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Left Ventricular Outflow Tract Pseudoaneurysm Compresses Left Anterior Descending Artery: A Case Report and Review of Literature

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Abstract **Case Report**

A case of a 49-year-old man with a history of buprenorphine-substituted heroin was admitted for acute heart failure after three months of bioprosthetic aortic replacement to treat infective endocarditis. Transthoracic echocardiography (TTE) showed a left ventricular ejection fraction (EF) was 35% and a periprosthetic mass with an aorto-ventricular fistula. Thoracic computed tomography revealed a left ventricular outflow tract (LVOT) pseudoaneurysm measuring 69 x 45 mm that compressed left anterior descending (LAD) artery with downstream myocardial ischemia. Patient was treated by an urgent surgery, including an exclusion of the pseudoaneurysm, a left ventricular reconstruction surgery and a bioprosthetic aortic replacement. Patient went through a difficult postoperative period. Finally, he was safely discharged with a low EF (34%) from hospital to rehabilitation center with a Life vest. This case spotlights a rare devastating complication of a LVOT pseudoaneurysm compresses LAD artery and how surgery could decompress the false aneurysm and stabilize ischemia.

Keywords: Left anterior descending artery compression, left ventricular outflow tract pseudoaneurysm, case report.

INTRODUCTION

Left ventricular pseudoaneurysm is a life-threatening complication of myocardial rupture involving non-myocardial tissue [1]. The percentage of left ventricular pseudoaneurysm sites are posterior, lateral, apical, inferior, anterior, and proximal, respectively [2]. LVOT pseudoaneurysms can due to extrinsic coronary artery compression by large pseudoaneurysms. This complication is very rare, with a reported incidence of 4 % in patients with acute coronary syndrome associated with infective endocarditis [3, 4].

The definitive treatment for LVOT pseudoaneurysms is surgery. The goal is to exclude the aneurysm segment, restore the size and shape of the left ventricle. Several repair techniques have been described in the literature, all aimed at eliminating the aneurysm sac and restoring the normal shape of the left ventricle [5]. Standard techniques without patch or ablation techniques, linear and circular repair techniques with or without patches, involving remodeling of ventricular geometry [6].

CASE PRESENTATION

A 49-year-old man with a history of heroin addiction substituted by Buprenorphine was admitted with acute heart failure. In three months ago, he was diagnosed with infective endocarditis of aortic valve and treated by bioprosthetic aortic replacement with patch closure of the annular abscess cavity. Despite his young age, his mechanical valve was denied to avoid future anticoagulant compliance issues. Streptococcus agalactiae was the causative agent, and according to the results of antibiotic testing, the infective disease specialist used a therapeutic antibiotic amoxicillin in two months.

On admission, 11 days after asymptomatic positive Covid-19, he presented with symptoms of subacute pulmonary edema with retrosternal chest pain radiating to his left arm. An electrocardiogram showed sinus rhythm with ST elevation in the aVR, fine QRS,

and diffuse ST depression. Blood tests showed an increase in troponin I 38,000 ng/ml, BNP 19,000 ng/l, and CRP 150 mg/l. These signs did not point to Covid-19. Transthoracic echocardiography (TTE) (Fig 1) showed a left ventricular EF of 35–40% and a periprosthetic mass in the left ventricle and a aorto-ventricular fistula due to patch rupture. Computed tomography (CT) of the chest (Figs 2, 3, 4) revealed his LVOT pseudoaneurysm measuring 69 x 45 mm causing an intra-prosthetic leak. This LVOT pseudoaneurysm contact with the left lateral edge of the ascending aorta was responsible for LAD artery compression with sign of downstream myocardial ischemia.

After 48 hours of treatment in the intensive care unit, severe acute ischemia recurred and urgent surgery was performed. Euroscore II for this operation was 38%. The two main goals in surgery were removal of LVOT pseudoaneurysm compressing the left anterior descending artery and left ventricular reconstruction surgery. The entry orifice (30x40mm) was very wide, starting at the level of the right ostium and ending at the level of the non-coronary left commissure. A pseudoaneurysm was ruled out, a left ventricular reconstruction was done with a large bovine pericardium patch (60x20mm) and a bioprosthetic aortic replacement in supra-annular position.

His hospital stay was prolonged due to reinfected sepsis despite adequate antibiotic therapy, pulmonary embolism, and low EF of the left ventricle. He was treated by cefazolin for a second period of 6-week. Postoperative thoracic CT scan (Fig 4) showed no argument for a complication with regard to the aortic valve, a stable appearance of the thrombosed false aneurysm. TTE before discharge showed a severe left ventricular dysfunction (34%), apical, anterior septal and anterior akinesia, moderate right ventricular dysfunction. Finally, the patient was safely discharged from hospital to rehabilitation and re-education center with Life vest.

