Massive Lipomatous Infiltration to the Left Ventricle Mimicking a Cardiac Tumor

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SUMMARY

A case with massive lipomatous infiltration to the left ventricle is reported. An intracardiac tumor was suspected on the results of echocardiography, computed tomography, thallium scintigraphy and left ventriculography. This is the first case which was diagnosed in vivo and successfully resected.

Additional Indexing Words:
CT Thallium scintigram Coronary angiogram Left ventricular wall

CASES of massive lipomatous infiltration of the heart are rarely reported, probably because it is difficult to diagnose in vivo.1,2) Pathological investigations have demonstrated myocardial fatty accumulations in the wall of the right ventricle, beneath the endocardium of the trabeculae carneae and even in the other cardiac walls.1) Lipomatous accumulations are common autopsy findings with an over-all incidence of approximately 3%,1) and are found occasionally in obese and elderly people.3) Such lesions have been believed to be relatively benign, except in unfortunate cases with infiltration to the conduction system.4,5) However, Voigt and Agdal reported an interesting case of a young man who died unexpectedly due to massive lipomatous infiltration to the entire right wall of the heart.3) Recently, we observed the first case which could be diagnosed in vivo as having lipomatous infiltration of the left ventricular wall.

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CASE REPORT

A 55 year old male office worker with no previous history of serious disease was admitted to this hospital because of chest discomfort during exertion. Two years before the admission, high blood pressure (148/96 mmHg) had been found during a regular check-up. The ECG at that time showed tall R waves and ST depression with conspicuously inverted T waves in the precordial leads. Thereafter, he had been treated under the diagnosis of coronary artery disease despite the absence of cardiac symptoms. From 2 months prior to admission he began to feel chest oppression lasting for several minutes during exertion. He was referred to our hospital for detailed examination.

The pulse rate was 75 beats/min and the blood pressure was 104/76 mmHg. The patient was 155 cm tall, and weighed 56 Kg. The patient appeared well. The lungs were clear; no thoracic deformity was seen. The heart was not enlarged; heart sounds were normal; a grade 2/6 harsh and early systolic

Fig. 1. An X-ray computerized tomographic imaging of the chest (A) and a thallium 201 myocardial scintigram (B). An intracardiac mass (black arrow) is located in the antero-lateral wall with the same density as that of the cardiac muscle. The mass indicates a hot area in the scintigram as shown by white arrows. Abbreviations: A=anterior; B=posterior; U=upper; L=lower.
murmur was heard at the apex. The abdomen and extremities were normal. Neurological examinations were negative. The retinal arteries were not sclerotic.

Most laboratory data were normal except for an increased erythrocyte sedimentation rate (47 mm/hour), positive C-reactive protein and elevated CPK. The total cholesterol was 267 mg/dl and the beta-lipoprotein (768 mg/dl). An electrocardiogram demonstrated tall R waves with ST-T changes. The 7 Mets treadmill exercise increased these ST depressions from those of the resting ECG. The chest X-ray film revealed a cardiothoracic ratio of 47% and no abnormal pulmonary vascular markings. The two-dimensional echocardiogram revealed an abnormal mass near the anterior papillary muscle of the left ventricle and a thickened LV posterior wall. An X-ray computerized

![Histological aspects of the removed cardiac mass.](image)

Fig. 2. Histological aspects of the removed cardiac mass. In the lower magnification (A), many fatty droplets corresponding to the myofiber in size infiltrate into the space between cardiac muscle fibers as if intermingled with each other, and capillaries are increased in the interstitial fibrosis surrounding them. In the higher magnification (B), hypertrophic myofibers with some degenerative changes are scattered here and there as shown by black arrows. The black bar corresponds to 300 micrometer in length in Fig. 2-A and 100 micrometer in Fig. 2-B, respectively. Masson-Gold staining.
tomographic (CT) scan of the chest, performed with and without contrast medium, showed an intracardiac mass with the same density as that of the cardiac muscle in the antero-lateral wall of the left ventricle (Fig. 1-A). A thallium (TL) 201 myocardial scintigram disclosed a hot area in the same portion (Fig. 1-B). Cardiac catheterization showed no abnormal hemodynamic data. The left ventriculogram documented a large shadow defect antero-laterally and coronary arteriography revealed hypervascularization at the site of the shadow defect.

