Echocardiographic Diagnosis of Intraventricular Clot*


The literature contains many reports of the echocardiographic findings in left atrial myxoma and clot; however, descriptions of left ventricular thrombus or tumor are rare. We discuss here the echocardiographic findings in a patient with a large apical left ventricular thrombus which was confirmed both angiographically and pathologically. The importance of echocardiographically examining the area below the mitral valve near the apex of the left ventricle, where most of the thrombi are located, is stressed.

Although the literature contains numerous reports of the echocardiographic findings of left atrial myxoma and clot,1-6 reports describing such findings in left ventricular thrombus or tumor are rare.1-6 Presented here are the echocardiographic findings in a patient with a large apical left ventricular thrombus, with angiographic and pathologic confirmation.

*From the Division of Cardiology, Department of Medicine, Pennsylvania State University School of Medicine, Milton S. Hershey Medical Center, Hershey, Pa.
**Assistant Professor of Medicine.
†Cardiology Fellow.
‡Professor of Medicine and Physiology.
Reprint requests: Dr. DeJoseph, Milton S. Hershey Medical Center, Hershey, Pennsylvania 17033

CASE REPORT

A 63-year-old white man had a one-month history of recurrent precordial chest pain, which at first occurred only with exertion, but in the past two weeks had occurred at rest and also had awakened him from sleep on several occasions. Three years previously, the patient had sustained an acute anterosetal myocardial infarction. He denied palpitations, dyspnea on exertion, orthopena, or paroxysmal nocturnal dyspnea.

Physical examination revealed an apprehensive man in no acute distress. Blood pressure was 118/72 mm Hg, and the pulse rate was 76 beats per minute and regular. There was no jugular venous distention. The chest was clear to percussion and auscultation. Examination of the heart revealed no palpable or visible lifts or thrills. The point of maximal impulse was in the fifth intercostal space in the midclavicular line and was diffuse. On auscultation, an S4 and S4 gallop rhythm was present. No murmurs were evident. The abdomen was without distention, masses, or enlargement of organs. There was no peripheral edema, and all pulses were full and equal. The findings from neurologic examination grossly were within normal limits.

Serial electrocardiograms and enzyme studies revealed no evidence of acute myocardial infarction. Because it was believed that the patient had unstable angina pectoris, cardiac catheterization was performed. Total occlusion of the left anterior descending coronary artery was found, as well as a radiolucent left ventricular mass. The patient subsequently underwent left ventriculotomy, with removal of a pedunculated thrombus from the left ventricular apex, and a single aortocoronary venous bypass graft to his left anterior descending coronary artery. The patient's postoperative course was essentially eventful.

Figure 1. Echocardiograms taken prior to removal of clot. A. Echocardiogram taken with transducer angled to record position deep in left ventricular cavity. Distinct mass of echoes is seen (between arrows), which lies between the echoes of interventricular septum (S) and left ventricular posterior wall (LV). B. Transducer is scanned upward from deeper position of left ventricle (LV) to area of mitral valve (m). Note disappearance of echo-producing mass (between arrows) as mitral valvular echo comes into view. S, Septum. C. Postoperative echocardiogram scanning left to right from area of mitral valve (m) to deeper portion of left ventricle (LV). This is same area scanned in Figure B. Note absence of mass of echoes which were present in preoperative tracing. S, Septum.
METHODS

Echocardiograms were recorded with the patient lying quietly in the supine position. A 2.25-MHz transducer one-half inch in diameter (Aerotech) with a 7.5-cm internal focus was used with an ultrasonic scope (Unirad 100 Diagnostic Echoscope). Permanent recordings were made on black and white film (Polaroid type 107) using a camera (Hewlett-Packard 197A) attached to the oscilloscopic screen of the diagnostic echocardiographic scope. Serial pictures were taken as the transducer was angled from aorta to cardiac apex in an inferolateral direction.

Right and left cardiac catheterization and left ventricular angiographic studies were performed in the usual manner. Coronary arteriographic studies were done using Sones' technique.

RESULTS

The echocardiogram revealed an echo-producing mass in the apical area of the left ventricle below the area of the mitral valve (Fig 1A and 1B). This was a distinct echo clearly separate from the echoes of the interventricular septum and left ventricular posterior wall. The mass was identified repeatedly upon scanning in an inferolateral direction with the transducer from the mitral valve area to the apex of the left ventricle.

Cardiac catheterization revealed a moderately enlarged left ventricular chamber with the entire apex being aneurysmal. A large radiolucent mass 3 to 4 cm in diameter was found occupying the aneurysm (Fig 2). At surgery, a large pedunculated thrombus 3 to 4 cm in diameter was removed from the apex of the left ventricle.

Postoperative echocardiograms revealed no evidence of a distinct echo-producing mass (Fig 1C).

