Computerized Tomographic Diagnosis of Paracardiac Masses

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Paracardiac masses may alter the cardiac contour seen on roentgenograms of the chest so as to mimic configurations associated with cardiac disease. Recently, the use of computerized transmission tomography has proved valuable as a noninvasive method of distinguishing between intrinsic cardiac disease and paracardiac masses. In some cases, the procedure obviates the need for preoperative cardiac catheterization.

Paracardiac masses may cause abnormalities of the cardiac contour that mimic configurations associated with cardiac disease. In the past it has been necessary to rely on careful auscultation, electrocardiography, fluoroscopy and cardiac catheterization to distinguish intrinsic cardiac disease from paracardiac masses. In recent years noninvasive techniques such as computerized transmission tomography (CTT) and two-dimensional real-time echocardiography have favorably complemented the older methods.

This report describes the cases of seven patients seen during the past five years in whom chest roentgenograms were interpreted as indicative of intrinsic cardiac disease but in whom noninvasive studies showed paracardiac masses. In six of these patients cardiac catheterization was eventually done. In the seventh and most recent patient treated, extracardiac disease was demonstrated by CTT, obviating the need for preoperative catheterization.

Reports of Cases

Case 1. An 18-year-old asymptomatic man was referred for evaluation of abnormal findings on a roentgenogram of the chest, which suggested absence of the left pericardium and pericardial cyst (Figure 1). Results of a physical examination were normal except for a palpable impulse felt in the left second intercostal space. An electrocardiogram showed no abnormalities.

Catheterization of the right side of the heart showed pressures and oxygen saturation to be normal. An angiogram of the left atrium gave normal findings, with no evidence of partial absence of the left pericardium. However, angiography showed compression of the right atrium.

A CTT scan demonstrated a large cystic mass extending from the right to the left cardiac border (Figure 2). At operation a lobulated cystic mass was found that originated from the thymus gland and extended anteriorly across the heart. It was
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Excised in toto. Pathological examination of the excised tissue showed nodular sclerosing Hodgkin's disease, originating in a thymic cyst.

Case 2. A 57-year-old man presented with exertional dyspnea and a heart murmur. Previously, he had been found to have obstructive...
hypertrophic cardiomyopathy at cardiac catheterization, and ventricular septal myectomy was carried out in 1965. In 1979 a roentgenogram of the chest showed a localized mass extending from the upper left cardiac border (Figure 3). A right aortic arch was present. An S3 gallop with a grade 2/6 murmur at the left sternal border, radiating to the apex, was noted. Electrocardiographic findings included left atrial enlargement and left bundle branch block. Asymmetric septal hypertrophy without systolic anterior motion of the mitral valve was seen at M-mode echocardiography. Angiography showed no evidence of ventricular false aneurysm or herniation of the atrial appendage, though a defect in the left pericardium was found. A computerized transmission tomographic scan showed an oval mass located in the left anterior mediastinum adjacent to the pulmonary artery and extending down the left ventricular border (Figure 4).

At thoracotomy a pericardial pseudocyst located in the left retrocardiac area was found; it extended along the left upper margin of the heart. This mass was not present at the time of initial operation in 1965.

CASE 3. A 27-year-old woman was seen because of tightness in her chest and shortness of breath. She had no previous history of cardiac disease. Abnormal findings on a roentgenogram of the chest were interpreted as enlargement of the main pulmonary artery (Figure 5).

On physical examination a grade 3/6 harsh systolic ejection murmur over the pulmonic area was noted, which did not vary with respiration. An electrocardiogram showed right ventricular hypertrophy. A right ventriculogram showed compression and displacement of the great vessels by an anterior mediastinal mass; however, the pulmonary artery was not enlarged.

At operation there was a grapefruit-sized mass embracing and compressing the great vessels. Histological examination indicated nodular sclerosing Hodgkin's disease.

CASES 4 through 7. In four additional patients, roentgenograms of the chest showed mediastinal...
masses that masqueraded as intrinsic cardiac disease.1-3 These included, respectively, mediastinal teratoma masquerading as idiopathic enlargement of the right atrium, thymoma masquerading as congenital partial absence of the left pericardium, desmoid tumor presenting as a pericardial fat pad, and Hodgkin's disease in a thymus presenting as enlargement of the main pulmonary artery (Figure 6). In the last patient a CTT scan convincingly showed a solid anterior mediastinal mass, which obviated the need for preoperative cardiac catheterization and angiography.

