ESC European Society of Cardiology

European Heart Journal - Case Reports (2022) **6**(1), 1–4
https://doi.org/10.1093/ehjcr/ytab529

COMPETITION WINNER
Cardiac imaging

Case report: epipericardial fat necrosis—a rare cause of chest pain

Frederik M.A. van den Heuvel [1], Aukelien C. Dimitriu-Leen[1], Jesse Habets[2], and Robin. Nijveldt [1]*

[1]Department of Cardiology, Radboud University Medical Centre, Geert Grooteplein Zuid 10, 6525 GA Nijmegen, the Netherlands; and [2]Department of Medical Imaging, Radboud University Medical Centre, Geert Grooteplein Zuid 10, 6525 GA Nijmegen, the Netherlands

Received 18 August 2021; first decision 29 October 2021; accepted 13 December 2021; online publish-ahead-of-print 31 December 2021

Background Epipericardial fat necrosis (EFN) is a rare cause of chest pain, which is often unrecognized.

Case summary A 58-year-old man previously known with a transient ischaemic attack presented with a sharp, substernal chest pain. Pulmonary embolism was ruled out by computed tomography (CT) angiography. However, CT angiography revealed an inhomogeneous epipericardial mass. On cardiovascular magnetic resonance imaging, the mass had an inhomogeneous signal intensity without infiltration of surrounding tissue. Late gadolinium enhancement imaging showed subtle hyperenhancement. Tissue characterization by means of parametric mapping revealed very low native T1 relaxation times and increased T2 relaxation times. In conclusion, the epipericardial mass showed fibrofatty inflammatory markers, suggestive of EFN. The chest pain resolved spontaneously. Follow-up CT 3 months later showed a marked regression of the mass which confirmed the diagnosis EFN.

Discussion Epipericardial fat necrosis is a benign and self-limiting inflammatory cause of chest pain, which can be diagnosed with multi-modality imaging and must not be overlooked in the differential diagnosis of patients with acute pleuritic chest pain.

Keywords Epipericardial fat necrosis • Computed tomography angiography • Cardiovascular magnetic resonance imaging • Chest pain • Case report

ESC Curriculum 2.4 Cardiac computed tomography • 2.3 Cardiac magnetic resonance • 2.1 Imaging modalities

Learning points

- Epipericardial fat necrosis is a rare and benign cause of chest pain.
- Epipericardial fat necrosis can be diagnosed with cardiovascular magnetic resonance imaging using parametric mapping.

Introduction

Chest pain is a frequent cause of emergency department admission and has a wide differential diagnosis ranging from benign to life-threatening diseases. One of those benign diseases is epipericardial fat necrosis (EFN), which is a rare cause of chest pain and is often not recognized.[1] In this case report, we present a case of EFN diagnosed with multi-modality imaging.

* Corresponding author. Tel: +31 24 361 1111, Email: robin.nijveldt@radboudumc.nl
Handling Editor: Amardeep Ghosh Dastidar
Compliance Editor: Linh Ngo
Supplementary Material Editor: Anthony Paulo Sunjaya
This case is being published as the best case from EuroCMR 2021 and was peer reviewed by that organisation.

Timeline

Timeline	Event
4 years before admission	Transient ischaemic attack and hypertension.
2 days before admission	New substernal chest pain which worsened during inspiration.
Admission	Computed tomography angiography revealed an inhomogeneous epipericardial mass. Obstructive coronary artery disease was ruled out by invasive coronary angiography.
1 day after admission	Discharge.
5 days after admission	Cardiovascular magnetic resonance imaging showed fibrofatty inflammatory markers suggestive of epipericardial fat necrosis.
3 months after admission	Computed tomography showed a marked regression of the epipericardial mass.

