CASE REPORT

Symptomatic pericardial cyst: a case series

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Pericardial cysts are most commonly located at the cardiophrenic angle or, rarely, in the posterior or anterior superior mediastinum. The majority of pericardial cysts are asymptomatic and are found incidentally. Symptomatic pericardial cysts present with dyspnoea, chest pain, or persistent cough. We describe four patients with symptomatic pericardial cysts who were treated with either echocardiographically guided percutaneous aspiration or video-assisted thoracoscopic surgery, or both; thoracotomy; or conservative therapy.

Keywords
Echocardiography • Mediastinal mass • Pericardial cyst • Transoesophageal echocardiography • Transthoracic echocardiography

Introduction

Pericardial cysts are rare. These benign intrathoracic lesions are most commonly located either at a cardiophrenic angle (right, 70%; left, 22%)1 or, rarely, in the posterior or anterior superior mediastinum (8%).2 The majority of pericardial cysts (>50%) are asymptomatic1,3 and have an uneventful natural course. Symptomatic pericardial cysts present with dyspnoea, chest pain, or persistent cough; uncommonly, a pericardial cyst may present with haemoptysis, fever, or pneumothorax.1 We describe four patients with symptomatic pericardial cysts who were treated with echocardiographically guided percutaneous aspiration or video-assisted thoracoscopic surgery, or both; thoracotomy; or conservative therapy. The study was approved by the Mayo Clinic Institutional Review Board.

Case reports

Case 1

A 48-year-old woman sought care for chest discomfort, generalized fatigue, and dyspnoea with minimal exertion. The symptoms were of 10 months’ duration. After exercise, her dyspnoea typically lasted for about 2 or 3 h. A chest radiograph revealed a right cardiophrenic mass and mild pectus excavatum, with one of the differential considerations being a pericardial cyst (Figure 1). The apical four-chamber view of the transthoracic echocardiogram showed an echolucent space next to the right atrium at the right cardiophrenic angle, consistent with a pericardial cyst. The right and left ventricular chamber size and function were normal, and there was no valvular heart disease. Computed tomography of the chest also showed a lenticular mass at the right cardiophrenic angle, diagnostic of a pericardial cyst (Figure 2). Coronary angiography showed normal coronary arteries. The patient underwent video-assisted thoracoscopic surgery, and a simple pericardial cyst measuring 5.5 × 3.5 × 2.5 cm was enucleated. The histopathologic results were consistent with a pericardial cyst.

Case 2

A 56-year-old woman sought care for dyspnoea, cough, and a sensation of chest fullness that had persisted for 2 months. A chest radiograph revealed a right cardiophrenic mass (Figure 3). Apical and subcostal views of transthoracic echocardiography showed an oval echolucent space at the right cardiophrenic angle next to the right atrium and of approximately 4 × 5 cm, consistent with a pericardial cyst (Figure 4; Supplementary data online, Movie 1). No pericardial effusion and no evidence of compromise of haemodynamic cardiac functions were found. The right and left ventricular sizes and functions were normal, and there was no valvular heart disease. Coronary angiography showed normal coronary arteries. The patient underwent thoracotomy, and a uniloculated, serum-filled pericardial cyst measuring 6.6 × 5.7 × 2.5 cm was enucleated (Figure 5). An intraoperative transoesophageal echocardiogram revealed a space in the right atrioventricular groove, consistent with a pericardial cyst. The histopathologic results also were consistent with...
Case 3

A 66-year-old woman with a pericardial cyst recently diagnosed at an outside facility presented to establish further care. Initially, she sought care for shortness of breath that had progressively worsened over 1 year. Her medical history was clinically significant for chronic obstructive pulmonary disease, with a 60 pack-year smoking history and weight loss of about 10 pounds over 1 year. The patient’s symptoms were attributed initially to her long-standing tobacco abuse. However, a chest radiograph showed an enlarged right heart border and computed tomography of the chest revealed a large 8 × 8 cm mass adjacent to the right heart and outside the pericardium. T1- and T2-weighted magnetic resonance imaging showed a 7 × 10 cm lobulated mass in the anterior mediastinum, suggestive of a pericardial cyst (Figure 6). The transthoracic echocardiographic apical and subcostal views showed a 6 × 12 cm echo-free space next to the right atrium, a finding also suggestive of a pericardial cyst (Figure 7; Supplementary data online, Movie 2). The left ventricular size and function were normal, with mild mitral regurgitation. The patient was treated conservatively because of high surgical risk attributed to severe emphysema. A repeated transthoracic echocardiography with the apical 4-chamber view at 22 months later showed minimal increase in the size of the pericardial cyst. At 6 years after her diagnosis of a pericardial cyst, she died secondary to squamous cell carcinoma of the lung.

Case 4

A 75-year-old woman had undergone a diagnostic work-up at an outside facility for evaluation of shortness of breath and intermittent chest pain of 6 months’ duration. A chest radiograph showed a large opaque mass occupying the lower half of the left hemithorax (Figure 8). Computed tomography of the chest showed a thin-walled, non-enhancing low-attenuation mass (13.3 × 8.7 cm) in the left hemithorax. The apical four-chamber and subcostal view of the transthoracic echocardiogram (Figure 9) showed a large, fluid-filled, echolucent space in the left hemithorax, suggestive of a pericardial cyst, resting next to the lateral wall of the left ventricle. Left ventricular size was decreased, with normal systolic function and mild mitral regurgitation. The right chamber’s sizes and functions were normal.

