

# Excess Epicardial Fat Mimicking a Pericardial Tumor in a Patient with Pericardial Effusion

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**Abstract** A mass-like lesion in the posterior atrioventricular groove and moderate pericardial effusion were incidentally observed during evaluation of fever in a woman in her 80s. Initially, a pericardial tumor was suspected. However, computed tomography revealed no mass lesions. Instead, low-density lesions were observed in the atrioventricular groove, interventricular groove, and around the great arteries, consistent with excess epicardial fat. Tissue characterization by computed tomography and the typical distribution consistent with fat deposits were key in diagnosis. Physicians should be aware that excess epicardial fat may be mistaken as a pericardial tumor, especially in the presence of pericardial effusion.

**Keywords:** *pericardial tumor, epicardial lipomatosis, pericarditis*

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## 1. Introduction

Advances in high-resolution imaging modalities have allowed physicians to make early and accurate diagnoses. However, this comes at the cost of overdiagnosis of normal variants, leading to unnecessary further investigations and interventions. Here, we present a case of excess epicardial fat mimicking a pericardial tumor, which was detected by echocardiography during routine evaluation of the cause of persistent fever.

## 2. Case Report

A woman in her 80s, living in a nursing home, was hospitalized for fever and loss of appetite for 2 days. Analysis of her medical history revealed hypertension, chronic atrial fibrillation, chronic heart failure, and Lewy body dementias. She had been bed-ridden for six months and had difficulty communicating because of dementia. She developed fever 2 days prior to admission. Echocardiography, performed in another hospital as a part of evaluation of the cause of fever, accidentally revealed pericardial effusion and a mass-like lesion along the posterior atrioventricular groove. The patient was subsequently referred to our hospital for further evaluation and treatment.

Initial vital signs were as follows: blood pressure, 105/67 mmHg; heart rate, 79 beats/min (irregularly

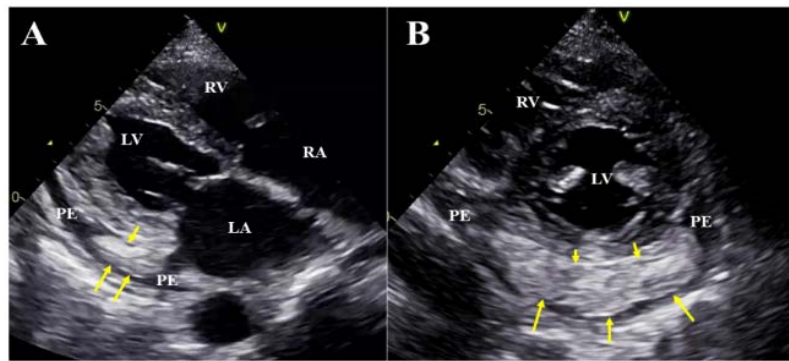
irregular); respiratory rate, 26/min; body temperature, 38.9°C; and oxygen saturation, 97% in ambient air. Examination of the ear, oral cavity, and neck revealed normal findings. No neck stiffness was observed. The jugular venous pressure was not elevated, and there was no edema. Auscultation of the heart revealed a grade 2 systolic ejection murmur along the left sternal border, while a third heart sound or friction rub was absent. Her lungs were clear to auscultate. The abdomen was flat and soft, and there was no tenderness on palpation. No skin eruptions or peripheral signs suggestive of infectious endocarditis were observed.

Laboratory tests revealed an elevated C-reactive protein level of 10.44 mg/dl (<0.14 mg/dl), but the white blood cell count was normal at 6900/ $\mu$ L. Kidney function and electrolytes were normal, and there was no elevation in liver enzymes. Urinalysis revealed no pyuria or bacteriuria. Thyroid function was normal, and there were no autoantibodies suggestive of collagen vascular disease. Three sets of blood cultures tested negative.

