

## Unusual CMR Findings of Apical Left Ventricle Pseudoaneurysm

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**Introduction:** Left ventricular Pseudoaneurysm is an interesting clinical entity. The left ventricular (LV) Pseudoaneurysm, in contrast to a true LV aneurysm, contains only pericardial layer and fibrous elements in its wall.

**Case Presentation:** We report a very rare case of a 47-year-old woman presents with an atypical form of LV apical Pseudoaneurysm confirmed by cardiac magnetic resonance imaging (CMRI).

**Conclusions:** Due to the tendency of LV Pseudoaneurysms to rupture, early surgical intervention is recommended.

**Keywords:** Left Ventricle; Aneurysm; Pseudoaneurysm; Magnetic Resonance Imaging

### 1. Introduction

Left ventricular (LV) Pseudoaneurysm is an interesting clinical entity. Rupture of the myocardial wall typically results in immediate collapse of the patient and electromechanical dissociation. In rare cases; however, the rupture is consist of pericardial and fibrous tissues, and the result is a Pseudoaneurysm. The LV Pseudoaneurysm, in contrast to a true LV aneurysm, contains only pericardial and fibrous elements in its wall-no myocardial tissue. Due to the tendency of LV Pseudoaneurysms to rupture, early surgical intervention is recommended (1).

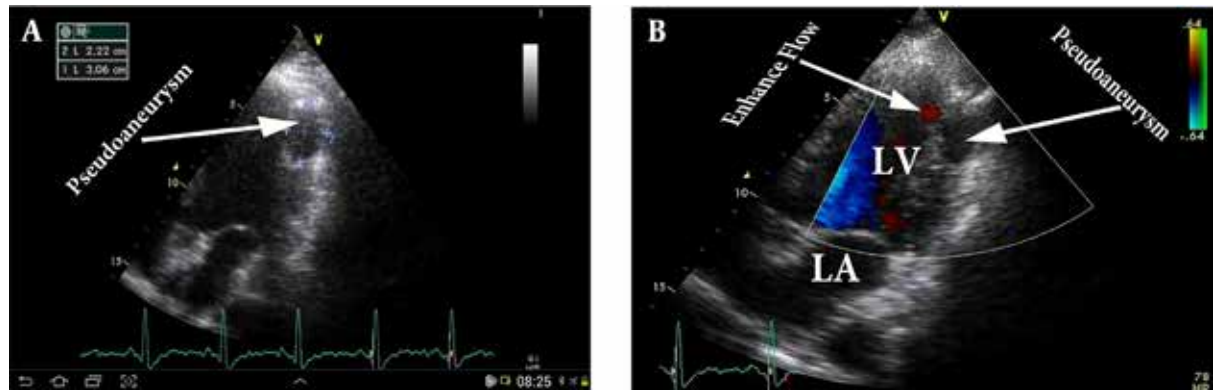
### 2. Case Presentation

We present a 47-year-old woman with a history of four-day hospitalization with the diagnosis of acute coronary syndrome. She had experienced a compressive retrosternal chest pain with dyspnea about 20 minutes last year which revealed by Nitroglycerin and other medications in emergency room and occasional recurrent progressive chest pain during last months. Electrocardiogram (ECG) showed only T inversion in leads I, AVL, V5, V6. Selective coronary angiography was performed and demonstrated normal epicardial coronary arteries. After a year, she came back with retrosternal chest discomfort by activity (CCS = II-III) which had been slowly progressed. Over 4 months, her new ECG didn't have any new changes but her Trans

Thoracic Echocardiography (TTE) showed preserved left ventricular function (ejection fraction = 50%) and around shaped out pouching with diameter 2.3 in apicolateral LV wall, which was related to LV with a narrow neck. Color Doppler study demonstrated the systolic flow into the bulging area and diastolic flow away from it with turbulence across entrance neck (Figure 1). So, for more evaluation, patient referred for cardiac magnetic resonance imaging (MRI).

SSFP cine multi-slices Left Ventricular Outflow Tract (LVOT) coronal view (Figure 2) and short axis view of the LV showed a 2.5 cm structure, dyskinetic (expanding in systole and collapsing in diastole) along the apical anterolateral LV segment with a small neck continuity to LV and evidence of local sudden myocardial discontinuity. The structure had covered by parietal pericardium (arrows). The left ventricle was not dilated. Flow was noted through the out pouching. There was not pericardial effusion. In the first pass perfusion (Figure 3) and early gadolinium enhancement images, the out pouching was filled completely with contrast without evidence of thrombus within it. Contrast-enhanced MRI showed no evidence of LV picardo myocardial delayed hyper enhancement. (Figure 4) All cardiac MRI finding were suggestive of a LV Pseudoaneurysm.

