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Case report

Multi-modality Imaging of a relapsing Mycotic post-infarction left ventricular pseudoaneurysm after surgical repair

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Abstract. Mycotic left ventricular pseudoaneurysm (LVP) is an uncommon life-threatening condition, resulting from myocardial rupture contained by the pericardium or scar tissue. Myocardial infarction is the leading cause of LVP, followed by cardiac surgery, previous chest trauma and infections. We present a case of a 69-year-old woman who developed a relapsing post-infarction LVP arising from mid infero-septal left ventricular wall. Such condition had been already treated with surgical repair 5-years earlier. Multiple non-invasive imaging modalities demonstrated its anatomy and localization. LVP is a challenging diagnosis due to the lack of specific symptoms and an insidious clinical presentation. Cardiac MR (CMR) allows an optimal LVP diagnosis due to its high spatial resolution and tissue characterization capabilities; CMR can also evaluate the pericardium, thrombi and the discontinuity of the myocardium. It is important to reduce the risk of LVP rupture; surgical repair is indicated in all acute cases of myocardial infarction. In chronic cases surgical repair is indicated for symptomatic patients, those diagnosed recently (<3 months), and those with large (>3 cm) or progressively expanding pseudoaneurysms. (www.actabiomedica.it)

Key words: left ventricular pseudoaneurysm, acute coronary syndrome, cardiac magnetic resonance, CMR, coronary artery bypass graft surgery, ventricular septal defect, imaging.

Introduction

Left ventricular pseudoaneurysm (LVP) is an uncommon life-threatening condition, resulting from myocardial rupture contained by the pericardium or scar tissue [1]. It must be distinguished by a true aneurysm which is characterized by all the ventricular wall layers and a larger breach with a breach/diameter ratio > 50% [2]. It is a challenging diagnosis due to the lack of specific symptoms and an insidious clinical presentation [3].

Advanced multimodality Imaging using Cardiac MR (CMR) and Cardiac Computed Tomography (CCT) is mandatory on top of echocardiography in this particular conditions especially when in non-acute settings; this is important for an adequate planning of the treatment strategy.

Case report

A 69-year-old woman, smoker, hypertensive, with type II diabetes, was admitted to the Stroke Unit with the diagnosis of cardio-embolic stroke of the right internal carotid artery territory and heart failure. During the hospitalization the patient developed fever, neutrophilic leukocytosis, with positive blood cultures for *Candida Albicans*. Past medical history revealed acute coronary syndrome (ACS) 5 years earlier, treated with