A twelve-lead electrocardiogram showed atrial fibrillation with a ventricular response of 70-80/min. The ST segment was slightly depressed in leads I, II, aVF, V3-V6 with T wave inversion. No ST segment elevation was observed. A chest roentgenogram revealed cardiomegaly and left pleural effusion, but no pulmonary congestion or infiltration. Echocardiography revealed moderate pericardial effusion without signs of tamponade. A mobile and elliptical echogenic mass along the posterior atrioventricular groove was observed and initially thought to be a tumor or thrombus (Figure 1, supplemental video1).

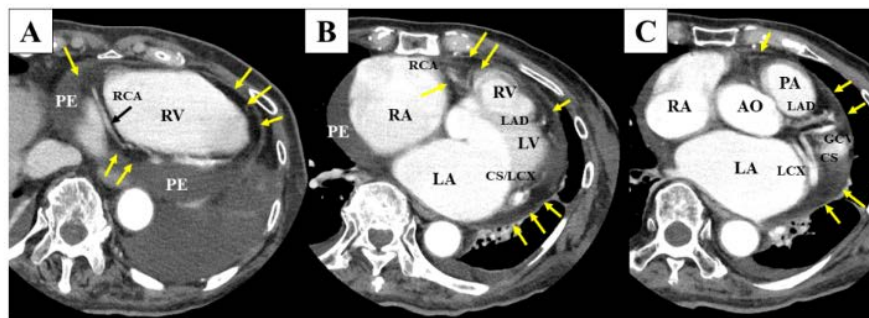
Mild-to-moderate mitral and tricuspid regurgitation was noted, but there was no vegetation on any valve. Both the

left and right atria were dilated, but the left ventricular size and systolic function were normal.



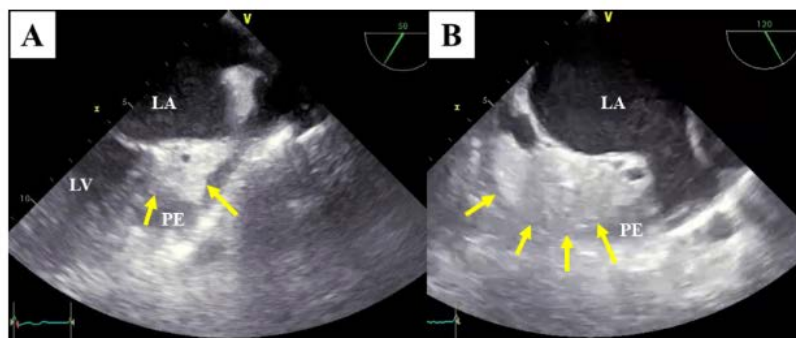
**Figure 1.** Transthoracic echocardiography performed at initial presentation, showing a mobile echogenic mass-like lesion in the atrioventricular groove (yellow arrows). A: A parasternal long axis view. B: Parasternal short axis view. Supplemental video 1: A para-sternal view of the trans-thoracic echocardiography performed at initial presentation, showing a mobile echogenic mass-like lesion in the atrioventricular groove.

Computed tomography (CT) of the chest and abdomen did not reveal pneumonia or other causes of fever. A small amount of bilateral pleural effusion and moderate pericardial effusion were noted. No mass lesions were observed in the pericardial space. Notably, prominent low-density lesions were observed along the anterior and posterior atrioventricular groove, anterior surface of the right ventricle, and apex (Figure 2).



**Figure 2.** Contrast enhanced CT scan images in the lower (A), middle (B) and upper (C) part of the heart, revealing excess epicardial fat located in the apex (A), anterior interventricular groove, anterior and posterior atrioventricular groove (B), surrounding the great vessels (C). Yellow arrows show excess epicardial fat. RV, right ventricle; LV, left ventricle; RA, right atrium; LA, left atrium; PE, pericardial effusion; RCA, right coronary artery; LAD, left anterior descending artery; LCX, left circumflex artery; CS, coronary sinus; GCV, great cardiac vein. AO: aorta; PA: pulmonary artery.

