

## CASE REPORT

# Acute respiratory distress secondary to a huge chronic left ventricular pseudo-aneurysm

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## Summary

Pseudo-aneurysms are a rare, potentially life-threatening complication of a myocardial infarction. We present the case of a 45-year-old male who was brought to the emergency department in extremis and had a previous history of a late presentation inferior ST-elevation myocardial infarction treated percutaneously. Clinical examination revealed evidence of cardiogenic shock, pulmonary edema and a pulsatile epigastric mass. Chest X-ray demonstrated marked cardiomegaly and pulmonary edema. Urgent echocardiography confirmed the presence of a huge basal inferior wall pseudo-aneurysm with bi-directional flow. This was also associated with severe mitral regurgitation, due to posterior mitral annular involvement. The patient was transferred to the local cardiothoracic surgical unit where he underwent emergency repair of the pseudo-aneurysm and mitral valve replacement. Despite the surgery being complex he made a full recovery.

### Key Words

- ▶ left ventricular pseudo-aneurysm
- ▶ myocardial infarction

## Learning points:

- Pseudo-aneurysms are a rare but life-threatening complication of a myocardial infarction and may present at any time point following a myocardial infarction.
- Patients with a chronic pseudo-aneurysm will often remain clinically stable for a period but may present with chest pain or dyspnea.
- Typical chest X-ray findings are of significant, asymmetrical cardiomegaly.
- When presenting with hemodynamic collapse these patients require urgent surgical intervention, which is associated with a high operative mortality.

## Background

Myocardial free wall rupture that is contained within the pericardium gives rise to a pseudo-aneurysm. These occur most often as a complication of a myocardial infarction which is frequently complicated by pericarditis,

allowing the myocardium to become adherent to the pericardium resulting in pseudo-aneurysm formation rather than tamponade. These patients can present acutely or chronically, often with chest pain and/or dyspnea.

Surgical repair is recommended but transcatheter treatment has a role in very high-risk cases. Medical therapy is also an option for small incidental pseudo-aneurysms at high surgical risk.

We present a patient admitted in extremis as a result of a pseudo-aneurysm and associated severe mitral regurgitation.

## Case presentation

A 45-year-old male presented to the emergency department in extremis. He was diaphoretic, hypotensive and in acute respiratory distress with a marked lactic acidosis. He was also noted to have a pulsatile epigastric mass.

Over the 3 months prior to the admission he had developed progressive dyspnea and weight loss. He also had an episode of unheralded syncope while in the shower. In light of these symptoms he was investigated by his general practitioner and as a result had a chest X-ray which demonstrated cardiomegaly and what was felt to be a large opacity in the left hemithorax. These findings prompted an urgent referral to the respiratory physicians.

One year prior to this admission he had presented with an inferior ST-elevation myocardial infarction. There had been some delay in seeking medical attention. Coronary angiography at the time demonstrated a severe lesion in the proximal right coronary artery with an unobstructed left system. He underwent percutaneous revascularization with three drug-eluting stents. His myocardial infarction was complicated by a significant episode of pericarditis. He completed 1 year of dual antiplatelet therapy but did not attend follow-up. His echo prior to discharge demonstrated an akinetic inferior wall but with relatively well preserved overall left ventricular systolic function.

## Investigation

His ECG demonstrated a sinus tachycardia with inferior Q waves. An urgent chest X-ray (Fig. 1) demonstrated appearances that were similar to the preceding month's film, except that there was now radiographic evidence of pulmonary edema.

Given his history an urgent echocardiogram was performed. This demonstrated preserved left ventricular systolic function with an inferior wall rupture and a very large pseudo-aneurysm (measuring 9 × 15 cm) with flow into it (Figs 2, 3, 4 and Videos 1, 2). There was associated severe mitral regurgitation.



