LV Pseudoaneurysm after Acute Myocardial Infarction

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Introduction

Left ventricular pseudoaneurysm is a rare condition of poor prognosis, usually resulting from acute myocardial infarction (AMI) which requires, in most cases, early surgery due to the risk of free rupture with subsequent tamponade and death.[1] It may be asymptomatic or present nonspecific clinical symptoms. Diagnosis is performed by imaging tests such as echocardiography, computed tomography, magnetic resonance imaging or cineangioventriculography.[2]

Case Report

In February 2016, J.V.C., male patient, 65 years old, hypertensive, smoker, dyslipidemic, was admitted to the emergency room with history of dyspnea and chest pain at rest for eight days. The patient reported worsening of symptoms in the past 24 hours, associated with sweating and coughing. On physical examination, the patient was eupneic, oriented, and with no edema. On auscultation, regular heart rhythm, hypophonetic sounds, no murmurs and crackles at the base of the left hemithorax. Heart rate (HR) of 90 bpm and blood pressure (BP) of 160/90 mmHg.

Laboratory tests revealed troponin levels of 42.9 ng/mL (normal value < 0.034 ng/mL). Electrocardiogram (ECG) on admission revealed sinus tachycardia rhythm with left bundle branch block (LBBB). After two hours, ECG showed reversal of LBBB with axis deviation to the left, left atrial enlargement, narrow QRS interval and symmetrical inverted T wave in leads V2 to V5, DI and aVL.

Patient was referred to cardiac catheterization, which revealed severe coronary lesion in the distal third of the posterior interventricular branch, short and severe lesions in the proximal third of the anterior descending (AD) artery, severe lesion in the proximal third of the diagonal branch and severe segmental lesion in the proximal third of the left marginal (LM) branch of the circumflex artery (Figure 1). Ventriculography revealed dyskinesia of the apex and severe hypokinesia of the entire anterior wall. Drug-eluting stent angioplasty was immediately and successfully performed in the proximal and middle thirds of the AD and LM branch.

On the fifth post-infarction day, the patient underwent chest computed tomography (CCT) to investigate retrocardiac tumor observed in the chest X-ray. CCT revealed sacculation in the lateral LV wall suggesting pseudoaneurysm (PAN) of about 2.0 x 2.1 cm (Figure 2). For a better characterization, transthoracic echocardiogram was performed and showed sacculation on the posterior left ventricular wall, presenting cervix diameter ratio of 1.7 cm/cavity diameter of 3.3 cm smaller than 0.5 cm, suggestive of pseudoaneurysm with thrombus inside. Mildly depressed left ventricular (LV) systolic function with mild ejection fraction (Simpson) of 45% and dyskinesia of the basal segment of the inferior-lateral wall (Videos 1 and 2).

Patient was asymptomatic and underwent LV aneurysmectomy twelve days after diagnosis suggestive of pseudoaneurysm on echocardiogram. Expansive formation was observed in the LV lateral wall near the atrioventricular junction with calcified walls firmly attached to the posterior pericardium. Saccular formation showed a large amount of thrombi within the cavity and walls not formed by myocardium, confirming the diagnosis of pseudoaneurysm due to ischemic LV wall rupture with hemostatic containment mechanism. The redundant material was dried up and then ventriculoplasty was performed.

Postoperatively, the patient had cardiogenic shock, requiring intra-aortic balloon. The patient presented nosocomial respiratory tract infection and acute kidney injury, which were later remedied. Echocardiogram performed after surgery revealed the absence of PAN (Videos 3 and 4). The patient was discharged 21 days after surgical correction of the pseudoaneurysm.

Discussion

Left ventricular PAN is a rare condition, with prevalence of about 0.05%.[3] It is an event characterized by free rupture of the cardiac wall contained by pericardial adhesion or scar tissue with no myocardial cells in their composition.[4] It usually results from AMI (55%). Inferior and inferolateral involvement of LV are responsible for 82% of pseudoaneurysms.[1] Pseudoaneurysm may also be associated with post-cardiac surgery, thoracic trauma or infection. [4]

PAN patients may be asymptomatic (12% of cases) or may have chest pain, heart failure, ventricular arrhythmia or embolic events.[5] As the clinic symptoms are unspecific, the use of complementary methods becomes essential for diagnosis. Cineangioventriculography has been considered the

Keywords

Aneurysm, False/diagnostic imaging; Aneurysm, False/surgery; Coronary Occlusion; Ventricular Dysfunction, Left/surgery; Myocardial Infarction/surgery.

