Case Report

Echocardiographic Recognition of the Cardiac Mural Tumor

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SUMMARY

An abnormal echocardiographic signal was detected in the myocardium on the echocardiographic examination of the septum and posterior left ventricular wall in a patient found to have lymphosarcoma which was diffusely infiltrated in the myocardium. This echocardiographic abnormality was well correlated with the autopsy findings. Echocardiography appears to be one of useful methods in diagnosing cardiac mural tumor antemortemly.

Additional Indexing Words:
Echocardiography Non-invasive method Cardiac mural tumor

ECHOCARDIOGRAPHY has been well established as a diagnostic tool of the structure of the heart.1) Many kinds of structural abnormalities from the pericardium to the intracardiac cavity such as pericardial effusion,2) hypertrophic obstructive cardiomyopathy,3) and intracardiac tumors,4) have been detected noninvasively with the echocardiography. Recently an analysis of the phasic movement of the posterior wall of the left ventricle on the echocardiogram demonstrated its ability to estimate left ventricular function5) and to detect the ventricular aneurysm.6)

The incidence of cardiac tumors is low, and its antemortem diagnosis is very difficult because of a few clinical clues and of variable correlation between the size and extent of cardiac mural tumors and their clinical manifestation.7),8) This article reports the abnormal echocardiographic recordings of the mural tumor and shows the correlation between the echocardiographic and autopsy findings.

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CASE REPORT

A 63-year-old woman, S.Y., was referred to the Kyushu University Hospital for progressive dyspnea and anorexia. She was well until 4 months prior to admission when exertional dyspnea and palpitation began. Symptoms were progressive steadily and by the time of admission she had had orthopnea, paroxysmal nocturnal dyspnea, and moderate pedal edema. There was no chest pain, hemoptysis or weight loss during her entire clinical course. Her past medical history was not contributory. Vital signs on admission were the temperature of 36.8°C, the radial pulse of a rate of 90 per min, regular, and the blood pressure of 88/64 mmHg. On the physical examination, the patient appeared pale and dyspneic, with slight cyanosis at the mucous membrane of the mouth. There was no paradoxical pulse. Neck veins were distended with positive hepato-jugular reflux. A Kusmaul’s sign was not evident. Moist rales were heard at the both lung bases. No abnormal cardiac pulsation was seen. The first heart sound was decreased in intensity. The second heart sound was widely split. A quadruple rhythm was heard at the apex. Neither murmur nor friction rub was present. An abdominal examination demonstrated a non-tender solid tumor, as large as a golf ball, in the epigastrium. Hepatomegaly was noted. There was pedal edema but no ascites was seen. Neurological examination was within normal range. Venous pressure was 220 mmH₂O.

Fig. 1. The chest X-ray on admission showing a marked cardiomegaly.
The arm to tongue circulation time by Dechicol was 25 sec. Complete blood counts were normal. Urinalysis showed mild proteinuria. The thyroid function studies were within normal limits.

An admission chest X-ray (Fig. 1) revealed a marked cardiomegaly (CTR 75%) while the chest X-ray a month prior to admission showed the considerably smaller cardiac size of CTR 60%. There was no parenchymal tumor in the lungs. An electrocardiogram (Fig. 2) showed a normal sinus rhythm at a rate of 88 per min, low voltage in the limb leads, diphasic P waves in the right precordial leads, right bundle branch block and non-specific T wave abnormality.

An echocardiographic examination of the heart with a Aloka SSD 60 ultrasonoscope (this instrument has a transducer 10 mm in diameter, a frequency of 2.25 megaHz, and a repetition rate of 1,300 pulses/sec) demonstrated an abnormally thick interventricular septum with a cluster of echoes. The septum was calculated to be approximately 3 cm thick. The posterior wall of the left ventricle was also thick and was composed of a few laminated heavy echoes as shown in Fig. 3. A motion of the mitral valve was normal. A comparison of the cardiac size on the chest X-ray to that on the cardiac scan with Technetium-99 m saline showed a considerable difference in the heart size between the 2 methods, which was either due to pericardial effusion or to the thickened myocardium (Fig. 4).