The patient underwent echocardiography-guided percutaneous aspiration of the pericardial cyst, during which 1100 mL of serous fluid was removed. A chest radiograph after the procedure showed nearly complete resolution of the pericardial cyst (Figure 10). A repeated chest computed tomography showed a small to moderate amount of residual fluid in the pericardial

Figure 1  Chest radiograph of patient 1. Posteroanterior (A) and lateral (B) views show a right cardiophrenic mass (arrows) at a typical location for a pericardial cyst.

Figure 2  Computed tomographic scan of the chest of patient 1. Contrast image shows a lenticular low-density fluid (arrows) at the right cardiophrenic angle that is most consistent with a pericardial cyst.
cyst. Postprocedure, the patient initially had excellent relief in her symptoms, but about 10 weeks later she had recurrent dyspnoea and chest pressure. Transthoracic echocardiography was repeated. It showed reaccumulation of fluid in the pericardial cyst, evident by a 11 × 9 cm mass filled with fluid and a semisolid substance in the left hemithorax beside the lateral wall of the left ventricle, with evidence of mild left ventricular compromise (Supplementary data online, Movie 3). Computed tomography of the chest was repeated and showed a recurrent pericardial cyst (Figure 11).

The patient underwent video-assisted thoracoscopic surgery, along with partial pericardiectomy, to resect the pericardial cyst. Results of cytological testing were negative for malignancy, and histopathologic evaluation was consistent with a pericardial cyst. After the surgery, she had persistent hoarseness secondary to left vocal cord paralysis, which eventually required type I thyroplasty with a Montgomery implant system. The patient had no recurrence of the pericardial cyst at her 28-month follow-up evaluation.

**Figure 3** Chest radiograph of patient 2. Posteroanterior (A) and lateral (B) views show a right cardiophrenic mass (arrows) at a typical location for a pericardial cyst.

**Figure 4** Apical (A) and subcostal (B) views of transthoracic echocardiogram of patient 2. Image shows a large, oval, echolucent space (arrow) at the right cardiophrenic angle next to the right atrium (RA) that measures approximately 4 × 5 cm, consistent with a pericardial cyst. LA, left atrium; LV, left ventricle; RV, right ventricle.

**Figure 5** Photograph of gross pericardial cyst of patient 2. Image shows an enucleated, serum-filled, 6.6 × 5.7 × 2.5 cm pericardial cyst.
Figure 6  Magnetic resonance imaging (MRI) scans of patient 3. (A) T1-weighted coronal MRI of the chest shows a large, $7 \times 10$ cm mass (arrows) contiguous with the pericardium with mixed attenuation. (B) T2-weighted MRI axial image shows a mass (arrows) with a high signal consistent with fluid, diagnostic of a pericardial cyst.

Figure 7  Transthoracic echocardiogram of patient 3. The apical four-chamber view (A) and subcostal view (B) show a large, $6 \times 12$ cm echo-lucent space (arrows) next to the right atrium (RA), suggestive of a pericardial cyst. LA, left atrium; LV, left ventricle; RV, right ventricle.

Figure 8  Chest radiograph of patient 4. Posteroanterior (A) and lateral (B) views show a large opacity (arrows) occupying more than half of the left hemithorax.
Most commonly, pericardial cysts are found incidentally. The diagnosis usually is suspected because of abnormal findings on chest radiography, showing an enlarged contour of the right heart border. Additional diagnostic methods for pericardial cysts include transthoracic echocardiography, computed tomography, and magnetic resonance imaging of the chest (Table 1). Apical and subxiphoid images of the transthoracic echocardiogram can delineate further the margins and cystic character of the echolucent mass adjoining the cardiac border, initially diagnosed with a chest radiograph or other imaging study. A loculated pericardial effusion also can mimic a pericardial cyst on transthoracic echocardiography, and differentiating one from the other can be extremely difficult. However, in some cases, a pericardial cyst may be differentiated from a loculated...
Pericardial effusion by the presence of a thin wall separating the cyst from the main pericardial space. The transoesophageal echocardiogram has an incremental value in establishing a diagnosis of pericardial cyst in atypical locations and in those instances when transthoracic echocardiographic images are not adequate for the diagnosis.6

Cardiac computed tomography and cardiac magnetic resonance imaging offer superb, detailed anatomical description of pericardial lesions and are valuable in the evaluation of associated extracardiac disease during preoperative preparation.7,8 Pericardial cysts appear as oval, thin-walled, and well-defined homogeneous masses on cardiac computed tomography; by comparison, they have a distinctive manifestation of intermediate to low signal intensity on T1-weighted sequences and high signal intensity on T2-weighted sequences.8 Usually, pericardial cysts fail to enhance in contrast imaging with both cardiac computed tomography and cardiac magnetic resonance imaging.8

Pericardial cysts can lead to complications.6,9 These complications include the following:

- Sudden death;
- Cardiac tamponade;
- Cyst rupture;
- Right ventricular outflow obstruction;
- Pulmonary stenosis;
- Erosion of the cyst into the superior vena cava and right ventricular wall;
- Mitral valve prolapse;
- Congestive heart failure;
- Atrial fibrillation;
- Pericarditis;
- Obstruction of the right main bronchus.