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Case Report

Figure 1 – *Coronary angiography showing severe lesion in the proximal third of the anterior descending artery (image on the left) and severe lesion in the proximal third of the left marginal (LM) branch of the circumflex artery (image on the right).*

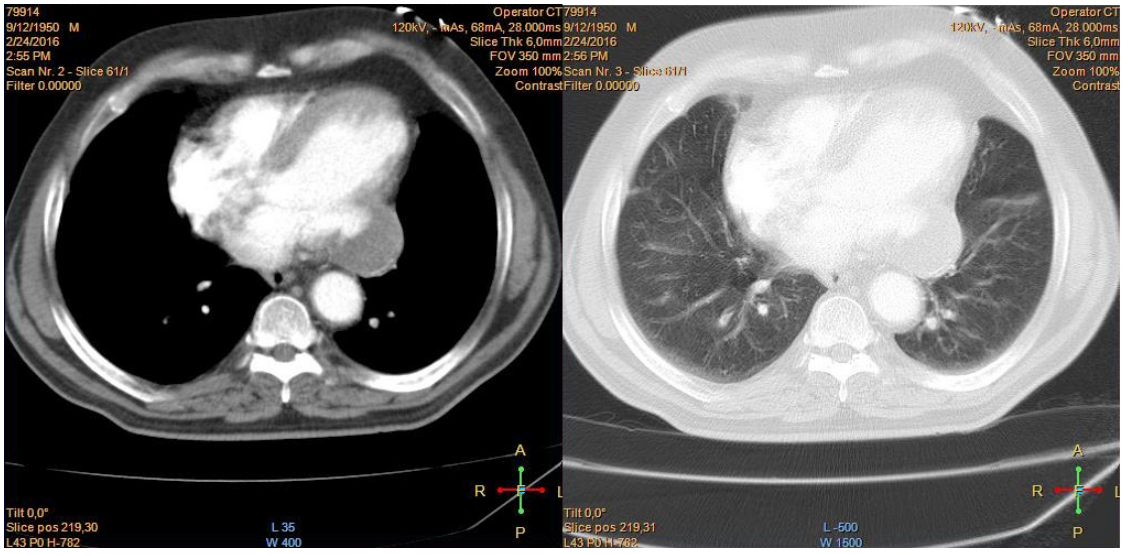

Figure 2 – *Computed tomography showing cardiac chambers with normal dimensions, with sacculation on the lateral LV wall, measuring about 2.0 x 2.1 cm, suggesting pseudoaneurysm.*

gold standard with an accuracy of around 85%. However, it is not a commonly used method because of the risk of thrombi displacement.[6] MRI has 100% sensitivity and 83% specificity and is very useful to differentiate PAN from real aneurysm.[7] Echocardiogram and computed tomography is important in early diagnosis.

In the case reported, left ventricle PAN was first suspected by CCT and subsequently confirmed by transthoracic echocardiogram. Echocardiogram is a diagnostic tool for differentiating between different types of ventricular rupture. Diagnosis of PAN is suggested that the orifice to cavity ratio is smaller than 0.5 (narrow cervix that opens into a wide cavity) or in the presence of a bi-directional flow through the cervix. [5]

The distinction between an aneurysm and PAN is essential to the therapeutic approach since the two conditions have different prognoses. While aneurysms has a smaller tendency to rupture due to the myocardial composition of its wall,

pseudoaneurysm presents poor prognosis and surgical correction is urgently recommended due to propensity to spontaneous rupture with subsequent tamponade and death.[5] If treated conservatively, the mortality rate is 50% and if surgically addressed, it drops to 23 to 35.7%.[4]

Emergency surgical approach is strongly recommended for PAN diagnosed in the first 2 to 3 months after myocardial infarction. However, if discovered years after infarction, surgical approach will depend on the symptoms.[4] As the area affected by infarction may be edematous and fragile, placing a synthetic patch is recommended in order to avoid dehiscence.[8] There have been reports of recurrence of pseudoaneurysm as a surgical complication.[2] Dissection should be cautious due to potential risk of systemic embolization in case of thrombi in the pseudoaneurysm cavity.