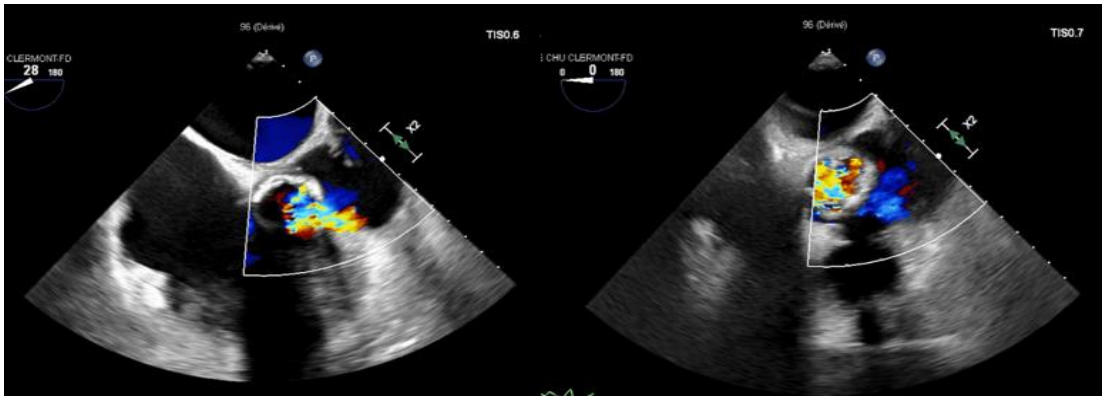

Figure 1: TTE: a periprosthetic mass in the left ventricle and an aorto-ventricular fistula

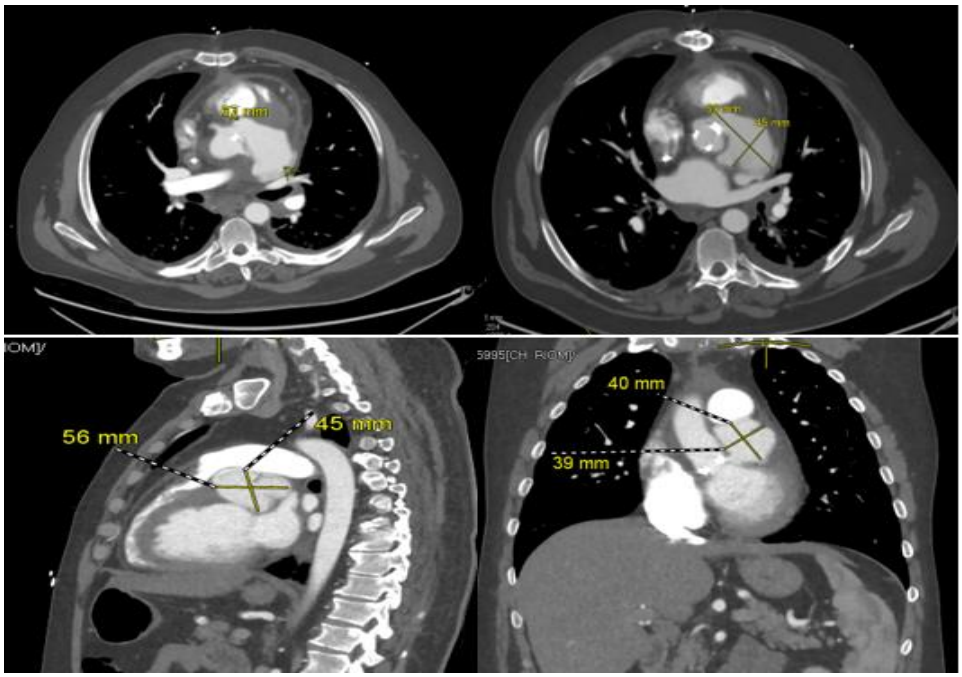

Figure 2: Thoracic CT scan: a LVOT pseudoaneurysm

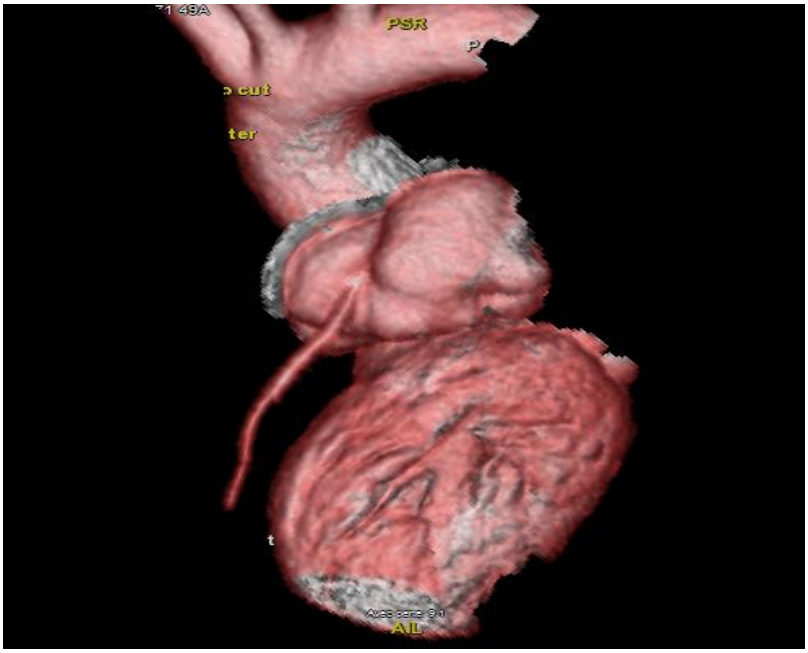

Figure 3: Thoracic CT scan reconstruct in 3D: a LVOT pseudoaneurysm compresses LAD artery

