Enlarging, Atypically Located Pericardial Cyst*  
Recent Experience and Literature Review

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Pericardial cysts frequently are recognized when they present in a cardiophrenic angle, but may not be suspected when they occur elsewhere in the chest. To highlight the unusual presentations of pericardial cysts, we present two patients with cysts in the upper mediastinum and review the reported experience with similar lesions. Our patients' cysts are particularly instructive because one cyst enlarged over 23 months and because the other did not appear cystic on a computerized tomographic scan. Because percutaneous aspiration may be an attractive alternative to surgical resection when a pericardial cyst is suspected, clinicians should include pericardial cyst in the differential diagnosis of upper mediastinal masses.

Pericardial cyst most commonly presents as a rounded mass in either cardiophrenic angle. Patients are usually asymptomatic, but when symptoms do occur and the diagnosis is appropriately suspected, percutaneous aspiration of cyst contents is an attractive alternative to surgical resection because the cyst can sometimes be permanently ablated with little morbidity. However, pericardial cysts often escape preoperative suspicion, especially when they occur in unusual mediastinal locations or when they do not appear cystic by imaging techniques like computerized tomographic (CT) scanning. In order to expand the clinical spectrum of pericardial cyst, we present two patients with atypically located pericardial cysts; one of these cysts enlarged over 23 months and the other did not appear cystic on CT scan. We also review the collected experience of atypically located cysts to emphasize that pericardial cyst should be considered in the differential diagnosis of superior anterior mediastinal masses.

Case Reports

Case 1

A 38-year-old white woman presented in February 1985 with a history of recurrent episodes of productive cough with dyspnea and complaints of nonexertional substernal chest pain. She had otherwise been in good health and had never smoked cigarettes.

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FIGURE 1a (upper). Case 1, chest roentgenogram, February 1985. The mediastinal mass is not apparent on plain films of the chest.  
1b (lower). Case 1, chest CT scan. A homogeneous mass of soft tissue density (arrow) is anterior and lateral to the aortic arch.
Physical examination was notable only for bilateral, coarse inspiratory rhonchi on chest auscultation.

An ECG was normal, pulmonary function tests showed moderate airflow obstruction (FEV1 = 49 percent of predicted; FEV1/FVC = 51 percent) with normal lung volumes, and a chest roentgenogram was normal (Fig 1, upper).

Further evaluation included a CT scan of the chest, which revealed a 1.5 x 4.0 x 4.0 cm homogeneous mass of soft tissue density in the left anterior mediastinum, lateral to the aortic arch and to the pulmonary outflow tract (Fig 1, lower). At thoracotomy, the mass was a cyst which communicated with the pericardium, and the diagnosis of pericardial cyst was made. Pathologic examination of the resected specimen confirmed this diagnosis.

CASE 2

A 54-year-old white woman presented in February 1985 with a three-month history of mild exertional dyspnea and dull, constant left substernal chest pain. She denied other symptoms, and was previously well except for pulmonary tuberculosis in 1962. She had never smoked cigarettes.

Physical examination was unremarkable; results of chest and cardiac examinations were normal and without evidence of elevated right-sided venous pressures. There was neither lymphadenopathy nor findings of myasthenia gravis.

Recent laboratory examinations included a normal electrocardiogram, normal spirometry, and normal lung volumes. Figure 2, left, shows the chest roentgenogram, which revealed a smooth-bordered, extrapleural mass abutting the upper left heart border; this lesion had grown since March 1983, when a routine chest roentgenogram also showed an abnormal prominence of the upper left heart border (Fig 2, right). Concern about an enlarging anterior mediastinal mass prompted a chest CT scan (Fig 3), which revealed a round unilocular mass of water density that extended from the top of the aortic arch to the midportion of the left atrium. The roentgenographic diagnosis was pericardial cyst; thymic and other mediastinal cysts were deemed less likely but could not be definitely excluded by the available studies. Because the cyst was thought to be causing her symptoms, percutaneous aspiration of the cyst contents was recommended, but the patient declined treatment.