### Discussion

The current series of cases (Table 1) emphasizes that paracardiac masses may alter the cardiac contour in such a manner as to mimic the configurations of intrinsic cardiac disease. Findings of a physical examination and electrocardiogram may show abnormalities that support the diagnosis of a primary cardiac lesion—particularly when extracardiac masses cause compression of the pulmonary artery.4-7 Such paracardiac masses that mimic heart disease are usually mediastinal solid or cystic neoplasms or pericardial cysts and diverticulae. The mediastinal neoplasms that cause such apparent changes in cardiac contour usually originate in the radiographic anterior mediastinum as defined by Felson.8 The solid and cystic masses arising in this area are legion and include thymoma, thymic cyst, teratoma, germinal cell tumors, pericardial cysts and diverticula, foramen of Morgagni hernia, lymphoma, lipoma, fibroma, parathyroid adenoma and paraganglioma.

Often the extracardiac location of such lesions can be determined by fluoroscopy, oblique and overpenetrated chest roentgenograms, and linear tomography. A valuable addition to these techniques is CTT with contrast media, which can usually determine whether the lesion involves an extracardiac process and whether it has extended to the heart or pericardium.9-11 Cardiac catheterization and angiography can exclude intrinsic cardiac abnormalities, but they provide less information regarding the nature, location and extent of the responsible extracardiac process than does CTT.9-11 Fatty tumors that infiltrate the mediastinum have been confused with primary cardiac disease12; however, CTT has been reliable in detecting the fatty nature of the mediastinal process.8,13

Pericardial cysts infrequently mimic primary cardiac disease; however, most of these cysts can be recognized by their characteristic location at cardiophrenic angles and by the fact that the mass is usually round and abuts the hemidiaphragm and anterior chest wall.14

A particularly difficult problem with the cases under discussion was that the paracardiac masses caused abnormalities in the cardiac contour that suggested cardiac entities usually recognized by a specific configuration on roentgenograms of the chest. For example, idiopathic dilatation of the right atrium is considered when a prominent right atrial shadow is observed in the absence of other cardiac findings.15 Enlargement of the main pulmonary artery segment in the presence of a systolic murmur suggests a diagnosis of either valvular pulmonic stenosis or idiopathic dilatation of the pulmonary artery. Because masses extrinsic to, but constricting, the pulmonary artery may cause a systolic murmur, confusion regarding the nature of the roentgenographic abnormality may be compounded.

A mass in the anterior mediastinum superimposed on the main pulmonary artery segment may be suggested by observing the hilum overlay, the hilar convergence signs, or both.8 Further, a pseudoaneurysm of the left ventricle usually has

### Table 1.—Diagnostic Information on Seven Patients With Paracardiac Masses

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age/Sex</th>
<th>Radiographic Working Diagnosis</th>
<th>Postcatheterization/Noninvasive Diagnosis</th>
<th>Surgical Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18/M</td>
<td>Pericardial cyst; partial absence of left pericardium</td>
<td>Mediastinal mass</td>
<td>Thymic cyst with Hodgkin's lymphoma</td>
</tr>
<tr>
<td>2</td>
<td>57/M</td>
<td>False cardiac aneurysm</td>
<td>Pericardial cyst</td>
<td>Pericardial pseudocyst</td>
</tr>
<tr>
<td>3</td>
<td>27/F</td>
<td>Pulmonary stenosis</td>
<td>Mediastinal mass</td>
<td>Hodgkin's disease</td>
</tr>
<tr>
<td>4</td>
<td>22/M</td>
<td>Iatidpathic enlargement of the right atrium</td>
<td>Mediastinal mass</td>
<td>Mediastinal teratoma</td>
</tr>
<tr>
<td>5</td>
<td>21/M</td>
<td>Congenital partial absence of the left pericardium</td>
<td>Mediastinal mass</td>
<td>Thymoma</td>
</tr>
<tr>
<td>6</td>
<td>28/M</td>
<td>Pericardial fat pad</td>
<td>Pericardial mass</td>
<td>Desmoid tumor</td>
</tr>
<tr>
<td>7</td>
<td>30/F</td>
<td>Enlargement of the main pulmonary artery</td>
<td>Mediastinal mass</td>
<td>Hodgkin's disease</td>
</tr>
</tbody>
</table>

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a characteristic radiographic appearance, and rapid enlargement in size of the contour abnormality is particularly suggestive of this entity. Pseudoaneurysm has been observed as a complication of cardiomyotomy.

Conclusion

These cases emphasize that paracardiac masses should be considered in the differential diagnosis of contour abnormalities of the cardiac shadow, even when the cardiac configuration seems characteristic of a specific cardiac diagnosis. Computerized transmission tomography has been particularly useful in delineating the extracardiac nature of these types of lesions.

REFERENCES


Information for Physicians and Patients About DES

FOUR PUBLICATIONS related to diethylstilbestrol (DES) exposure in utero are available without cost from the National Cancer Institute. Two of the publications are for health professionals: Information for Physicians and an illustrated Atlas of Findings. Two updated and expanded pamphlets for distribution to patients or the public also are available: Questions and Answers About DES Exposure During Pregnancy and Before Birth and Were You or Your Daughter or Son Born After 1940?

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