Pericardial Mesothelioma Masquerading as a Benign Pericardial Effusion

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A 53 year old asymptomatic man presented with a primary pericardial mesothelioma masquerading as a benign pericardial effusion. Although M-mode echocardiography showed an echo-free space, two-dimensional echocardiography and thoracic computed tomography demonstrated that the suspected effusion was caused by a mass surrounding the heart. Newer noninvasive techniques can be valuable for the early detection of pericardial tumor.

Pericardial mesothelioma is the most common primary malignancy of the pericardium (1), but it is an extremely rare tumor (2-4). Unfortunately, most cases are diagnosed only at postmortem examination. Those few patients whose tumor is discovered during life frequently receive an incorrect diagnosis initially, then are found to have extensive disease and die relatively quickly after the correct diagnosis is made. This case report illustrates that the patient may be asymptomatic for a prolonged period while the tumor is gradually enlarging, during which time the patient is considered to have "benign viral" or "idiopathic" pericarditis. In addition, this first reported case of primary pericardial mesothelioma imaged by two-dimensional echocardiography demonstrates the superiority of this technique over the plain chest X-ray study and M-mode echocardiogram for differentiating between pericardial fluid and pericardial mass.

Case Report

Clinical presentation. An active 53 year old white man presented to his physician complaining of a sore throat and nonproductive cough of short duration and was diagnosed as having an upper respiratory tract infection. However, a chest X-ray film demonstrated an enlarged cardiac silhouette (Fig. 1). The patient was referred for a M-mode echocardiogram which was interpreted as demonstrating an anterior and posterior pericardial effusion (Fig. 2).

The patient had no past history of cardiac or pulmonary disease, chest trauma, exposure to tuberculosis, renal disease or collagen-vascular disease. He did not smoke cigarettes or have exposure to asbestos. Laboratory studies revealed normal serum electrolytes, complete blood count, urine analysis, thyroid function tests and erythrocyte sedimentation rate. A 5 tuberculin unit test and antinuclear antigen titer were both negative. By exclusion, the effusion was diagnosed to be secondary to a viral process. Because the patient continued to feel well without signs or symptoms of tamponade or sepsis, he was followed up with bimonthly echocardiograms. However, over a 6 month period, progressive cardiomegaly and an increase in the echo-free space was noted and he was admitted to the hospital for a diagnostic pericardiocentesis.

Hospital admission. At the time of admission, the patient did not report chest pain, fatigue, weight loss, cough, dyspnea, fever or night sweats. On examination he had a regular pulse of 100/min and blood pressure of 120/80 mm Hg, without significant pulsus paradoxus. An important observation is that the jugular venous pulse was elevated to 7 cm above the angle of the jaw on the right side but was significantly less elevated on the left. Also, the veins over the right shoulder and upper arm were distended. No Kussmaul's sign was observed. The lungs were clear to auscultation. Heart sounds were distant and no murmur, rub or gallop was detected. There was no hepatosplenomegaly or abdominal mass. No significant adenopathy was detected. The admission chest X-ray film revealed a markedly enlarged cardiac silhouette and clear lung fields (Fig. 1). The
Figure 1. Chest X-ray films. Left panel, Previous film 8 months before discovery of an enlarged heart; middle panel, shortly after initial presentation; right panel, at time of hospital admission for pericardiocentesis.

electrocardiogram showed normal sinus rhythm, normal voltage and nonspecific ST-T wave changes. Laboratory studies were in the normal range.

Pericardiocentesis. This procedure was attempted with electrocardiographic guidance, but no fluid could be obtained on multiple passes. Subsequently, pericardiocentesis with two-dimensional echocardiographic guidance revealed that there was no free fluid to aspirate: the clear space that was continually interpreted as fluid on the M-mode echocardiogram was actually echo-dense tissue surrounding the heart (Fig. 3). Additionally, although there was no respiratory change in right or left ventricular dimensions, the motion of the entire heart was significantly restricted by the external mass.

Surgical findings. Two days later, the patient underwent a median sternotomy to evaluate the nature of the pericardial mass. Intraoperative inspection revealed tumor totally encasing the heart and invading the epicardium. No normal pericardium could be seen and no pericardial fluid was noted. Mediastinal nodes appeared to be involved with the tumor, but there was no extension into the lung. A

Figure 2. M-mode echocardiogram in August 1983, illustrating the echo-free space (T) that was diagnosed as an anterior and posterior pericardial effusion and later determined to be caused by tumor. Note the the echo-free space extends behind the left atrium (LA). Ao = aorta; LV = left ventricle; MV = mitral valve; RV = right ventricle.
limited resection was performed to release the inflow obstruction of the right subclavian and internal jugular veins.

Pathologic findings. A frozen section specimen sent from the operating room was interpreted initially as "probable poorly differentiated adenocarcinoma," but further analysis revealed that the tumor was a mesothelioma. The tumor mass was composed of sheets and cords of polygonal cells, showing mostly round nuclei and prominent nucleoli with moderate pleomorphism and mitotic activity. Papillary structures were found in many areas, and the tissue exhibited glandular and trabecular features as well as some anaplastic bizarre-shaped large cells. Special stains for mucin, argentaffin and argyrophil granules were negative; stain for glycoprotein was positive. Colloidal iron stain was positive and cleared partially with hyaluronidase. These features, along with typical electron microscopic studies, supported the final diagnosis of mesothelioma, epithelial type.

