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Non-Fatal Outcome after Acute Left Ventricular Free Wall Rupture

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Abstract

Left ventricular free wall rupture is an uncommon but catastrophic event caused by acute myocardial infarction. In most of the cases, acute rupture results in cardiac tamponade and shock which is usually fatal within few minutes. Only immediate diagnosis and surgery can increase the survival rate. We report the case of the acute left ventricular free wall rupture, which was treated surgically with good outcome.

Abbreviations: Left Ventricular Free Wall Rupture (LVFWR); Myocardial Infarction (MI); Transthoracic Echocardiography (TTE); Ejection Fraction (EF); Left Anterior Descending (LAD); Intra-Aortic Balloon Pump (IABP); Cardiopulmonary Bypass (CPB); Left Internal Mammary Artery (LIMA); Vacuum-assisted Closure (VAC).

Introduction

Left ventricular free wall rupture (LVFWR) is an infrequent, but one of the most serious, complication of acute myocardial infarction (MI). It usually occurs within the 1st week after the MI. Patients with LVFWR need emergent surgical intervention, but the vast majority of them die before transferring to the operating room.

Clinical Case

In June 2015 a 75-year-old male, without previous medical history of ischemic heart disease, was admitted to the Department of Interventional Cardiology, John Paul II Hospital, Krakow due to the ST-elevated anterolateral MI. On admission, patient presented with chest pain of 5 hours duration and had elevated levels of high-sensitivity troponin T (hs-TnT) and creatine kinase-MB (CKMB) - 0.692 μg/l and 102 U/l respectively. The transthoracic echocardiography (TTE) showed ejection fraction (EF) of 30%, the apical wall akinesia and the trace of free fluid in the pericardium. The cardiac catheterizationrevealeda total proximal left anterior descending (LAD) artery occlusion [Figure 1]. During the cardiac catherization, patient rapidly deteriorated. Filled jugular veins, tachycardia (120 bpm) and low blood pressure (70/40 mmHg) were observed. Ventriculography did not visualize the site of the rupture. Patient was started on circulatory support using intra-aortic balloon pump (IABP). Subsequent TTE revealed a large accumulation of free fluid in the pericardium (with maximum thickness of 30 mm) and an emergent surgery was scheduled. The patient was immediately transferred to the operating room. Median sternotomy was performed and the time that had elapsed from establishing the diagnosis to starting a cardiopulmonary bypass (CPB)was less than an hour. Intraoperatively 500 ml of blood were sucked out of the pericardial sac and a large blood clot (5 cm x 7 cm) was removed from the apical region [Figure 2]. The macroscopic morphology of the rupture site, confirmed an ischemic and non-iatrogenic cause of the LVFWR. The rupture was stitched up with interrupted sutures (single-pledged 4-0 Prolene®) and a 4 cm long Gore-Tex® patch. Next, a dressing consisting of human fibrin and thrombin on collagen matrix (TachoSil®) was applied. Considering patient's age and general condition, LAD occlusion was supplied with saphenous vein graft instead of left internal mammary artery (LIMA). Within postoperative recovery, maximum levels of hs-TnT and CK-MB valued 11.48 μg/l and 416 U/l, respectively. IABP support was stopped 6 days after the surgery. During postoperative recovery, patient developed mediastinitis with subsequent osteomyelitis and was treated with antibiotics and a vacuum-assisted closure (VAC) therapy. Due to this complication, hospital stay was prolonged. Last TTE showed EF of 35%. Patient was discharged home in good general condition in the beginning of October 2015.

Figure 1: Total proximal occlusion of left anterior descending artery (A) RAO CAUDAL projection; (B) LAO CAUDAL projection.