DISCUSSION

The echocardiographic features of left atrial myxoma are described profusely throughout the literature; however, there is a distinct paucity of reports concerning the findings in interventricular thrombus or tumor. Farooki et al described two cases of ventricular rhabdomyoma in infants, one in the left and one in the right ventricle. Both were identified by an abnormal cluster of echoes adjacent to the left and to the right sides, respectively, of the ventricular septal echo. In each case the echoes presumably produced by the tumors were difficult to separate from the septal echoes. Levisman et al described a cluster of echoes within the left ventricular cavity and also between the mitral valve and interventricular septum during systole. The echoes were due to a pedunculated thrombus of the left ventricle.

The findings in our case were limited to the area of the left ventricle below the mitral valve. These correlated well with both the findings at angiocraphic study and at surgery, where the thrombus was attached at several points in the apex of the ventricle and was not freely movable.

Mural thrombi of the heart are found in 21 to 67 percent of hearts at postmortem examination and in approximately 5 percent of patients undergoing coronary arteriographic studies. The systemic emboli that occur as a result of these thrombi are well documented. Since it appears that some of these emboli can be detected echocardiographically, it is important that they be diligently searched for on routine echocardiographic examination. Also, because it seems that the emboli are most commonly found in the apex of the left ventricle, it is important in performing the echocardiographic study that one examine carefully the area below the mitral valve deep within the left ventricular cavity.

REFERENCES

Spontaneous pneumothorax, which results from the introduction of air into the pleural spaces of the thorax, has been observed in patients as a symptom of pulmonary diseases. Symptomatic spontaneous pneumothorax has been associated with a variety of pathologic conditions, including emphysema, bronchial asthma, chronic bronchitis, and Marfan's syndrome.\textsuperscript{1,2} By contrast, idiopathic spontaneous pneumothorax appears to occur in the absence of consistently demonstrable pulmonary pathologic findings.\textsuperscript{3} The idiopathic condition has a marked tendency to recur and is most frequently seen in young men in the age range of 20 to 40 years old.\textsuperscript{3,4,5}

It has been proposed that air escapes into the pleural space from a ruptured bleb in the visceral pleura. Such blebs are attributed to a dissection of air into the pleural tissue from a defect in the wall of a subpleural alveolus.\textsuperscript{6} The cause of such a defect has never been established. One author postulates a chance congenital defect in the elstica of the alveolar wall.\textsuperscript{6} Another explanation involves a remote infection resulting in a check-valve obstruction of a small airway, distal distention, and subsequent rupture and dissection.\textsuperscript{6}

A lung biopsy obtained from a patient undergoing treatment for a second occurrence of idiopathic spontaneous pneumothorax was examined with the light and electron microscopes.

**Case Report**

On Jan 17, 1975, a 22-year-old man who was 180.3 cm (5 ft 11 in) tall and weighed 61 kg (135 lb) was admitted to the hospital with a right apical pneumothorax. He had smoked one pack of cigarettes per day for the past eight years. A chest tube was inserted, and the lung was expanded. On Jan 24, 1975, the patient was discharged from the hospital. Chest x-ray films taken at this time showed almost complete reexpansion of the right lung and otherwise normal pulmonary parenchyma.

On the evening of March 24, 1975, the patient had a few coughs and developed what he thought was a muscular cramp in the right posterior portion of his chest. When he awoke the next morning, he smoked a cigarette and developed shortness of breath and difficulty in breathing with pain again in the right side of the chest. The patient entered the emergency room, and chest x-ray films taken at that time showed a medium-sized pneumothorax, with approximately 4.0 cm of separation between the visceral pleura and the chest wall in the superior portion of the right hemithorax. The size of the pneumothorax was estimated to be 10 to 15 percent. No other chest abnormalities or masses were seen.

The patient was admitted to the hospital, at which time he stated that he had had no serious childhood or adult illnesses with the exception of the first collapsed lung. His mother died at the age of 40 years from lung cancer. His father and sister are in good health and have no history of pulmonary disease.

On the second day of hospitalization, a right thoracotomy and pleural abrasions were performed. At the time of surgery, fibrinous adhesions were seen medially in the upper right lobe, which suggested that this was the area of rupture of a bleb causing the pneumothorax. A lung biopsy was taken from an area adjacent to the area of suspected rupture. A portion of the tissue was fixed for routine pathologic examina-

**Idiopathic Spontaneous Pneumothorax**

**Electron Microscopic Study**

Edward E. Tweller, M.D.; Nancy R. Crise; John C. Belton, Ph.D.; and Richard F. McLaughlin, Jr., M.D., F.C.C.P.

A lung biopsy obtained from a patient following a second occurrence of idiopathic spontaneous pneumothorax was studied by electron microscopy. A remarkable increase in septal mass was a notable finding. Proliferation of the interstitium was due to an abundance of collagen and elastic fibers. In addition, a proliferation of type 1 and type 2 epithelial cells was seen.

*From the Peninsula Hospital, Burlingame, Calif (Drs. Tweller and McLaughlin), and California State University, Hayward (Dr. Belton and Ms. Crise). Supported in part by the California Lung Association and by a contribution from R. F. McLaughlin, Jr., M.D., in memory of Martin M. Kohn, M.D.*

Reprint requests: Dr. Belton, Department of Biology, California State University, Hayward 94542

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