The case shows pseudoaneurysm of the left ventricular inferior-lateral wall after five days of AMI. Its description shows the importance of early diagnosis and intervention in this condition, greatly reducing mortality.

Authors' contributions

Research creation and design: Macedo Jr. ARA; Data acquisition: Macedo Jr. ARA, Santos ECL, Lima AGS, Motta LGM, Figueira FAMS; Manuscript drafting: Macedo Jr. ARA, Santos ECL, Lima AGS, Travassos PP; Critical revision of the manuscript as for important intellectual content: Santos ECL, Figueira FAMS.

Potential Conflicts of Interest

There are no relevant conflicts of interest.

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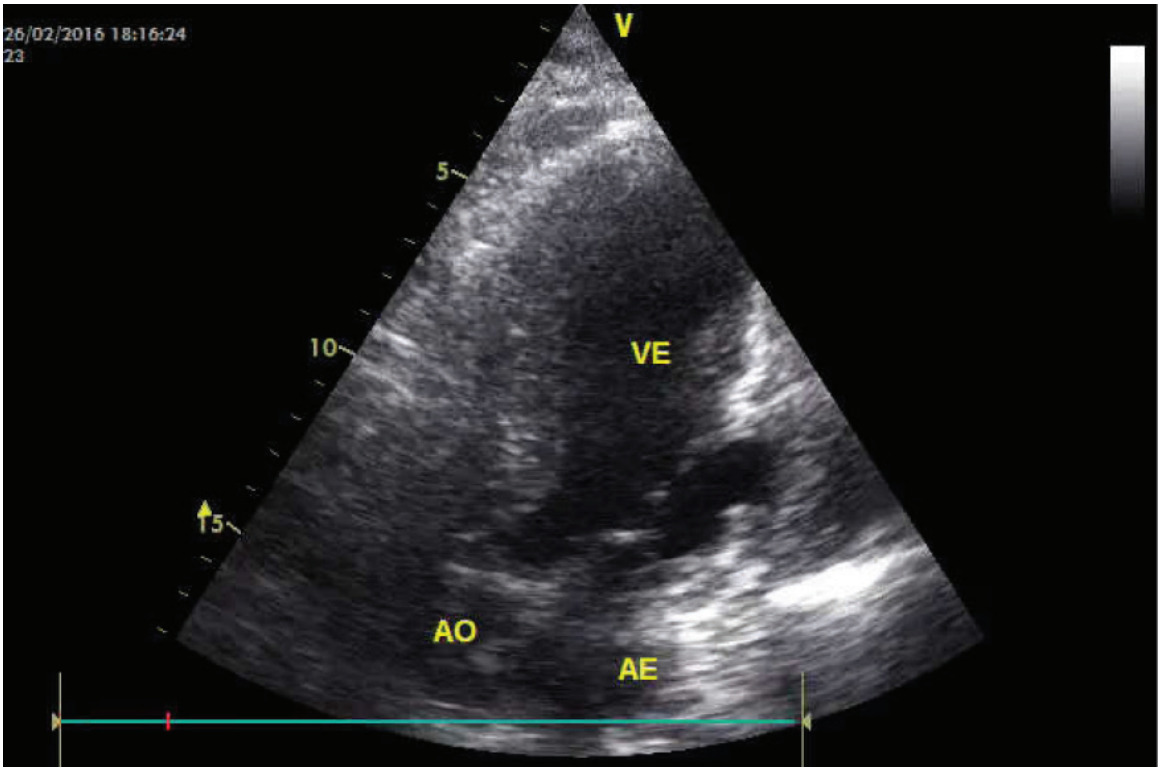
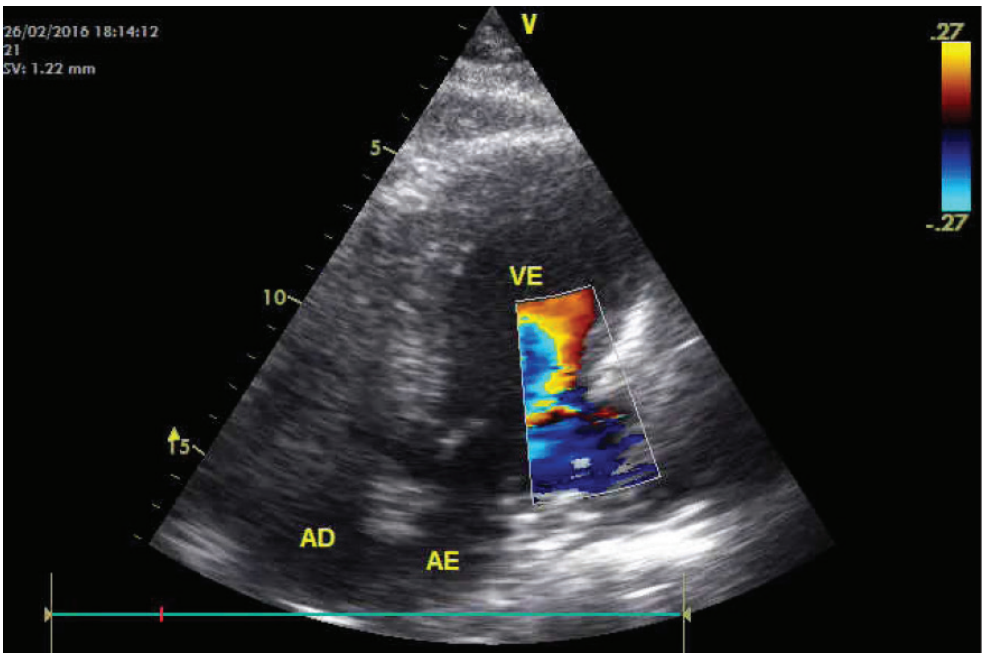
Academic Association

