was not palpable. Acute embolic occlusion of the abdominal aorta was suspected and promptly confirmed through cross-sectional abdominal echography and angiography. Thromboemboli in the aorta were removed with a Fogarty thrombectomy catheter, but the bilateral renal arteries and the superior mesenteric artery were not revealed by the aortography performed immediately after thrombectomy. A venous catheter inserted from the right saphenous vein showed the systolic pressure in the right ventricle

![Fig. 1. A forward left ventriculogram taken in the posteroanterior projection, showing 2 round shadow defects in the left ventricle (arrows).](image-url)
and the pulmonary artery to be 80 mmHg, and a forward left ventriculogram obtained from a pulmonary arterial injection revealed 2 round shadow defects in the left ventricle, one in contact with the lateral wall, the other in the apex (Fig. 1). A laparotomy was then performed. This revealed shower emboli in the renal, splenic, and superior mesenteric arteries and multiple infarctions of the kidneys, spleen, and small intestine. Ventricular fibrillation developed during resection of the necrotized small intestine, and the patient failed to respond to resuscitative efforts. Postmortem examination was not allowed by the parents. Histological

Fig. 2. Cross-sectional echocardiograms. The schema illustrated shows scanning lines of each echocardiogram. Note the masses in the left ventricular cavity. A=aorta; LA=left atrium; LV=left ventricle; RA=right atrium; RV=right ventricle; T=thrombus.
examination of the emboli removed from the abdominal aorta revealed them to have the appearance of white thrombi.

**Echocardiographic findings:**

A cross-sectional echocardiographic examination was performed on the day of admission, using an Aloka SSD-200B with a mechanical sector scanner. The images were recorded on both videotape and 8 mm cine film. Echo images of the patient's heart showed marked dilatation and poor contraction of both ventricles, especially the left one. The thickness of the left ventricular wall was increased symmetrically. There were 2 round masses 2 to 3 cm in diameter attached to the posterolateral wall in the left ventricular cavity, which were not related to the mitral valve leaflets or papillary muscles (Fig. 2). These masses, also suspected on M-mode echocardiography (Fig. 3), are thought to be the left ventricular thrombi.

![Fig. 3. A M-mode echocardiogram scanned along the long axis of the left ventricle from the aortic root to the apex. Note the massive cluster of echos in the left ventricular cavity near the apex. A=aorta; AML=anterior mitral leaflet; IVS=interventricular septum; LA=left atrium; LV=left ventricle; LVPW=left ventricular posterior wall; RV=right ventricle; T=thrombus.](image)

**DISCUSSION**

Left ventricular mural thrombi are not uncommonly found associated with such heart diseases as coronary heart disease, cardiomyopathy, or myocarditis at postmortem examination. Antemortem detection, however, is rather rare, although Hamby et al have reported angiographic findings on left ventricular mural thrombi in 22 patients with symptomatic coronary artery disease. There are very few reports dealing with echocardiographic findings of thrombus in the left ventricle. Levisman et al have reported on an echocardiogram of a mobile, pedunculated tumor in the left ventricle of a woman manifesting multiple emboli. The surgically excised tumor was histologically diagnosed as a thrombus with early organization. Horgan et al have reported on a patient with extensive myocardial infarction, in whom a left ventricular thrombus was suggested by echocardiogram and was confirmed
on pathological examination.4) DeJoseph et al also described the echocardiographic findings on a large apical left ventricular thrombus in an old man with angina pectoris.5) These 3 papers report findings derived from M-mode echocardiography. Ports et al have very recently reported M-mode and 2-dimensional echocardiographic findings of left ventricular masses in adults.6) They were able to identify the thrombi in the left ventricle by 2-dimensional real-time echocardiography, in 4 out of 8 patients with left ventricular thrombi.

We performed a cross-sectional echocardiographic examination in patient with long-standing endocardial fibroelastosis, and found round masses in the left ventricle. Although conventional M-mode echocardiography was also able to detect a suspected abnormal massive echo band near the apex of the left ventricular cavity, detection was much easier and definitive when using the cross-sectional method. These masses were confirmed as thrombi, though confirmation was indirect, relying on histological examination of the emboli removed from the aorta. All of the previously reported cases of left ventricular thrombi were in adults, most of whom had coronary heart disease. The use of echocardiography to successfully diagnose left ventricular thrombi in endocardial fibroelastosis has not been previously reported, although mural thrombi have been described as one of the pathological complications of endocardial fibroelastosis.

The usefulness of echocardiography, especially of cross-sectional echocardiography, for the antemortem detection of left ventricular thrombi, even in pediatric patients, should be emphasized.

REFERENCES