DISCUSSION

Pericardial cysts are uncommon mediastinal abnormalities (ie, estimated prevalence of 1/100,000 persons) which most commonly occupy a cardiophrenic angle on chest roentgenogram. They infrequently provoke symptoms and when discovered in the cardiophrenic angle, may simulate pericardial fat; ventricular aneurysm or diverticulum; enlargement of diaphragmatic lymph nodes; diaphragmatic tumors or eventration; lung, pleural, or pericardial neoplasms; or foramen of Morgagni hernias. Two large series reported by Grundmann et al (N = 91 patients) and by Feigin et al (N = 82 patients), respectively, describe pericardial cyst locations as follows: right cardiophrenic angle (51 percent and 70 percent), left cardiophrenic angle (38 percent and 22 percent), and mediastinal locations not adjacent to the diaphragm (11 percent).
Table 1—Collected Cases of Upper Mediastinal Pericardial Cysts

<table>
<thead>
<tr>
<th>First Author/Ref</th>
<th>Date of Publication</th>
<th>Radiographic Position Of Pericardial Cyst</th>
<th>No. of Patients</th>
<th>Initially Suspected Diagnosis</th>
<th>Serial Follow-Up Available?</th>
<th>Was Serial Growth Seen?</th>
<th>Any Symptoms Described?</th>
</tr>
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<tbody>
<tr>
<td>DuFour13</td>
<td>1929</td>
<td>Above diaphragm, unspecified</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lillie7</td>
<td>1950</td>
<td>Left hilar</td>
<td>1</td>
<td>Thymoma</td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Perasalo13</td>
<td>1954</td>
<td>Left upper heart border</td>
<td>1</td>
<td>Pericardial tumor</td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Davis14</td>
<td>1954</td>
<td>Right hilar</td>
<td>1</td>
<td></td>
<td>No</td>
<td>No</td>
<td>Chest pain</td>
</tr>
<tr>
<td>Grundmann1</td>
<td>1955</td>
<td>Right atrial area</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Maier8</td>
<td>1957</td>
<td>Aortic arch</td>
<td>1</td>
<td>Thymic tumor</td>
<td>Yes</td>
<td>Yes (15 mos)</td>
<td>None</td>
</tr>
<tr>
<td>Mills18</td>
<td>1959</td>
<td>Right paratracheal</td>
<td>1</td>
<td></td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Hewitson18</td>
<td>1963</td>
<td>Left hilar</td>
<td>1</td>
<td></td>
<td>Yes</td>
<td>Yes (years)</td>
<td>None</td>
</tr>
<tr>
<td>DeRoover17</td>
<td>1963</td>
<td>Right paratracheal</td>
<td>1</td>
<td></td>
<td>No</td>
<td>No</td>
<td>Wheezing &amp; weakness</td>
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<tr>
<td>Pader9</td>
<td>1969</td>
<td>Left hilar</td>
<td>1</td>
<td>Hilar lymphadenopathy</td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Sarin18</td>
<td>1970</td>
<td>Right upper heart border</td>
<td>1</td>
<td></td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Feigin1</td>
<td>1977</td>
<td>Left upper heart border</td>
<td>1</td>
<td></td>
<td>Yes</td>
<td>Yes (5 years)</td>
<td>Dyspnea</td>
</tr>
<tr>
<td>Unverferth4</td>
<td>1979</td>
<td>Above diaphragm, unspecified</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present cases</td>
<td>1985</td>
<td>Left superior mediastinum near aortic arch</td>
<td>1</td>
<td>Thymoma</td>
<td>No</td>
<td>No</td>
<td>Cough with purulent sputum</td>
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<tr>
<td></td>
<td>1985</td>
<td>Left upper heart border</td>
<td>1</td>
<td>1983-? Left atrial appendage</td>
<td>Yes</td>
<td>Yes (23 mos)</td>
<td>Mild dyspnea + left subcostal chest pain</td>
</tr>
</tbody>
</table>

percent and 8 percent). Our patients' pericardial cysts were therefore unusual because both cysts presented in atypical mediastinal locations and because one cyst grew substantially over 23 months.