Case presentation

A 58-year-old man, presented to the emergency department with 2 days of sharp, substernal chest pain which worsened during inspiration. The patient was previously known with hypertension and a transient ischaemic attack and was on clopidogrel, atorvastatin, and valsartan at admission. He presented with a temperature of 36.2°C, a blood pressure of 131/78 mmHg, a regular pulse of 98 beats per minute, and a saturation of 98% on ambient air. Clinical examination was unremarkable without pericardial or pleural friction rub. The electrocardiogram was normal without repolarization disorders or signs of pericarditis. Laboratory examination showed normal leucocyte count, elevated C-reactive protein of 44 mg/L (reference value < 10 mg/L), and mildly elevated high-sensitivity troponin T of 20 ng/L (reference value < 14 ng/L) with a rise to 30 ng/L. Polymerase chain reaction of a nasopharyngeal sample was negative for coronavirus. Our differential diagnosis included (myo)pericarditis, non-ST elevation myocardial infarction, pulmonary embolism, pleuritis, and acute aortic syndrome. The patient was hospitalized for further analysis. Obstructive coronary artery disease was ruled out by invasive coronary angiography. A contrast-enhanced computed tomography (CT) angiography showed no pulmonary embolism, aortic dissection, pericardial effusion, or intrapulmonary abnormalities, but revealed an inhomogeneous epipericardial mass (*Figure 1*). The chest pain resolved spontaneously the following day and the patient was discharged without any treatment.

Cardiovascular magnetic resonance imaging (CMR) was performed 5 days later using a 1.5 Tesla clinical magnetic resonance imaging (MRI) scanner, which showed normal anatomy and myocardial function. On cine MRI, the epipericardial mass had an inhomogeneous signal intensity without infiltration of surrounding tissue and absence of pericardial effusion (*Video 1*). Further tissue characterization of the mass by means of parametric mapping showed very low

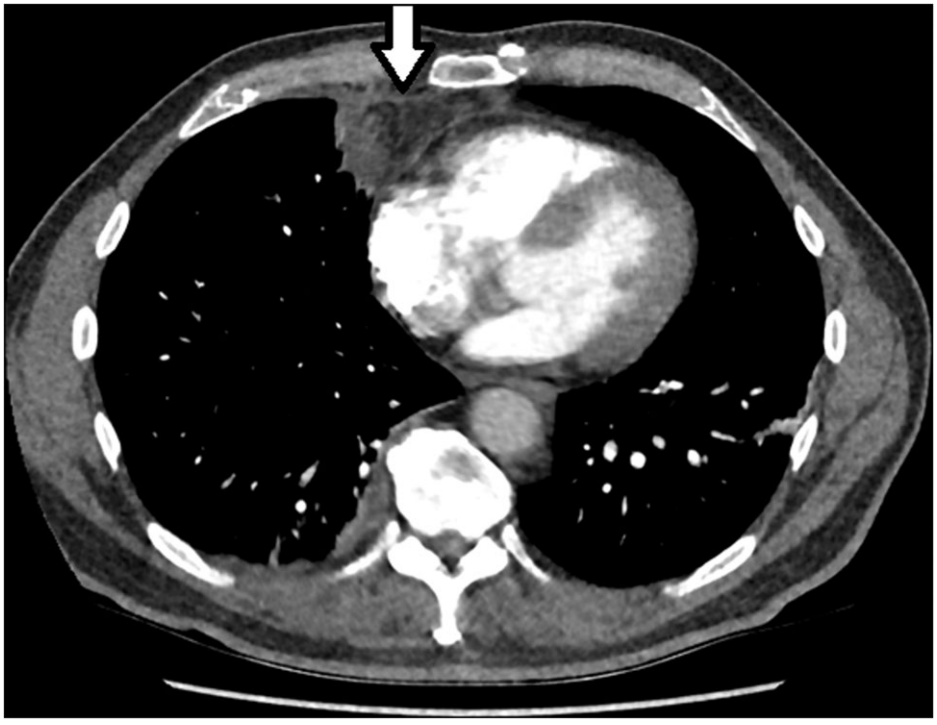
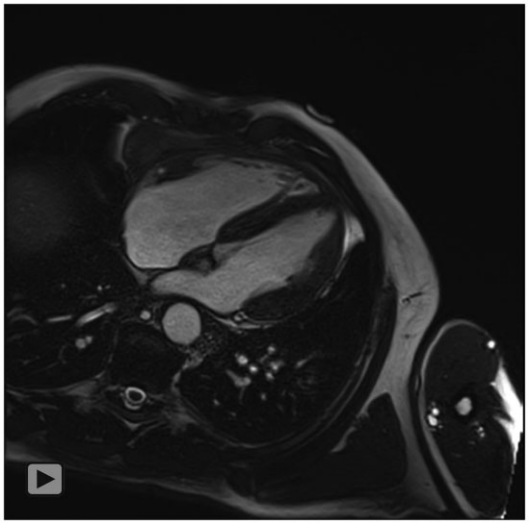