Figure 1. Trans Thoracic Echocardiography in 4 Chamber View



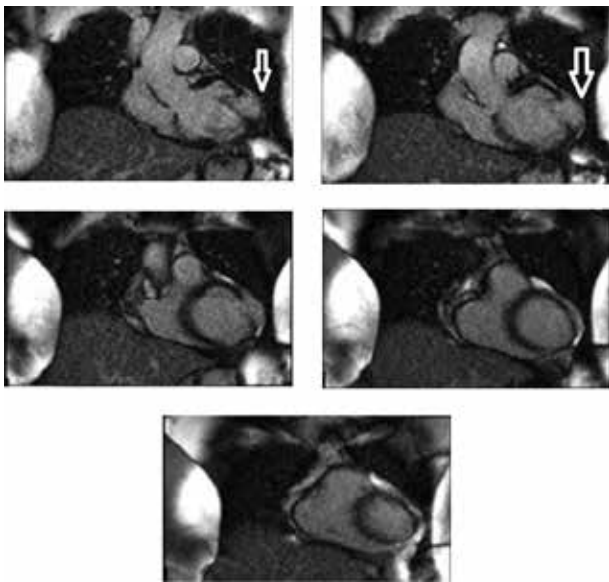
It showed an out pouching at the apicolateral left ventricle (A) communicating through a narrow neck to left ventricle consistent with Pseudoaneurysm (B). LV, left ventricle; LA, left atrium.



Figure 2. Left Ventricular Outflow Tract Coronal SSFP Multi Slices Cine View of the Left Ventricular Shows Myocardial Rupture With an Out Pouching Which is Surrounded by Pericardial Layer and Consistent With Localized Apicolateral Left Ventricular Pseudoaneurysm



**Figure 3.** First Pass Perfusion Image in Left Ventricular Outflow Tract Coronal View Shows Complete Filling of Left Ventricular Out pouching With Contrast (Arrow)



**Figure 4.** Late Gadolinium Enhancement Images Don't Show Evidence of Pericardo Myocardial Enhancement (Arrow Depicted Non-Enhanced Parietal Pericardium Which Has Surrounded Left Ventricular Out Pouching)

### 3. Discussion

Pseudoaneurysms are the result of rupture of the ventricular free wall that is covered by overlying adherent pericardium (2). Pseudoaneurysms are often asymptomatic and incidentally discovered on imaging tests. Symptoms include recurrent chest pain which may be associated with symptoms of hypotension. Other signs of

a complicated Pseudoaneurysm include decreased heart sounds, a pericardial friction rub, changes of both left and right sided filling pressures, and sinus bradycardia or junctional rhythm (3, 4).

It's important to differentiate Pseudoaneurysms from aneurysm by TTE. Diagnostic clues for diagnosis of Pseudoaneurysm are location, neck and ratio of neck to maximum internal diameter of sac (5). The most common location of LV Pseudoaneurysms is in the posterolateral walls; whereas, true LV aneurysms are typically situated in the anterior and apical walls (4). The connection of Pseudoaneurysm and ventricular cavity is through a narrow neck; in contrast, ventricular aneurysm has a wide neck (6). The ratio of neck to maximal inner diameter of sac is 0.25 to 0.5 for Pseudoaneurysm and 0.9 to 1 for aneurysm (2, 3).

However, Pseudoaneurysm incidentally discovered in imaging tests. There have been several reports describing the utility of MRI in identifying left ventricular Pseudoaneurysm. Advantages of MRI are its high spatial resolution and ability to image the entire heart. Thus, it is highly accurate in determining the size and location of the Pseudoaneurysm. Additional advantages include the capability to distinguish between aneurysm and Pseudoaneurysm (7). Characteristic finding that differentiates them is lack of myocardial wall in Pseudoaneurysm.

In delayed gadolinium enhancement images, hyperenhancement can identify areas of infarcted myocardium. If infarcted myocardium seen within the aneurysmal wall, it's a true aneurysm but in Pseudoaneurysm, there is discontinuity of the myocardium at the neck of the defect (8). Additional helpful finding for differentiation between aneurysm and Pseudoaneurysm is through marked delayed enhancement of the pericardium that seen in Pseudoaneurysm (9).

In our case, CMR study showed a localized interruption of myocardium with LV out pouching which was covered only by a pericardial layer and with a narrow connection into LV apical cavity. It did not accompany with pericardial effusion or thrombosis. These all findings suggest an atypical form of LV apical Pseudoaneurysm. Finally, we referred our patient to surgery but she refused it, so we performed a regular follow up, and she has had no problem up to this time.

### Authors' Contributions

Zahra Alizadeh Sani: preparing case report and performing and analysis CMR result, Afsoon Fazlinezhad and Maryam Moshkani Farahani: preparing the case report and doing perioperative echocardiography, Shadi Sarafan Sadeghi, Azin Seifi and Bahram Shahri: helped us in patient management and preparing the case report, Mohammad Vojdanparast: preparing case report and following the patient.

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