

# Left ventricular pseudoaneurysm in a young adult after non-ST elevation myocardial infarction

Swetha Pasala,<sup>1</sup> Kevin Pak,<sup>2</sup> Leonard Genovese,<sup>3</sup> Abbas Emaminia<sup>4</sup>

<sup>1</sup>Department of Internal Medicine, Inova Fairfax Hospital, Annandale, Virginia, USA

<sup>2</sup>Department of Internal Medicine, Walter Reed National Military Medical Center, Bethesda, Maryland, USA

<sup>3</sup>Department of Cardiology, Inova Heart and Vascular Institute, Falls Church, Virginia, USA

<sup>4</sup>Division of Cardiology, Inova Heart and Vascular Institute, Falls Church, Virginia, USA

## Correspondence to

Dr Swetha Pasala;  
swetha.pasala@inova.org

Accepted 2 November 2021

## DESCRIPTION

A 33-year-old man presented to the emergency department with sudden substernal chest pain at rest that improved with nitroglycerin. Urgent coronary angiography was performed, which showed complete occlusion of the posterior left ventricular branch of the right coronary artery and left ventricular ejection fraction (LVEF) of 40–45%. He was discharged on medical therapy but was lost to follow-up care. Five months later, the patient was readmitted for acute decompensated heart failure after endorsing orthopnea, swelling and dyspnoea. His symptoms resolved after diuresis and echocardiography revealed LVEF of <20% and what was thought to be a basal inferior wall aneurysm (figure 1A, video 1). He was suspected to have mixed ischaemic and non-ischaemic cardiomyopathy as his prior left heart catheterisation did not demonstrate significant coronary artery disease and was further evaluated for non-ischaemic causes with thyroid stimulating hormone, human immunodeficiency virus, serum and urine protein electrophoresis, and Chagas antibody, which were unremarkable. CT of the chest revealed a complex fluid collection along the inferior border, likely indicative of haemopericardium or thrombus. Closer examination with cardiac magnetic resonance imaging (cMRI) revealed a new large left ventricular pseudoaneurysm (LVP) in the basal to mid-inferior wall



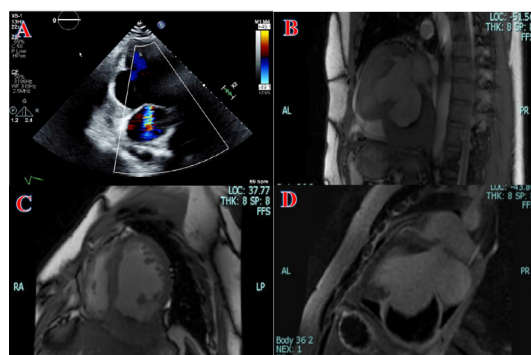
**Video 1** An apical two-chamber view of a transthoracic echocardiogram showing dilation of the mitral annulus with resultant centrally directed mitral regurgitation and presence of a large, basal, inferior wall outpouching.

(measuring 8.7 cm × 4.4 cm × 5.6 cm) which was contained by a thin pericardial layer and layering thrombus (figure 1B,C). Urgent coronary angiography was performed, which showed an occluded Right Posterolateral Ventricular Branch (RPLV) branch.

Although urgent surgical ventricular repair, transplant evaluation and left ventricular assist device (LVAD) placement were offered at that time, the patient left to seek a second opinion. The patient then presented to our hospital with a persistently depressed LVEF and dilated LV and was deemed a poor candidate for surgical repair. He ultimately underwent orthotopic heart transplantation and made an uneventful recovery.