Figure 1 Computed tomography angiography. Contrast-enhanced computed tomography angiography indicating a substernal inhomogeneous epipericardial mass (arrow).



Video 1 Cardiovascular magnetic resonance imaging. Cardiovascular magnetic resonance imaging cine imaging shows a substernal epipericardial mass with inhomogeneous signal intensity and without infiltration of surrounding tissue nor pericardial effusion.

native T1 relaxation times (283 ms) (*Figure 2A*) consistent with fat. T2 relaxation times (100 ms) were elevated (*Figure 2B*) and T2-weighted oedema imaging (*Figure 2C*) revealed hyperintense areas of the mass both consistent with oedema. Late gadolinium enhancement imaging demonstrated hypo-enhanced areas surrounded by areas of hyperenhancement (*Figure 2D*). In conclusion, the mass showed fibrofatty inflammatory markers, suggestive of EFN. Follow-up CT 3 months after admission showed a marked regression of the epipericardial mass which confirm the diagnosis EFN (*Figure 3*). The patient remained asymptomatic and no further follow-up was indicated.

Discussion

Epipericardial fat necrosis is a rare and underdiagnosed cause of chest pain.[1,2] The incidence of EFN is about 2.2% among patients who underwent chest CT for chest pain on the emergency department.[3] Chest pain is most often classified as acute pleuritic chest pain[1] which can mimic other acute conditions such as acute myocardial infarction, pericarditis, pulmonary embolism, and pleuritis. Clinical examination is often unremarkable, without abnormalities on electrocardiogram and no typical rise and fall in troponin.[1] Epipericardial fat necrosis can be diagnosed using contrast-enhanced CT or CMR using parametric