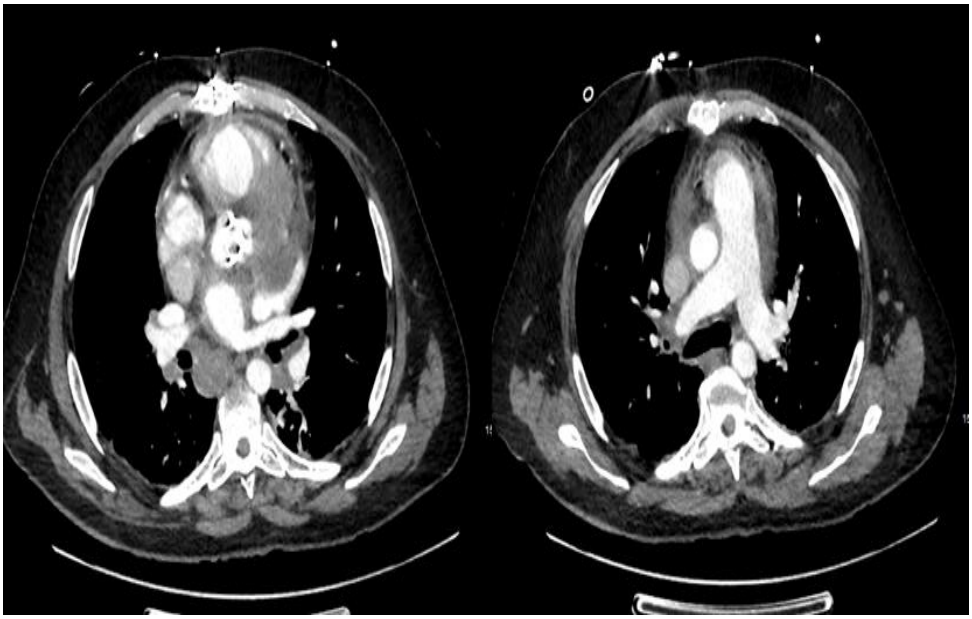

Figure 4: Post-operative thoracic CT scan: a stable appearance of the thrombosed false aneurysm

DISCUSSION

The incidence of prosthetic valve endocarditis in aortic valve replacement is 0.3% to 1.2% per patient-year, with devastating complications such as valve rupture, abscess formation, pseudoaneurysm, fistula, perforation, heart block, and stroke [7]. High-velocity blood flow within the LVOT can enter the tear and form a paravalvular leak. Dehiscence of suture lines, whether of infective etiology or suturing technique, can lead to the formation of LVOT pseudoaneurysms [8]. In our patient's clinical scenario, including one major and three minor of Duke's criteria [9], suggests that LVOT pseudoaneurysms are caused by infective endocarditis and due to LAD artery compress.

In a case report of a 73-year-old man who had previously undergone mechanical AVR, an LVOT aneurysm presented with angina secondary to compression of the left main coronary artery and its main branches. Schaap *et al*., performed a Bentall procedure with a Bio Valsalva 25- mm prosthesis for infective etiology [10]. Castillo-Sang *et al*., presented a 70-year-old female with aortic root pseudoaneurysm 3 years after AVR presenting with shortness of breath. She underwent an aortic valve replacement within a Dacron graft and Cabrol anastomosis of the coronary arteries [11]. In our case, a giant LVOT pseudoaneurysm caused irreversible myocardial injury as a result of LAD artery compression. Due to the heavy clinical background of this patient, we did not

choose Bentall surgery. Actually, a pseudoaneurysm exclusion and a single-patch left ventricular reconstruction were successful. Fortunately, the patient survived despite severe left ventricular dysfunction and persistent heart failure. The ideal time of surgery is emergency within 24 hours, in the context of native (aortic or mitral) or prosthetic valve endocarditis and severe congestive heart failure or cardiogenic shock caused by fistula into a cardiac chamber or the pericardial space [12]. So, an earlier surgery maybe prevents a severe myocardial infarction.

For coronary artery compression with evidence of myocardial ischemia, coronary stent placement was rejected because it predicted sepsis, risk of septic embolization, and ineffectiveness of long stent placement. Previous cases have reported that bare metal stents have been used in similar situations. Nevertheless, the patient died of cardiogenic shock, emphasizing the critical nature of this complication [13]. The prime approach of reperfusion in acute coronary syndromes in the course of infective endocarditis remains uncertain due to the infrequency of the condition and the lack of evidence of outcome.

CONCLUSION

This case spotlights the devastating complication of a left ventricular outflow tract pseudoaneurysm following infective endocarditis, causing LAD artery compress with evidence of downstream acute severe myocardial ischemia and how surgery could decompress the false aneurysm and stabilize ischemia. An earlier surgery could perhaps prevent severe myocardial infarction.

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