Follow-up. A thoracic computed tomographic scan was performed after surgery and demonstrated a mass surrounding the heart without extension into the lungs (Fig. 4). No other cardiac, pulmonary or abdominal involvement was seen.

Because of the extensive nature of the tumor, the patient was referred for chemotherapy. Since hospital discharge, he has been progressively symptomatic with dyspnea and fatigue.

Discussion

Previous reports. Pericardial mesothelioma is an extremely rare malignancy, usually not correctly diagnosed during life because there are no specific signs or symptoms. Synter and MacAlpin (3) noted that almost all patients with this tumor present with pleuritic chest pain, a dry cough and manifestations of congestive heart failure. The physical examination often shows distended cervical veins and faint heart sounds, and chest X-ray study commonly suggests pericardial effusion. Thomas and Phyton (4) noted that a sanguinous pericardial effusion is characteristic of pericardial mesothelioma (especially if it rapidly reaccumulates), but this finding is neither specific nor sensitive because, in spite of the appearance of an effusion, pericardiocentesis may be nonproductive (1,3,5). Inspection at surgery or autopsy usually shows the heart to be encased in a thick shell, and tumor may be invading the myocardium; the great vessels or venae cavae may also be encircled with tumor (6). Death is frequently secondary to cardiac tamponade or circulatory failure secondary to pericardial constriction (6). Pericardial mesothelioma has been reported to have a 60% mortality rate in the first 6 months after diagnosis (3).

Clinical manifestations. Pericardial mesothelioma has a variable clinical presentation that may include pericardial constriction (1,3), hemorrhagic pericarditis (4), acute pericarditis (5,7), cholesterol pericarditis (8), superior vena cava syndrome (9) or even valvular heart disease (10). Our case illustrates that pericardial mesothelioma may also masquerade as an asymptomatic pericardial effusion. The patient was believed to have a pericardial effusion of viral origin because other potential causes had been excluded, despite the fact that he had never had symptoms of a generalized viral syndrome or pericarditis. In retrospect, it can be said that certain clinical features in this case (such as the unusual distribution of venous distention) and echocardiographic features (such as the presence of an echo-free space behind the left atrium without the hypermobility of the atrial wall usually associated with pericardial effusion behind the atrium) might have served as clues to the absence of a typical effusion. Dawe et al. (6) commented that patients with clinical or radiologic signs of pericardial effusion, but without a history or signs of a disease that would account for the
effusion, should be suspected of having an ensheathing type of tumor. Unfortunately, when the patient remains active and asymptomatic a diagnosis of malignancy is usually not entertained.

**Noninvasive evaluation of cardiomegaly.** M-mode echocardiography is frequently used to determine whether cardiomegaly on chest X-ray film is secondary to pericardial fluid (11). However, epicardial fat pads, pericardial cysts or solid tissue tumors can appear as an echo-free space and thereby simulate an effusion (12–15). In 1982, Yilling et al. (7) reported a case of primary pericardial mesothelioma that had been diagnosed as febrile acute pericarditis, in which they recognized only after the autopsy that the echo-free space noted on M-mode echocardiography represented tumor instead of fluid. Our case demonstrates that two-dimensional echocardiography can distinguish between echo-free space caused by fluid or solid tissue, and is the first reported case of two-dimensional echocardiographic imaging of pericardial mesothelioma. Computed tomography may also be a useful tool for diagnosing and defining the extent of pericardial disease (16). Noninvasive imaging techniques such as these may eliminate unnecessary pericardiocentesis and expedite a more definitive diagnostic study. Furthermore, in patients who do have a pericardial effusion, the two-dimensional echocardiogram is useful for delineation of the distribution of pericardial fluid and localization of needle position during pericardiocentesis (17).

**Clinical implications.** Cases of pericardial effusion are common in large practices of cardiology or internal medicine. However, with more sophisticated noninvasive technology, incidental laboratory abnormalities create a dilemma in determining the extent of required study. The extent of the evaluation is usually dictated by the patient's underlying disease and symptoms. However, our case demonstrates that patients with a pericardial malignancy can have a long asymptomatic period during which a tumor may enlarge. Dooley et al. (18) reported the successful surgical removal of a primary pericardial mesothelioma and noted that early recognition of the disease may result in detection of localized tumor which can be completely excised. Presumably, a two-dimensional echocardiogram performed earlier in the course of our patient’s disease would have identified a less extensive tumor mass that may have facilitated a surgical cure. It is recommended that patients who appear to have a pericardial effusion of unclear origin have a two-dimensional echocardiogram to better delineate the possible pathologic basis and facilitate early detection of mass lesions of the pericardium that may simulate fluid on X-ray study or on M-mode echocardiography.

**Summary**

This case report demonstrates that primary pericardial mesothelioma may have a long asymptomatic period during which the tumor is enlarging. The tumor may mimic a pericardial effusion on chest X-ray film and M-mode echocardiogram, but the tumor can be easily differentiated from fluid by two-dimensional echocardiography. Patients who are suspected of having a persistent pericardial effusion or who have an effusion of unclear origin, even if totally asymptomatic, should have a two-dimensional echocardiogram early in their course to facilitate detection of an unsuspected pericardial tumor.

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**References**