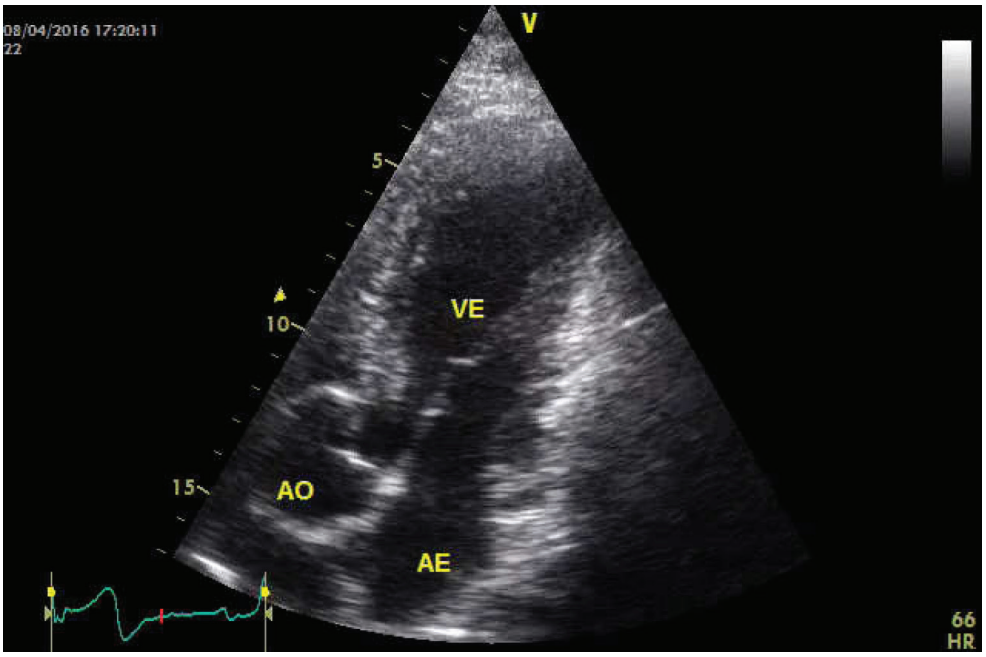
This study is not associated with any graduate program.