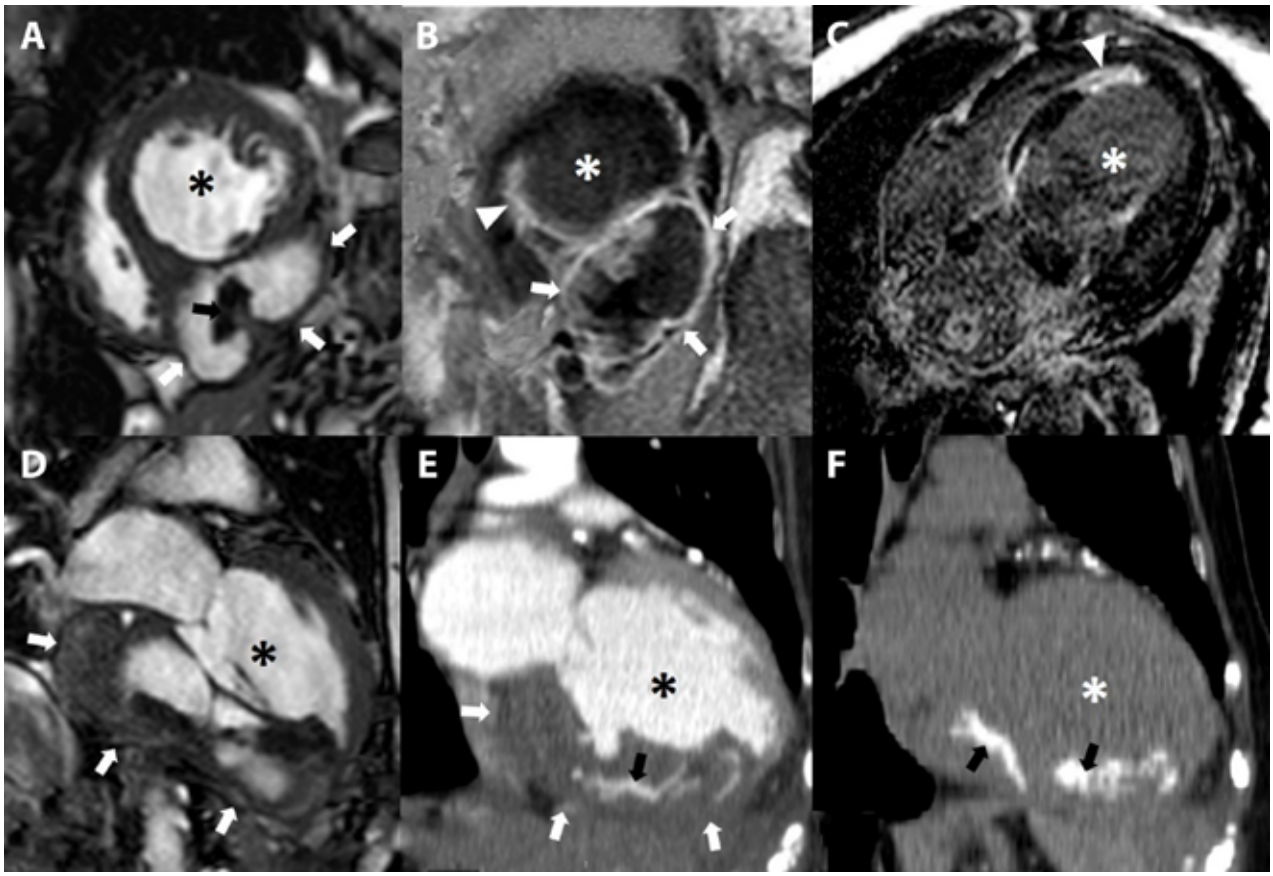

Figure 1. CMR (white arrows in a,b,d) and CT (white arrows in e) images showing large pseudoaneurysm from the infero-septal left ventricular wall extended from atria to ventricular apex in b-TFE sequences; post-contrast PSIR sequences demonstrated pericardium hyperintensity (white arrows in b) and transmural LGE in left myocardial septal wall (arrow head in b and c). Vertical long axis computed tomography (CT) view depicting linear hyperdensities consisting with surgical material of previous pseudoaneurysm treatment (black arrow in e and f).

percutaneous coronary intervention (PCI) with drug-eluting stent of right coronary artery and left anterior descending artery. Hence, Patient underwent two surgical repairs with bovine pericardial patch for a double post-infarction ventricular septal defect (VSD) and a post-infarction pseudoaneurysm resection; moreover, a double coronary artery bypass graft (CABG) surgery was performed due to downstream stent thrombosis. During the hospitalization the patient underwent several medical tests; for the evaluation of suspected cardiac source of embolism, an Echocardiography was performed, which showed wide LVP and a thrombus within. CCT was performed to better define anatomical landmarks of the pseudoaneurysm. The investigation was completed by CMR (1.5 T MR scanner; Achieva, Philips, Netherlands) which confirmed a 6.6×4×13 cm pseudoaneurysm arising from mid infero-septal left ventricular wall, extended from atria to ventricular apex, in continuity with the diaphragm and the anterior margin of the left hepatic lobe. Indexed left ventricle (LV) end diastolic volume was 102 mL/m^2. Systolic function was significantly depressed with an LV ejection fraction of 36%, with interventricular septum and inferior left ventricular segments akinesia. Phase Sensitive Inversion Recovery (PSIR) sequences demonstrated extensive transmural (> 75% of left ventricular wall thickness) Late Gadolinium Enhancement (LGE) in the same akinetic segments above-mentioned, referring to a post-infarction scar and LGE of the pericardium (Figure. 1b, c).

