Surgical resection of a giant pericardial cyst: a case report

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Background
Pericardial cysts are rare congenital mediastinal cysts. They are typically asymptomatic and are often discovered incidentally, although some patients may present with chest pain and dyspnoea. Asymptomatic patients are managed conservatively with multiple modalities, with surgical resection often recommended for symptomatic patients only. The frequency of follow-up imaging has yet to be established.

Case summary
We report a case of a 59-year-old female with a gradually increasing pericardial cyst, first noted 10 years prior as an abnormal cardiac silhouette on routine chest radiography. Further evaluation confirmed the presence of a pericardial cyst compressing the left ventricle with new-onset atrial fibrillation. The patient underwent successful thoracoscopic excision of the pericardial cyst under general anaesthesia. The patient’s post-operative course was uneventful, and she was ultimately discharged in stable condition.

Discussion
Pericardial cysts are typically benign, but complications may arise in the case of compression of adjacent cardiac structures, inflammation, haemorrhage, or rupture of the cyst. Magnetic resonance imaging is considered the better modality for both diagnosis and follow-up of pericardial cysts. This case illustrates the need for long-term clinical follow-up in order to optimize the time for treatment.

Keywords
Case report • Pericardial cyst • Clinical course • Surgical resection • Differential diagnosis

Learning points
• Magnetic resonance imaging is considered superior for both diagnosis and follow-up of pericardial cysts, as it provides excellent delineation of pericardial anatomy and can aid in precise localization and characterization of various pericardial lesions.
• Surgical excision is indicated for symptomatic or large asymptomatic cysts given the increased risk for complications.

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Introduction

Pericardial cysts are rare benign congenital intrathoracic lesions, typically discovered incidentally, and are more often located in the right cardiophrenic angle.\(^1\) The rate of estimated incidence is about 1 in 100 000.\(^2\) Most pericardial cysts are asymptomatic and have a benign natural course. Asymptomatic patients are managed conservatively using multiple modalities [chest radiography, echocardiography, computed tomography (CT), and magnetic resonance imaging (MRI)], while surgical resection is typically recommended for symptomatic patients only. Symptoms can include dyspnoea, chest pain, dysphagia, acute or persistent cough, fever, weight loss, as well as severe complications such as cardiac tamponade depending on size and location.\(^3\) Curative treatment options include excision via thoracotomy, sternotomy, video-assisted thoracoscopic surgery (VATS), and robotic-assisted thoracoscopic system.\(^4\) Percutaneous echo-guided aspiration and ethanol sclerosis are other options. We describe a rare case in which follow-up imaging over a 10-year period revealed a gradually growing cyst, ultimately prompting surgical thoracoscopic treatment.

Timeline

| Year   | Description                                                                 |
|--------|-----------------------------------------------------------------------------|
| 2010   | Abnormal chest shadow seen on a chest radiograph. Chest computed tomography (CT) revealed a cyst measuring 57–117 mm in size. |
| 2011   | No obvious changes in size and symptoms.                                     |
| 2012   | Chest CT revealed a cyst measuring 60–118 mm.                               |
| Between 2013 and 2016 | Magnetic resonance imaging (MRI) revealed a cyst measuring 60–124 mm. |
| From 2017 to 2019 | Annual visits that included an electrocardiogram (ECG), chest radiograph, and transthoracic echocardiography showed normal results and the patient remained without subjective symptoms. |
| 2020   | CT revealed an enlarged cyst measuring 71 mm × 137 mm with new atrial fibrillation observed on ECG. |

**Figure 1** (A) Postero-anterior chest radiograph showing an area of increased density on the left side of the heart (blue arrows). (B) Axial view of the patient’s contrast-enhanced chest computed tomography showing lenticular low-density fluid at the left cardiophrenic angle. (C) Postero-anterior chest radiograph showing further extension of homogenous density in the left cardiophrenic angle (blue arrows). (D) Contrast-enhanced computed tomography showing further extension of lenticular low-density fluid at the left cardiophrenic angle.
Case presentation

In 2010, a 49-year-old asymptomatic woman was referred to our hospital because a chest radiograph revealed an abnormality in the left cardiophrenic angle. She had no particular medical or medication history. Cardiopulmonary examination and vital signs were normal, and electrocardiogram (ECG) revealed normal sinus rhythm. The chest radiograph showed a homogenous density (Figure 1). She was ultimately diagnosed with a benign pericardial cyst via contrast-enhanced chest CT (Figure 1) and MRI. The attenuation of the cyst on CT was 5–10 Hounsfield units. Neither pleural effusions nor mediastinal lymphadenopathy was evident on CT. Given that she was asymptomatic at the initial diagnosis, our team decided to pursue conservative management with regular follow-up. As time passed, although the cyst increased in size, the patient remained asymptomatic. It was not until 2020 that she began to experience palpitations and shortness of breath with exertion. Follow-up CT (Figure 2) and MRI revealed a 12 cm (major axis) pericardial cyst in the left cardiophrenic angle associated with left ventricular compression and new-onset atrial fibrillation on ECG. T1-weighted MR image showed a round low-signal intensity cyst with a regular thin wall. Axial and sagittal T2-weighted MR image showed a well-circumscribed high-attenuated cyst in contact with the left cardiac margin (Figure 2). The patient was scheduled for thoracoscopic resection of the pericardial cyst per our cardiac team’s recommendations. Pre-operative transthoracic echocardiography revealed a large, fluid-filled, echolucent space in the left hemithorax. Left ventricular size was decreased, with normal systolic function and moderate mitral regurgitation with a left atrial enlargement (Video 1). The left atrium diameter was 40 mm. Operative visualization was provided by 3D VATS. Three small incisions about 1 cm in length for trocar insertion were made in the fourth, fifth, and sixth intercostal spaces. Ports facilitated the introduction of a camera and left- and right-hand instruments. Surgeons carefully peeled away the