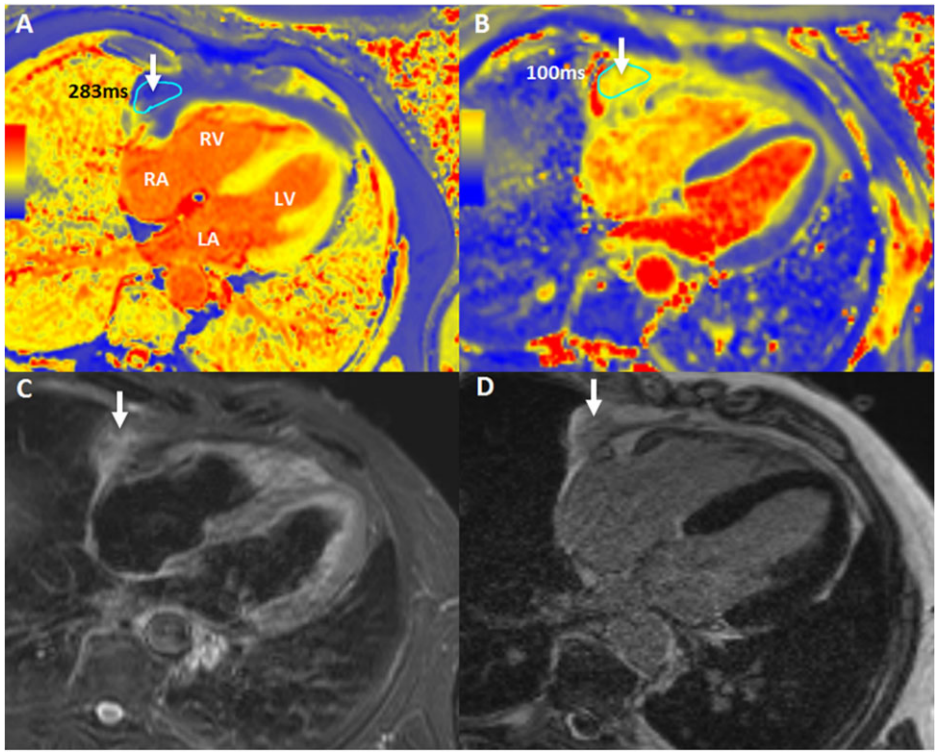


Figure 2 Cardiovascular magnetic resonance imaging of the mass. (*A*) Cardiovascular magnetic resonance imaging T1 mapping with very low native T1 relaxation times (283 ms) of the mass (arrow). (*B*) Cardiovascular magnetic resonance imaging T2 mapping with high T2 relaxation times (100 ms) of the mass (arrow). (*C*) Cardiovascular magnetic resonance imaging T2-weighted short-tau inversion recovery shows hyperintense areas of the mass (arrow). (*D*) Cardiovascular magnetic resonance imaging late gadolinium enhancement imaging shows hypo-enhanced areas surrounded by areas of hyperenhancement of the mass (arrow). LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle.

Figure 3 Follow-up computed tomography after 3 months. Computed tomography 3 months later showed a marked regression of the epipericardial mass compared to admission.

mapping. Main CT features of EFN are soft tissue lesions, with or without fatty centre, located in the epipericardial fat.[1] Main CMR features of EFN consist of an epipericardial mass with fibrofatty markers as determined on T1- and T2-weighted imaging or mapping. Epipericardial fat necrosis is a benign and self-limiting inflammatory process,[2] but could be treated with non-steroidal anti-inflammatory medication.[1,4] There are currently no clear recommendations in the literature or guidelines on when to start non-steroidal anti-inflammatory medication. As recommended in the literature,[1] follow-up CT after 4–8 weeks is recommended to confirm regression of the mass and exclude malignancy. In conclusion, EFN is a rare cause of chest pain and must not be overlooked in the differential diagnosis of patients with acute pleuritic chest pain.

Lead author biography

Dr Frederik M.A. van den Heuvel studied medicine at the Catholic University of Leuven (Leuven, Belgium). Afterwards, he did his cardiology training at the Radboud University Medical Center (Nijmegen, the Nether lands), where he is currently working as a cardiologist with focus on cardiovascular imaging. He is conducting research in the field of coronavirus infectious disease 19 (COVID-19) and myocardial disease.

Supplementary material

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

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 informed 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.

Conflict of interest: None declared.

Funding: None declared.

References

1. Giassi KS, Costa AN, Bachion GH, Apanavicius A, Filho JR, Kairalla RA et al. Epipericardial fat necrosis: an underdiagnosed condition. *Br J Radiol* 2014;**87**: 20140118.
2. Gayer G. Mediastinal (epipericardial) fat necrosis: an overlooked and little known cause of acute chest pain mimicking acute coronary syndrome. *Semin Ultrasound CT MR* 2017;**38**:629–633.
3. Giassi KS, Costa AN, Bachion GH, Kairalla RA, Filho JRP. Epipericardial fat necrosis: who should be a candidate? *AJR Am J Roentgenol* 2016;**207**:773–777.
4. Baig A, Campbell B, Russell M, Singh J, Borra S. Epicardial fat necrosis: an uncommon etiology of chest pain. *Cardiol J* 2012;**19**:424–428.