Management of a pericardial cyst depends on the distinctiveness of the cyst and the occurrence of symptoms (Figure 12). Serial transthoracic echocardiography is used to monitor asymptomatic patients and ensure a benign course in which the pericardial cyst can resolve spontaneously.10,11 Among patients who have a symptomatic pericardial cyst, a cyst resection with either a thoracotomy or video-assisted thoracoscopic surgery has

**Table 1** Diagnostic choices and therapeutic options for pericardial cysts

<table>
<thead>
<tr>
<th>Diagnostic choices</th>
<th>Therapeutic options</th>
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</thead>
<tbody>
<tr>
<td>Transthoracic echocardiography</td>
<td>Cyst resection by either thoracotomy or video-assisted thoracoscopic surgery</td>
</tr>
<tr>
<td>Echolucent space visualized adjoining the heart border usually on subcostal images and occasionally on apical views</td>
<td>Cyst aspiration</td>
</tr>
<tr>
<td>Cardiac CT scan</td>
<td>Echocardiography- or ultrasonography-guided percutaneous aspiration</td>
</tr>
<tr>
<td>Oval, thin-walled, and well-defined homogeneous space</td>
<td>Conservative treatment</td>
</tr>
<tr>
<td>Failure to enhance with contrast medium</td>
<td></td>
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<tr>
<td>Cardiac MRI</td>
<td></td>
</tr>
<tr>
<td>Intermediate- to low-intensity signal on T1-weighted sequences and high-signal intensity on T2-weighted sequences</td>
<td></td>
</tr>
<tr>
<td>Failure to enhance with contrast medium</td>
<td></td>
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CT, computed tomographic; MRI, magnetic resonance imaging.

**Figure 12** Management of pericardial cysts.
been the most favoured approach\(^4\) (Table 2). Nonetheless, percutaneous aspiration of pericardial cysts, guided by echocardiography and ultrasonography, has been reported with excellent results.\(^{12,13}\)

### Supplementary data

Supplementary data are available at European Journal of Echocardiography online.

### Conflict of interest:

none declared.

### References


### Table 2  Summary of published case series of patients with pericardial cysts

<table>
<thead>
<tr>
<th>First author/reference</th>
<th>Publication year</th>
<th>Total no. of patients</th>
<th>No. of symptomatic patients</th>
<th>Presenting symptoms</th>
<th>Treatment in symptomatic patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feigin(^1)</td>
<td>1977</td>
<td>82</td>
<td>34</td>
<td>Chest pain, dyspnoea, cough, paroxysmal atrial tachycardia, pneumothorax, haemoptysis, fever</td>
<td>Cyst resection in majority of symptomatic patients</td>
</tr>
<tr>
<td>Unverferth(^14)</td>
<td>1979</td>
<td>12</td>
<td>2</td>
<td>Chest pain, dyspnoea</td>
<td>Cyst resection</td>
</tr>
<tr>
<td>Stoller(^15)</td>
<td>1986</td>
<td>2</td>
<td>2</td>
<td>Productive cough, dyspnoea, chest pain</td>
<td>One patient had thoracotomy; the other patient refused treatment</td>
</tr>
<tr>
<td>Abad(^4)</td>
<td>1996</td>
<td>2</td>
<td>2</td>
<td>Cardiac tamponade, chest discomfort</td>
<td>Thoracotomy in both patients</td>
</tr>
<tr>
<td>Menconi(^16)</td>
<td>1998</td>
<td>5</td>
<td>3</td>
<td>Arrhythmia, dyspnoea, cough</td>
<td>Video-assisted thoracoscopic surgery in all patients</td>
</tr>
<tr>
<td>Kutlay(^17)</td>
<td>2001</td>
<td>3</td>
<td>2</td>
<td>Chest pain, cough</td>
<td>Thoracotomy in both patients</td>
</tr>
<tr>
<td>Patel(^6)</td>
<td>2004</td>
<td>2</td>
<td>1</td>
<td>Vague abdominal pain</td>
<td>None mentioned</td>
</tr>
<tr>
<td>Maksimovic(^18)</td>
<td>2007</td>
<td>2</td>
<td>1</td>
<td>Dyspnoea</td>
<td>Cyst puncture</td>
</tr>
<tr>
<td>Najib</td>
<td>Present</td>
<td>4</td>
<td>4</td>
<td>Chest pain, chest fullness, cough, dyspnoea, fatique</td>
<td>Video-assisted thoracoscopic surgery ((n = 1)); thoracotomy ((n = 1)); conservative treatment ((n = 1)); failed echocardiography-guided percutaneous aspiration and subsequent video-assisted thoracoscopic surgery ((n = 1))</td>
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</tbody>
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