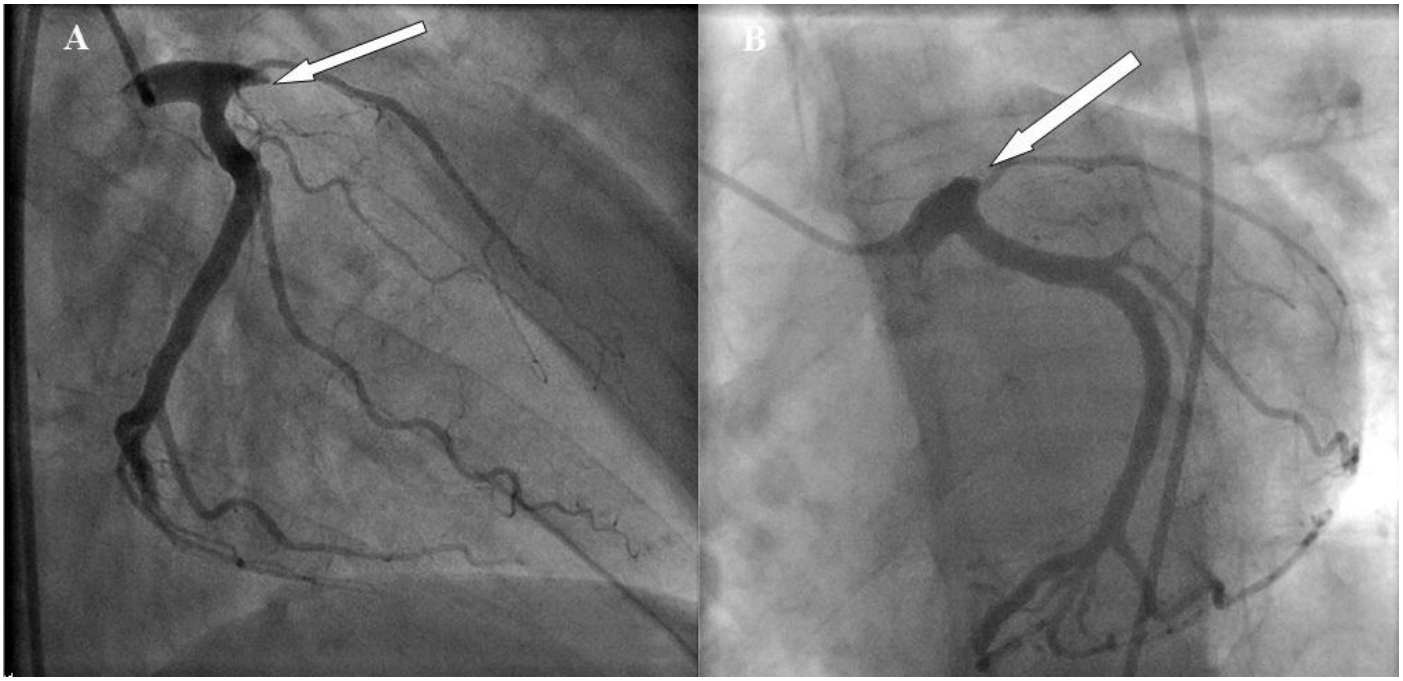

Figure 2: (A) The place of the rupture; (B) Rupture closed with a Gore-Tex® patch.

Discussion

Acute LVFWR is a serious complication that may occur after MI. Despite development in diagnostic imaging, percutaneous approach and surgical techniques, acute LVFWR still cannot be managed with satisfactory positive outcome rate.

The presentation of acute LVFWR is usually catastrophic and leads to cardiac tamponade and cardiogenic shock that,in most of the cases, are commonly fatal within minutes. Therefore, the diagnosis is almost always made in postmortem examination. Occasionally, rupture can be sub-acute and slow bleeding into the pericardium over hours or days is observed. Arterial hypertension, ageing, female sex, and 1st anterior or lateral wall MI constitute traditional risk factors for LVFWR [1]. Based on intraoperative findings, two main types of ruptures are described. Blow-out ruptures, present as a macroscopic tear in the epicardium and the communication between the left ventricle cavity and the pericardial space is observed. In oozing ruptures, no macroscopic defects are visible [2].

In patients with LVFWR, instant diagnosis is crucial and is known as the most important factor that increases the survival. Every sudden deterioration in patient's general condition should result in immediate TTE, which is the diagnostic method of choice for LVFWR [2]. However, in majority of the cases, despite early diagnosis and treatment, the outcome is fatal [3].

Surgical technique of managing LVFWR depends on the rupture type. Gore-Tex® patches or strips are most commonly used in an ongoing, squirting rupture. On the other hand, suture less management is preferable in the oozing type [4,5]. Our center's experience indicates that in relatively large ruptures the technique described above results in the greatest chance of a successful outcome.

The patient's survival arose not only from the appropriate medical staff response and early diagnosis, but also from the possibility of performing emergent on-pump surgery. Moreover, formation of the blood clot in the pericardium, which temporarily slowed down the bleeding, was presumably essential to patient's survival.

Acute left ventricle free wall rupture is a rare but usually fatal complication after MI. Early diagnosis and emergent cardiac surgery improve the outcome. However, even in spite of these resources, the chances of survival are minimal.

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