Table 1 presents the collected experience of pericardial cysts outside the cardiophrenic angles. To date, we can find only 34 cases described since 1929 (present cases included). Thirteen of these abutted the left heart border on chest roentgenograms; nine abutted the right heart border, and five occupied the superior mediastinum, either in the right paratracheal area, or near the aortic arch. Exact locations (other than being removed from the diaphragm) were not specified in seven cases. Unlike pericardial cysts in the cardiophrenic angles,1 those located cephalad in the mediastinum have more commonly been reported on the left than on the right (16/27 vs 11/27). Also unlike the typically located cysts, cephalad mediastinal cysts often were mistaken for more ominous mediastinal lesions, like thymoma, lymphoma, mesenchymal tumor, or extragonadal germ cell tumor (Table 1). In one of our patients, the cyst's enlargement further raised
suspicion of a neoplasm and prompted a CT scan, both to rule out a solid mass and to better localize the lesion. This CT examination proved especially useful because it showed that the mass was actually a unilocular cyst. In the other patient, chest CT revealed a previously unsuspected mass. Because the lateral borders of the cyst did not extend beyond the aortic knob, the lesion was not apparent on the posteroanterior chest roentgenogram.

Although serial x-ray follow-up of pericardial cysts has been reported infrequently, experience with our second patient and with a few others17,19,20 clearly shows that pericardial cysts can enlarge. In rare instances, enlargement of strategically-located cysts has even caused obstruction of the right mainstem bronchus19 and spontaneous cyst rupture.20

The diagnostic approach to mediastinal masses has been controversial,21,22 but because currently available imaging techniques like CT and sonography can often reliably distinguish mediastinal cysts from solid masses, earlier recommendations to resect all mediastinal masses for definitive diagnosis6,20 have more recently been amended by some authors.18,22 In fact, because unilocular mediastinal cysts—whether pericardial, thymic, lymphangiomatous, or bronchial—are not known to have neoplastic potential,7,9 or to cause acutely catastrophic complications, some authors now recommend ablating the cyst only if a local complication or a referable symptom occurs.22 Furthermore, when treatment does become necessary, recent experience with percutaneous aspiration of cyst contents has made this an attractive initial alternative to surgical resection. To date, seven percutaneous pericardial cyst aspirations have been reported,4,4,23 and an eighth pericardial cyst has been aspirated during mediastinoscopy.18 Follow-up has been reported in six patients, and four patients have shown no cyst recurrence after as long as three years.4,4,23

Experience with our first patient confirms previous observations23 that mediastinal cysts may not appear cystic on CT when their attenuation (as measured by Hounsfield units) exceeds that of water. In large series of patients examined with CT, attenuations as high as 20 to 40 Hounsfield units have been seen, and these pericardial and other mediastinal cysts have resembled soft tissue masses.24 On the basis of similar experience, Westcott25 advocates aspirating mediastinal masses for diagnosis before resection because, in his hands, this strategy has proven safe (even when major vessels were inadvertently impaled), accurate, and useful to ablate masses that are actually cysts. A more conservative approach4 is to aspirate the mediastinal mass percutaneously only after the lesion has been shown not to involve or closely abut a major vascular structure. While the choice of diagnostic strategy will depend heavily on local experience, our experience and that of others1,8 suggests the following points: (1) unlike asymptomatic cysts, soft tissue mediastinal masses often warrant aggressive diagnosis; (2) cysts in the mediastinum may present as soft tissue densities on CT; and (3) percutaneous aspiration can be a useful technique to diagnose mediastinal masses which do not appear cystic. For those unusual patients with mediastinal cysts that mimic soft tissue densities, aspiration can ablate the cyst and may obviate the need for surgical resection.

In summary, although pericardial cysts infrequently occur in the upper mediastinum, chest physicians, radiologists, and cardiothoracic surgeons should include this entity in the differential diagnosis of enlarging upper mediastinal masses. Chest CT and/or sonogram can be useful to confirm a cystic structure, thereby largely excluding such solid tumors as thymomas, lymphomas, and tumor, or mesenchymal and germ cell origin. However, mediastinal cyst still should be considered even if chest CT suggests a soft tissue density. Because the described natural history of pericardial cysts is benign, attempts to ablate known cysts seem warranted only when symptoms or local complications occur. Percutaneous cyst aspiration is an attractive initial alternative to resection, and may also be useful in diagnosing mediastinal cysts that resemble soft tissue densities by CT.

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