![Video 1](https://academic.oup.com/ehjcr/article/5/4/ytab116/6220420)

**Video 1** Transthoracic echocardiography shows a large, fluid-filled, echolucent space in the left hemithorax and an enlarged left atrium with moderate mitral regurgitation. The left ventricle was compressed by a large cyst.

![Figure 2](https://academic.oup.com/ehjcr/article/5/4/ytab116/6220420)

**Figure 2** A 320-multi-slice cardiac multidetector computed tomography. Three-dimensional, volume-rendered reconstruction of the multidetector computed tomography images showing a large pericardial cyst (blue images) in the left lower hemithorax on coronal (A) and sagittal (B) views. Computed tomography typically shows a non-enhancing pericardial cyst after intravenous administration of contrast media. (C) Axial T2-weighted MR image shows a high signal intensity cyst without septation in contact with the left cardiac margin. (D) Sagittal T2-weighted MR image shows a well circumscribed high-attenuated cyst.
cyst, which contained clear water-like fluid (Figures 3 and 4). Histopathological findings revealed a cyst wall composed of a thin layer of fibrous tissue lined with a single layer of mesothelial cells (Figure 5). The patient’s post-operative course was uneventful. We performed cardioversion for her atrial fibrillation on post-operative Day 7, and the patient maintained normal sinus rhythm afterwards. Post-operative echocardiography showed mild mitral regurgitation (Video 2). The patient is doing well and has no post-operative symptoms.

**Discussion**

We report a case of successful thoracoscopic resection of a pericardial cyst. The size and positioning of the pericardial cyst were confirmed by MRI. The cyst gradually increased in size over time until it caused the development of atrial fibrillation. Both the enlarging cyst size and subsequent atrial fibrillation could explain the patient’s subjective shortness of breath and dyspnoea on exertion. Surgical treatment was ultimately pursued after multidisciplinary discussions with our cardiac team.

The differential diagnosis for pericardial cysts includes pericardial diverticula, which also communicate with the pericardial space. Cysts can be distinguished from diverticula in that their size remains constant, whereas the size of diverticula can change with location and respirations. Cysts are also reported to be three times more common than diverticula. Spontaneous emptying or rupture of the cyst into the pleural space may explain the sudden resolution of the lesion. However, since cysts and diverticula originate from a common embryologic process, their symptoms and complications are similar, and the distinctions between the two in the literature are vague, so they are often discussed together.

The CT features of a benign mediastinal cyst are a smooth, oval, or tubular mass with a well-defined thin wall without enhancement after intravenous administration of contrast media; homogeneous attenuation, usually in the range of water attenuation (0–20 HU); no enhancement of cyst contents; and no infiltration of adjacent mediastinal structures. In this case, cyst attenuation on CT was similar to the density of water. Due to the fact that cysts containing fluid can have high attenuation on CT, they may be mistaken for solid lesions, especially when intravenous contrast media cannot be administered. Magnetic resonance imaging can be useful for showing the cystic nature of these masses because these cysts continue to have characteristically high signal intensity when imaged with T2-weighted sequences. This is especially apparent after fat-suppression techniques, regardless of the nature of the cyst contents.

Supraventricular arrhythmias, such as atrial fibrillation, are not uncommon in patients with pericardial cysts. As in this case, palpitations due to cardiac arrhythmia may be the first presenting symptom of
this disease. Compression of the atria, pulmonary veins, or the sino-atrial node region can be the predisposing factors for cardiac dysrhythmia.\textsuperscript{10,11} In this case, left ventricular compression due to a giant cyst and atrial overload due to mitral regurgitation may be contributing factors. We performed cardioversion 7 days after the operation and could maintain normal rhythm afterwards with reduced mitral regurgitation.

**Conclusions**

We described a case of a giant pericardial cyst for which imaging follow-up allowed monitoring of its gradually increasing size over a 10-year period, with ultimate surgical thoracoscopic resection due to subsequent symptom onset.

**Supplementary material**

Supplementary material is available at *European Heart Journal—Case Reports* online.

**Lead author biography**

Dr Eiji Taguchi studied at Kurume University, Japan, where he obtained national qualification as a medical doctor in 1997. He then came to Okayama University for training in Cardiology and was certified by 2004. Since 2008, he has been working at Saiseikai Kumamoto Hospital Cardiovascular Center under the lead of Dr Hideyuki Uesugi and Tomohiro Sakamoto.

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Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

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