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Case Report

Echocardiographic Features of Metastatic Pericardial and Myocardial Malignancy

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Clinical and echocardiographic features of a patient with extensive metastasis to the pericardium and myocardium are presented. Echocardiography revealed pericardial effusion, markedly thickened pericardium, and myocardium with increased echogenicity. These findings were subsequently confirmed during surgery and autopsy, which revealed marked tumor encasement of the heart and pericardial myocardial infiltration. (Henry Ford Hosp Med J 1986;34:288-90)

Echocardiographic Diagnosis of Metastatic Pericardial and Myocardial Malignancy

Pericardial effusion with or without cardiac tamponade is not an uncommon feature of metastatic malignancy (1,2), and the diagnostic accuracy of echocardiography in these cases is well established (3). Recently we were able to identify not only metastatic pericardial effusion but also extensive tumor infiltration of the pericardium and myocardium by echocardiography in a patient with cardiac tamponade. The diagnosis was confirmed during surgery and autopsy. The echocardiographic findings are detailed in this report.

Case Report

A 49-year-old man presented to Henry Ford Hospital with symptoms of progressive dyspnea on exertion, atypical chest pain, generalized malaise, weight loss, and a nonproductive cough progressive over a six-week period. The patient had no history of heart disease but did have a 20-pack/year history of smoking cigarettes.

On physical examination the blood pressure was 110/70 with a pulsus paradoxus of 18 mm Hg. The heart rate was 108 beats/min, respiratory rate 30 breaths/min, and temperature was 37°C. The patient was tachypneic and obviously distressed. Jugular venous pressure was elevated to the angle of the jaw even while he was sitting upright. Distant heart sounds and a loud three component friction rub were noted on cardiac auscultation. The lungs were clear to percussion and auscultation. Abdominal examination revealed hepatomegaly without ascites. There was no pedal or ankle edema.

Hospital course

With the patient under local anesthesia, 400 mL of serosanguinous pericardial fluid was removed through a pericardial window. The patient’s clinical status, respiratory rate, and systolic blood pressure improved immediately after surgery. During the operation the pericardium was over a centimeter thick, and a biopsy revealed undifferentiated adenocarcinoma. After 36 hours, the patient’s breathing gradually became more labored. His blood pressure dropped from 130 to 90 systolic without pulsus paradoxus. A repeat echocardiogram showed a minimal residual pericardial effusion and/or pericardial thickening. Again, patchy nodules were present around the heart with a minimal pericardial effusion. The patient died from cardiac tamponade. A biopsy of the pericardium revealed extensive infiltrating adenocarcinoma involving the right and left heart valves, the aortic and mitral valve leaflets, and lymph nodes as well as the epicardium. The patient had never been treated prior to this admission.

Abnormal results from laboratory studies included a serum sodium of 125 mEq and a potassium of 5.4 mEq. Total WBC count was 22,000/mm with normal differential count. The EKG demonstrated sinus tachycardia at a rate of 110 beats/min with low voltage and a QRS axis of 90°. The cardiac silhouette was enlarged with normal-appearing lung fields and prominent mediastinal shadow on a chest roentgenogram. An M-mode, two-dimensional echocardiogram showed a moderate anterior and posterior pericardial effusion and right atrial diastolic collapse suggesting tamponade. The presence of patchy pericardial and myocardial thickening with increased echogenicity of the right and left ventricles was particularly striking. This unusual appearance was interpreted as tumor infiltration of both the pericardium and heart muscle (Fig. 1).
patchy myocardial thickening was noted. An emergency sternotomy was performed because of the patient's deteriorating clinical condition. The pericardium was markedly thickened. A portion of the pericardium was resected in an attempt to relieve the cardiac compression, but the patient developed recurrent ventricular fibrillation and died. Necropsy limited to the thorax confirmed the presence of an undifferentiated carcinoma involving the pericardium with marked tumor invasion of both right and left ventricular myocardium (Fig 2). The mediastinal lymph nodes as well as foci in the lung were positive for undifferentiated adenocarcinoma. The primary site of the tumor was not identified.

Discussion

Malignancy from any primary site can metastasize to the pericardium, but usually carcinoma of the lung in males and carcinoma of the breast or lungs in females are implicated (1,2). Other malignancies such as lymphomas, leukemia, and malignant melanoma also have been reported to metastasize to the pericardium (1,2). In our patient the possible primary site of the undifferentiated carcinoma was gastrointestinal, pancreatic, prostatic, or bronchogenic in origin. Chandraratna and Aronow reported patients with pericardial metastasis to have irregular masses protruding from pericardium and epicardium on the echocardiogram (3). Echocardiography in our patient demonstrated not only pericardial masses but also diffuse pericardial and myocardial thickening indicating concomittant myocardial

Fig 1—Two-dimensional echocardiographic apical four chamber view of the heart. Note the presence of pericardial effusion (PE) and irregular visceral pericardial (PR) and myocardial thickening (arrow) representing tumor involvement. LA = left atrium, LV = left ventricle, LVW = left ventricular wall, RA = right atrium, RV = right ventricle, and RVW = right ventricular wall.

Fig 2—Gross pathologic specimen of the heart demonstrating tumor encasement of pericardium and myocardium infiltration.
infiltration. Foote et al demonstrated metastatic pericardial infiltration and thickening to mimic moderate effusion on the echocardiogram (4). This can be one reason for obtaining a “dry” pericardiocentesis tap. Marked pericardial thickening due to tumor infiltration is rare and seldom reaches a magnitude where it can be confused with large pericardial effusions. Our patient had an unusually extensive tumor infiltration of the pericardium and myocardium which restricted myocardial function. Echocardiography correctly identified pericardial effusion, tamponade, and visceral, pericardial, and myocardial thickening due to tumor invasion and was most helpful in delineating the extent of the disease process. Drainage of the pericardial fluid alleviated symptoms of tamponade but not the constrictive-restrictive effects of the tumor. A limited pericardiectomy was attempted when the patient’s clinical condition deteriorated.

In conclusion, metastatic malignancy rarely presents as pericardial effusion, tamponade, or extensive pericardial and myocardial infiltration and can be detected by echocardiography.

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References