**Figure 1**  
AP chest X-ray, demonstrating cardiomegaly and pulmonary edema.

### Video 1

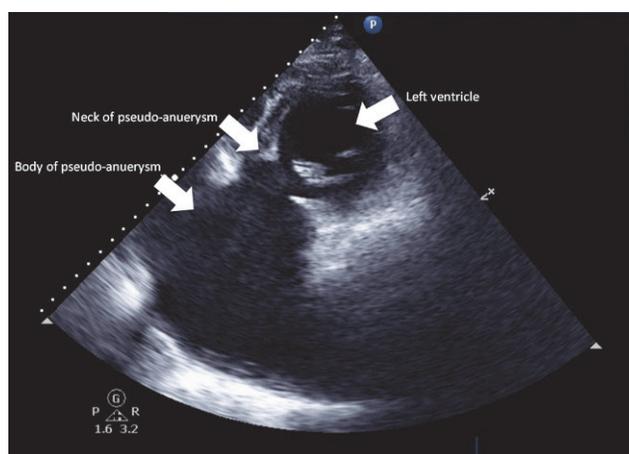
Apical two-chamber view. The neck of the pseudo-aneurysm is located at the base of the inferior wall and the large pseudo-aneurysm is seen adjacent to the inferior wall of the left ventricle. View Video 1 at <http://movie-usa.glencoesoftware.com/video/10.1530/ERP-19-0018/video-1>.

### Video 2

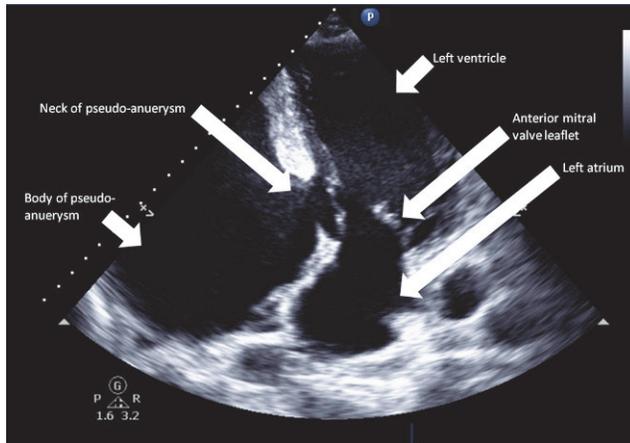
Apical two-chamber with color flow demonstrating flow into the pseudo-aneurysm and severe mitral regurgitation. View Video 2 at <http://movie-usa.glencoesoftware.com/video/10.1530/ERP-19-0018/video-2>.

## Treatment and outcome

In view of his respiratory distress the patient was intubated and ventilated and urgently transferred to



**Figure 2**  
Parasternal short axis at papillary muscle level.

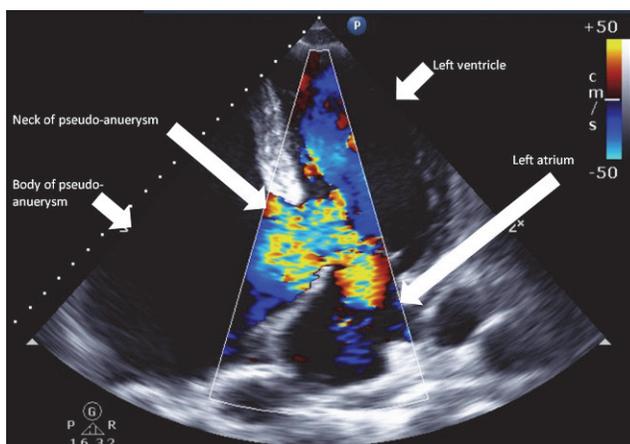


**Figure 3**  
Apical two-chamber view.

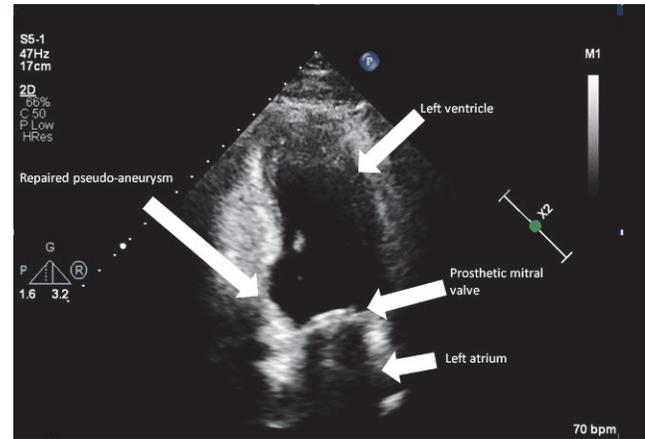
the local cardiothoracic center where he underwent emergent surgery. The pseudo-aneurysm was resected and the patient underwent a patch repair of the inferior wall defect. The valve was not felt to be repairable and therefore the patient underwent mitral valve replacement. The procedure was prolonged and complex. Post-operatively the patient had severe lactic acidosis and required high levels of cardiovascular support. He has since made a full recovery. **Figure 5** demonstrates the appearance of the repair after recovery.