These data suggested the presence of a cardiac tumor near the anterior papillary muscle. Thus, an operation was carried out under cardiopulmonary bypass. Incision of the heart disclosed a mass with a whitish surface, 6.5 × 4.0 cm in size. The mass was resected carefully without injuring the papillary muscles. After the resection, the defect was closed with a teflon pledget. The histology of the mass showed neither malignant cells nor encapsulation. Massive infiltration by fatty droplets was observed transmurally. Blood capillaries were increased in number relative to the muscle fibers and hypertrophic and degenerating cardiocytes were scattered in the interstitial fibrosis (Fig. 2-A and 2-B). Since the operation the patient has been able to resume his work completely, and has had no further symptoms.

**DISCUSSION**

Fatty accumulations in the heart are rarely found clinically and can be classified as lipoma, lipomatous hypertrophy and lipomatous infiltration. A cardiac lipoma is a well-encapsulated mass consisting of adipose tissue and occasionally containing either fibrous tissue and/or muscular tissue in the histology. The common chambers affected are the left ventricle, right atrium and interatrial septum. Lipomatous hypertrophy is a non-encapsulated adipose mass located in the interatrial septum and contains fetal fat cells, termed granular cells. Lipomatous infiltration of the heart is categorized as an unencapsulated mass of fatty tissue in the myocardium and containing varying amounts of cardiac muscle. It typically consists of muscle fibers separated by sheets and cords of a fatty tissue and often intermingled with bands of fibrous connective tissue. Lipomatous hypertrophy is clinically the most significant fatty abnormality because it sometimes causes sudden death or congestive heart failure. However, it has been reported that lipomatous infiltration seldom produces clinical symptoms and is rarely diagnosed by routine examinations. However, Voigt and Agdal have cautioned that sudden death may result from massive infiltration to the heart.

This report describes the first patient diagnosed in vivo as having a
lipomatous infiltration of the left ventricular wall. This diagnosis was facilitated by the excellent resolution of echocardiography, X-ray CT and scintigraphy. However, even these procedures did not positively identify the nature of the mass. Consequently, the diagnosis of a cardiac tumor was most likely. The lesion was so large that hemodynamic troubles in the near future were likely. Thus, an operation was performed. This lesion was very similar to the autopsied case reported by Voigt and Agdal except for the following 2 points: 1) only the left ventricular wall was affected transmurally and 2) the patient showed no familial occurrence.

The etiology of lipomatous infiltration of the heart is unknown, but it is considered to arise from fatty deposits in the cardiac muscle. The histological abnormality of this present case is summarized as hypertrophic and degenerative changes in cardiocytes, interstitial fibrosis, an increased number of blood capillaries and fatty droplets occupying a large part of the ventricular wall. In our opinion, these changes suggest a replacement of the cardiac tissue by an adipose tissue and/or a fatty metaplasia following myocardial degenerative changes of unknown etiology. Although the cause of an increased number of the blood capillaries in the infiltrated area is unclear, it probably produced the “hot area” in the scintigram.

Progress in diagnostic techniques may improve detection of fatty masses in the heart, such as lipoma, lipomatous hypertrophy and lipomatous infiltration. However, present technologies are not capable of distinguishing tumors from lipomatous masses prior to surgery. This case underlines the importance of developing diagnostic methods for identifying the nature of intracardiac masses.

REFERENCES
7. McAlliater HA: Tumors of the heart and pericardium. in Cardiovascular Pathology, ed by Silver MD, Churchill Livingston, New York, p 909, 1983
8. Prior JT: Lipomatous hypertrophy of cardiac interatrial septum, a lesion resembling hibernoma, lipoblastosis and infiltrating lipoma. Arch Pathol 78: 11, 1964