The distribution of low-density areas was consistent with that of epicardial fat. A transesophageal echocardiogram was performed for further evaluation, revealing a mobile echogenic mass-like lesion at the base of the great arteries and atrioventricular grooves surrounding the coronary sinuses and arteries (Figure 3, supplemental video 2). Based on the multimodality images, the mass-like lesion was diagnosed as prominent epicardial fat, which was coincidentally found in the presence of pericardial effusion.



**Figure 3.** Transesophageal echocardiograms showing mobile, excess epicardial fat located in the atrioventricular groove surrounding the coronary artery and vein. A: a mid-esophageal mitral commissural view rotated posteriorly. B: The omni-plane was rotated to 120 degrees for tangential view of the atrioventricular groove. LV, left ventricle; LA, left atrium; PE, pericardial effusion. Supplemental video 2: A mid-esophageal mitral commissural view of the transesophageal echocardiograms showing mobile, excess epicardial fat located in the atrioventricular groove surrounding the coronary artery and vein.

As there was no obvious source of infection, the patient was carefully observed without antibiotic treatment. The patient's fever spontaneously subsided within 3 days, and her C-reactive protein level improved. The patient's general condition and appetite improved. The patient was returned to the nursing home on the 8<sup>th</sup> hospital day. She has remained stable for 8 months after discharge.

### 3. Discussion

There have been several case reports and case series reporting similar conditions to our patient [1,2,3,4] in which the term lipoma [1], lipomatosis [2], and excess epicardial fat [3,4], have been used interchangeably. However, based on the distribution, the term "excess epicardial fat" or "lipomatosis" best describes our patient's condition rather than "lipoma" which refers to more localized space-occupying lesion compressing surrounding structures [5]. Usually, excess epicardial fat is detected with echocardiography during the evaluation of cardiac symptoms such as dyspnea and chest discomfort and is usually associated with pericardial effusion [1,2,3,4]. Tissue characterization by CT and MRI has been shown to be particularly useful for accurate diagnosis [1,2,3,4,6]. As in our patient, epicardial fat presents as thick low-density structures located in the surface of the atrioventricular groove on CT (Figure 2) [1,2,3,4]. On magnetic resonance imaging (MRI), epicardial fat is characterized by hyperintense lesions on T1 weighed images, intermediate to high intensity signals in T2-weighted images and no signals in fat suppression images [6]. Excess epicardial fat usually does not require specific treatment. However, if the amount of pericardial effusion is large, surgical treatment may be necessary [4].

In our case, a mobile mass-like structure in the posterior atrioventricular groove was initially misdiagnosed as a tumor or thrombus (Figure 1, supplemental video 1). However, CT scan revealed thick low-density structures distributed in the atrioventricular groove and around the base of the aorta and main pulmonary artery, in the anterior wall of the right ventricle and apex (Figure 2). Based on the typical location and tissue characterization by CT scan, we concluded that the tumor-like lesion was a prominent epicardial fat emphasized by the presence of pericardial effusion.

The cause of the pericardial effusion was difficult to define in the present case. Acute pericarditis was possible, but a definite diagnosis was difficult because of the

absence of friction rub, ST elevation on electrocardiogram, and chest pain. Because the fever subsided spontaneously, bacterial infection was not considered likely. Autoantibodies were negative, and thyroid function test results were normal. She had no history of trauma or aortic dissection. Acute viral pericarditis or systemic viral illness superimposed on chronic pericardial effusion may be a probable cause of fever. Epicardial fat is known to produce cytokines and cause inflammatory cellular infiltration [4]. However, it is not known whether excess epicardial fat resulted in pericardial inflammation in the present case.

### 4. Conclusion

Clinicians should note that excess epicardial fat may present as an echogenic and mobile pericardial tumor, especially in the presence of pericardial effusion. Thus, tissue characterization and observation of the distribution of lesions by CT or MRI are important.

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