On the 10th hospital day, the patient fainted twice with increased fatigue and dyspnea. The blood pressure was 82/54 mmHg. Although paradoxical pulse was still not evident, cardiac tamponade due to carcinomatous pericarditis was suspected and pericardiocentesis was done. On attempting to aspirate the fluid, the patient fell into shock and expired in spite of a resuscitative emergency surgery. At autopsy, the pericardial sac contained no abnormal fluid. The myocardium was diffusely infiltrated by a grey-white tumor. Both the interventricular septum and the left and right ventricular walls were involved. The interventricular septum and the posterior wall of the left ventricle were 3 cm and 2.5 cm thick respectively, which were correlated well to the thickness measured on the echocardiogram (Fig. 5). No mural thrombi were present. Microscopically the tumor was lymphosarcoma (Fig. 6). The same tumor was present in the abdomen, affecting the pancreas and the omentum. There was no tumor tissue in any other organ or site.
Fig. 3. Echocardiograms with the ultrasound beam directed (A) through the aorta and left atrium, (B) through the interventricular septum and mitral valve and (C) through the left ventricle, where I.V. = interventricular, M.V. = mitral valve, LV = left ventricular, and A.C.W. = anterior chest wall.
Fig. 4. The Tc\textsuperscript{99m} pool scanning of the heart. The cardiac silhouette on the chest X-ray is outlined.

Fig. 5. The gross section of the heart through the right and left ventricle, showing the extensive and diffuse involvement of the tumor in the myocardium. IVS=interventricular septum, RV=right ventricle, LV=left ventricle.
DISCUSSION

Ultrasonography has been used in detection of tumors in various organs such as in the breast,\textsuperscript{9} liver,\textsuperscript{10} thyroid,\textsuperscript{11} and uterus.\textsuperscript{12} This technic depends on an abnormal reflection of the ultrasound generated by the difference in acoustic impedance between the tumor and the surrounding tissue.\textsuperscript{1} An intracavitary cardiac tumor, such as a left atrial myxoma, is now readily diagnosed by echocardiography as abnormal clusters of echo behind the mitral valve.\textsuperscript{4}

Myocardial mural tumors are rarely diagnosed clinically because of lack of characteristic clinical manifestations.\textsuperscript{7} In the few tumors diagnosed antemortem, arrhythmias provided the clinical clue. Some of the more common arrhythmias are those of bundle branch block, atrial fibrillation or flutter, paroxysmal atrial tachycardia, ventricular tachycardia, and ventricular fibrillation. Other clinical pictures are of myocardial damage presenting as cardiac enlargement or congestive heart failure.\textsuperscript{7}

Angiocardiography or radioisotopic\textsuperscript{13},\textsuperscript{14} scanning may be useful to identify a myocardial tumor as it is localized by demonstrating a regional thickness of the myocardium or a deformed ventricular cavity. However when the tumor involves the myocardium diffusely as in the present case, these
diagnostic technics reveal only an increased thickness between the intracavitary blood pool and the pericardium. The latter finding is certainly not diagnostic for cardiac tumor, but is compatible with the thickened myocardium, such as myocardial hypertrophy or myocardial mural tumor, as well as pericardial effusion.

Echocardiogram has not, to our knowledge, been employed in the identification of myocardial tumors. In the present case the posterior wall of the left ventricle was thick and had a few heavy echoes. Although the meaning of this finding was not known antemortem, this should have suggested the presence of mural tumors since simply hypertrophied myocardium should not produce abnormal reflections of ultrasound within the myocardium. If a plenty of cellular debris are present in the pericardial effusion, it may show internal reflection echoes but seems unlikely to show such heavy echoes as seen in the present case. In fact the present case showed no evidence of pericardial involvement at autopsy. Myocardial thickness estimated on echocardiogram was closely correlated with the actual myocardial thickness.

As a diagnostic technic for myocardial tumor, echocardiography is certainly limited by its one dimensional recording. It may not demonstrate an abnormal echoes in the myocardium unless echo beam hits the site of tumor involvement, but we believe echocardiography is one of diagnostic procedures which should be attempted since it is a non-invasive technic and repeatable. If echocardiography demonstrates clusters of abnormal echoes within the myocardium, myocardial mural tumor should be considered.

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REFERENCES