Both true and pseudoaneurysms can be sequelae of myocardial infarction. However, while a true aneurysm sac contains endocardium, epicardium and thinned fibrous scar tissue, a pseudoaneurysm is a rare phenomenon that often develops after wall rupture that is stabilised by organising adhesions or pericardium.<sup>1</sup> Untreated pseudoaneurysms have a high risk for rupture, while rupture of a true aneurysm is uncommon. Thus, early diagnosis of pseudoaneurysms is critical, and resection is indicated in patients with symptoms, expanding pseudoaneurysms, or pseudoaneurysms that are >3 cm in diameter.<sup>2</sup>

On echocardiography, a pseudoaneurysm is characterised by a narrow neck and a wide apex; however, the neck is not always clearly delineated on standard views.<sup>3</sup> Multimodality imaging with multiple axes is recommended for the diagnosis of LVPs, which also allows for clear anatomic delineation and determining surgical options. cMRI is an excellent tool to diagnose LVP, define its anatomy and identify thrombus within the sac. It is particularly helpful in differentiating LVPs from



**Figure 1** Cardiac imaging modalities. (A) An apical two-chamber view of a transthoracic echocardiogram showing a large, basal, inferior wall outpouching (white arrow) initially identified as an aneurysm. (B) Steady-state free precession MRI of two-chamber view and (C) short-axis view demonstrating ruptured inferior myocardial wall and pseudoaneurysm (white arrow) with large thrombus (asterisk) within the sac. (D) Late gadolinium enhancement MRI of two-chamber view showing large thrombus within the pseudoaneurysm sac (asterisk).



© BMJ Publishing Group Limited 2022. No commercial re-use. See rights and permissions. Published by BMJ.

**To cite:** Pasala S, Pak K, Genovese L, et al. *BMJ Case Rep* 2022;**15**:e244880. doi:10.1136/bcr-2021-244880

## Images in...

true aneurysms with a reported sensitivity of 100%. LVPs often feature delayed enhancement of the pericardium on cMRI.<sup>4</sup> cCTA is a rapid modality that allows for spatial characterisation of the pseudoaneurysm including extent and involvement of adjacent structures.<sup>5</sup> Timely diagnosis of LVP is challenging and high degree of suspicion aided by multimodal imaging is particularly warranted.

### Learning points

- ▶ Urgent surgical evaluation is indicated in all patients with left ventricular pseudoaneurysms (LVPs) given the risk of fatal rupture. In general, surgery is strongly advised in symptomatic patients and in patients with expanding pseudoaneurysms or with pseudoaneurysms >3 cm.
- ▶ Multimodality imaging with multiple axes is recommended for the diagnosis of LVPs, which also allows for clear anatomic delineation and determining surgical options.

**Contributors** SP, KP and LG conceived and planned the manuscript. SP, LG and AE helped gather videos and images. SP led chart review and initial manuscript preparation. LG and AE contributed to image interpretation and assembly. KP

assisted with assembly, formatting and editing. All authors provided critical feedback and helped shape the research, analysis and manuscript.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Consent obtained directly from patient(s).

**Provenance and peer review** Not commissioned; externally peer reviewed.

Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

### REFERENCES

- 1 Hultén EA, Blankstein R. Pseudoaneurysms of the heart. *Circulation* 2012;125:1920–5.
- 2 Mujanovic E, Bergsland J, Avdic S, *et al.* Surgical treatment of left ventricular pseudoaneurysm. *Med Arch* 2014;68:215–7.
- 3 Kupari M, Verkkala K, Maamies T, *et al.* Value of combined cross sectional and Doppler echocardiography in the detection of left ventricular pseudoaneurysm after mitral valve replacement. *Br Heart J* 1987;58:52–6.
- 4 Gill S, Rakhit DJ, Ohri SK, *et al.* Left ventricular true and false aneurysms identified by cardiovascular magnetic resonance. *Br J Radiol* 2011;84:e35–7.
- 5 Landi A, Andres AL, Napodano M. Late recurrence of a giant left ventricular pseudoaneurysm: the importance of multimodality imaging approach. *Monaldi Arch Chest Dis* 2020;90. doi:10.4081/monaldi.2020.1232. [Epub ahead of print: 12 Mar 2020].

Copyright 2022 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <https://www.bmj.com/company/products-services/rights-and-licensing/permissions/> BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

### Customer Service

If you have any further queries about your subscription, please contact our customer services team on +44 (0) 207111 1105 or via email at [support@bmj.com](mailto:support@bmj.com).

Visit [casereports.bmj.com](http://casereports.bmj.com) for more articles like this and to become a Fellow