## Discussion

Pseudo-aneurysms of the left ventricle are a rare complication of a myocardial infarction, often of the inferior wall (1, 2). Pseudo-aneurysms have also been



**Figure 4**  
Apical two-chamber with color flow, demonstrating flow into the pseudo-aneurysm and severe mitral regurgitation.



**Figure 5**  
Post-operative apical two chamber.

reported to occur as complication of cardiac surgery, endocarditis and blunt or penetrating trauma (1, 3). Unlike a true aneurysm, a pseudo-aneurysm occurs when there is complete rupture of the myocardial wall contained by an area of pericardium adherent to the epicardium (4). The adherent pericardium prevents the otherwise rapid development of cardiac tamponade associated with myocardial free wall rupture (4). Interestingly, like in this case, a significant episode of pericarditis after a myocardial infarction is likely to encourage adherence of the pericardium to the epicardium and hence allow formation of a pseudo-aneurysm (4, 5).

Patients with pseudo-aneurysms can often present with chest pain or dyspnea, however, some may be picked up incidentally, particularly smaller ones (1, 5). Clinical examination may demonstrate signs of congestion in association with a murmur but is by no means specific (1). Chest X-rays, like in this case, frequently demonstrate marked cardiomegaly (6). The ECG can demonstrate persistent ST-elevation in the affected territory in around 20% of patients, but the majority have non-specific ECG findings (7, 8). Despite these findings further imaging is required to make the diagnosis. In this case transthoracic echocardiography demonstrated the pathology clearly. However, in some less obvious cases, transthoracic echocardiography may not be diagnostic and sometimes transoesophageal echocardiography, cardiac CT or MRI may be needed to clarify the diagnosis (1).

The thin wall of a pseudo-aneurysm means that they are much more likely to rupture than a true aneurysm, with historic reported rates of rupture between 30 and 45% (1, 3, 5). However, a single study containing ten patients who were medically managed, demonstrated no instances of rupture at four years. This suggests that in small

(especially less than 3 mm in size), asymptomatic pseudoaneurysms, medical therapy might be a reasonable option, particularly if the patient is at high risk of surgery (9). However large pseudo-aneurysms or those associated with decompensation require repair either surgically or transcatheter (1, 5, 10).

Surgical treatment of pseudo-aneurysms is associated with a high operative mortality, particularly as these patients often have co-existing coronary disease or heart failure (1, 5). Given that this complication is a relatively rare finding, there is limited data on the surgical management in these patients (5). One case series, of thirty patients demonstrated that the majority (83%) required a patch closure rather than just a primary repair (5). A wide neck or a more basal pseudo-aneurysm would favor a patch repair (5). This series demonstrated that concomitant mitral repair or replacement was not infrequently required (30%) due to basal pseudo-aneurysms disrupting the mitral valve apparatus, as in this case (5). This study also highlights the poor outcomes even after hospital discharge, with only 45% of this group alive at 8 years (5).

Despite surgical treatment being the preferred option, transcatheter treatment has been shown to be a feasible alternative for high-risk surgical candidates in a small, single-center case series (10). When considering transcatheter treatment, careful pre-procedural planning is required including a multi-modality imaging approach. In this case series a third of the procedures were performed using a retrograde approach with the rest performed via a transapical approach (10). A number of different devices were used to occlude the neck of the pseudo-aneurysm depending on its morphology. The pseudo-aneurysms were all excluded successfully, but one patient required multiple procedures. Furthermore after a mean of 32-month follow-up, there were no complications and no instances of rupture (10).

#### Declaration of interest

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of this case report.

#### Funding

This work did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector.

#### Patient consent

Written informed consent for publication of their clinical details and clinical images was obtained from the patient.

#### Author contribution statement

J H and G H drafted this work. M D and R H were the responsible physicians for this patients care and guided revisions of this work.

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Received in final form 17 July 2019

Accepted 29 August 2019

Accepted Manuscript published online 29 August 2019