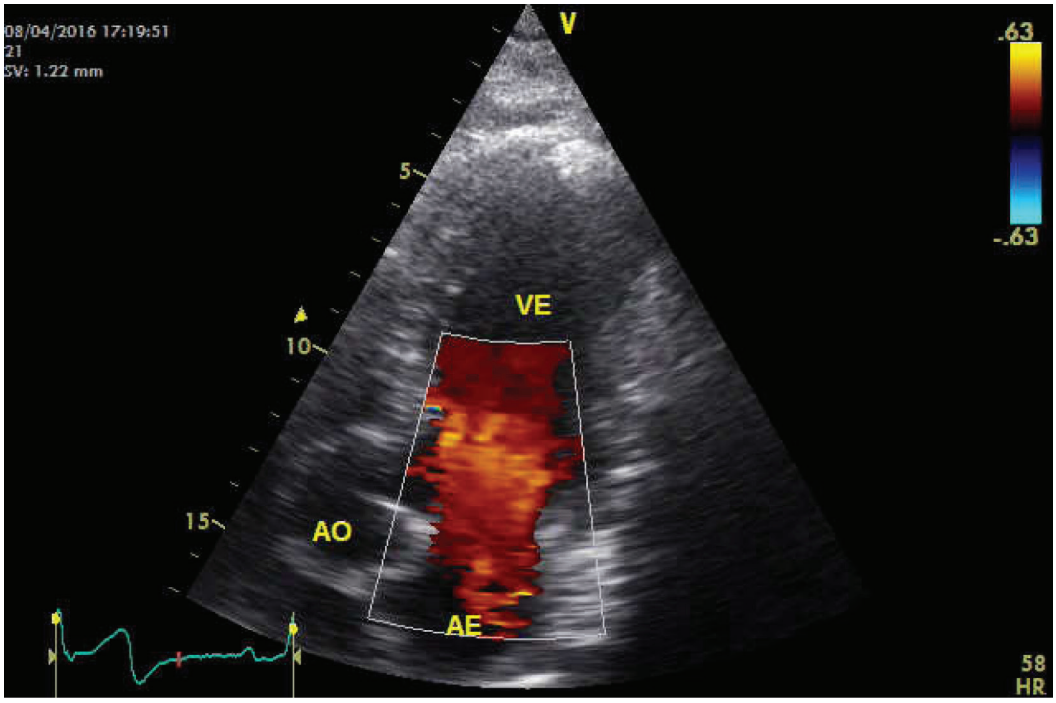
Video 1 – *Watch the videos here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2017/v30_2/video_v30_2_175_ingles.asp*



Video 2 – *Watch the videos here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2017/v30_2/video_v30_2_175_ingles.asp*



Video 3 – *Watch the videos here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2017/v30_2/video_v30_2_175_ingles.asp*



Video 4 – *Watch the videos here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2017/v30_2/video_v30_2_175_ingles.asp*

References

1. Mujanovic E, Bergsland J, Avdic S, Stanimirovic-Mujanovic S, Kovacevic-Preradovic T, Kabil E. Surgical treatment of left ventricular pseudoaneurysm. Med Arch. 2014;68(3):215-7.
2. Wolf, M, Vermeersch P, Van Reet B, Van Den Branden F. Early surgical repair of an acute post-infarction left ventricular pseudoaneurysm complicated by second pseudoaneurysm formation". *Acta Cardiol* .2012;67(6):723-6.
3. Mahilmaran A, Nayar PG, Sheshadri M, Sudarsana G, Abraham KA. Left ventricular pseudoaneurysm. Tex Heart Inst J. 2002;29(2):122–.5
4. Eren, E, Bozbuga N, Toker ME, Keles C, Rabus, MB, Yildirim O, et al. Surgical treatment of post-infartion left ventricular pseudoaneurysm. *Tex Heart Inst J.2007;*34(1):47-51.
5. Bekkers, CAM, Borghans, AP, Cheriex, EC. Ventricular pseudoaneurysm after subacute myocardial infarction. Int J Cardiovasc Imaging.2006;22(6):791-5.
6. Figueras J, Cortadellas J, Domingo E, Soler-Soler J. Survival following self-limited left ventricular free wall rupture during myocardial infarction. Management differences between patients with or without pseudoaneurysm formation. Int J Cardiol. 2001;79(2-3):103-11.
7. Gill S, Rakhit D, Ohri S, Harden S. Left ventricular true and false aneurysms identified by cardiovascular magnetic resonance. Br J Radiol. 2011;84(998):e35-7.
8. Villanueva C, Milder D, Manganas C. Ruptured left ventricular false aneurysm following acute myocardial infarction: case report and review of the literature. *Heart Lung Circ.2014;23(12):e261-3.*