Considering the patient clinical history and the clinical picture, there was no indication for surgery, because of high surgical risk and after few days she passed away.

Discussion

Left ventricular pseudoaneurysm (or false aneurysm), is a blood collection contained by adjacent pericardium or scar tissue, resulting from myocardial rupture [1-3]. Main risk factors for the development of this condition are female sex and age >60 years [4]. It accounts for the 0.2% of all myocardial infarctions [5]. Leading cause of LVP is an extensive transmural myocardial infarction (55%) followed by cardiac surgery (33%), chest trauma (7%), infections (5%), and rarely tumour infiltration [1,6]. The most common localizations of LVP are the inferior or posterior walls, due to occlusion of the right coronary or circumflex artery, like in the case presented. Left ventricular anterior wall involvement is a rare finding, since anterior rupture more often results in hemopericardium and death rather than posterior rupture [7]. According to Farag [8], instead, the apex and anterior left ventricular walls are much more affected than the infero-posterior walls [8]. Diagnosis can be very difficult because LVP may be manifested by non-specific symptoms, such as heart failure, dyspnoea, chest pain, mitral regurgitation due to dysfunction of the posterior papillary muscle. Less frequent symptoms can be arrhythmias, systemic embolism and cerebrovascular accidents, sudden death, dizziness, cough. Moreover approximately 10% of cases are completely asymptomatic [1, 6-7, 9]. Different imaging techniques can be used for diagnosis of LVP. Echocardiography is usually the first test performed thanks to its wide availability and non-invasiveness. CMR and CCT allow a more accurate visualization, characterization and quantification in comparison with echocardiography. CMR offers an appropriate LVP diagnosis due to its high spatial resolution and tissue characterization; it allows the evaluation of pericardium, thrombi and the discontinuity of the myocardium, and also extracardiac findings [10] and valvulopathy [11-12]. CCT is more widely available than cardiac MR; it can be used in patients with contraindication to MR and it has a high spatial resolution and allows a fine visualization of the coronary arteries and by-pass grafts [7]. Pseudoaneurysm must be distinguished from true aneurysm, even if it is not always easy; true aneurysm wall consists of continuous myocardium, therefore it is at less risk of rupture than pseudoaneurysm, and it is often medically treated [9]. The typical localization is different: in contrast with pseudoaneurysm, 80-90% of true aneurysm is located in the apex of the left ventricular anterolateral wall, due to occlusion of the LAD. Moreover, true aneurysm has a larger breach with a breach/diameter ratio > 50% [2]. CMR is a valid tool to distinguish left ventricular true and false aneurysm; it allows easily to identify the lack of myocardial wall in case of pseudoaneurysm, thanks to the good contrast between different tissues [7]. Untreated pseudoaneurysms may develop life-threatening complications, such as pseudoaneurysm rupture, which is higher the first month after infarction, and in case of LVP rapid expansion [4], thromboembolism, infection, compression of surrounding structure, heart failure, arrhythmias [1, 3]. It is important to reduce the risk of LVP rupture; surgical repair is usually performed with primary repair or patch closure and it is indicated in all acute cases of myocardial infarction, even though it is associated with high mortality (23-28%). In chronic cases surgical repair is indicated for symptomatic patients, recently diagnosed (<3 months), large (>3 cm) or progressively expanding pseudoaneurysms [6].

In conclusion, advanced multi-modality imaging is mandatory when a suspicion or a diagnosed LVP has to be proposed for surgery; anyhow the condition of LVP needs strict monitoring even when not symptomatic or when there is still no surgical indication.

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