

## Left Ventricular Pseudoaneurysm in a Diabetic Patient without Clinical Acute Coronary Syndrome

*Pseudoaneurisma Ventricular Esquerdo em Paciente Diabético sem Clínica de Síndrome Coronariana Aguda*

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### Introduction

Left ventricular (LV) pseudoaneurysm consists of a free wall rupture contained by the adjacent pericardium.<sup>1</sup> It is a severe pathology with high morbidity and mortality and usually a complication of acute myocardial infarction (AMI).<sup>2</sup> Its clinical status may be nonspecific; in some situations, the patient is asymptomatic, which may hinder the diagnosis.<sup>1-3</sup> Surgical correction is the treatment of choice due to the high risk of rupture and cardiac tamponade.<sup>3,4</sup>

This is a case report of an asymptomatic diabetes mellitus (DM) patient with a previous history of kidney transplantation and immunosuppression who had an incidental diagnosis of LV pseudoaneurysm.

### Case report

A Brazilian 55-year-old man with hypertension and hypothyroidism had a 25-year history of DM (on insulin therapy for the past 5 years) and chronic stage IV renal failure and had undergone a renal transplant using immunosuppressants 3 years prior. He was admitted with diabetic foot and underwent antibiotic therapy and amputation of the third right toe. The patient denied other symptoms. During the hospitalization, he underwent echocardiography (transthoracic and, due to the changes found, transesophageal), which evidenced left cavity diameters at the upper limit of normal, preserved left ventricular function (left atrium, 40 mm; LV, 56 mm; ejection fraction, 56%), and significant hypokinesia in the middle and basal segments of the lower wall. Inferolateral wall akinesia was also identified associated with myocardial discontinuity and a saccular bulge with a thrombus inside, which communicated with the LV (flow detected on Doppler) and was quite suggestive of LV pseudoaneurysm. The pseudoaneurysm measured 1.7 cm at the neck and had an internal anteroposterior diameter of 3 cm, laterolateral diameter of 3.7 cm, and longitudinal diameter of 4 cm (Figure 1).

Cine computed tomography angiography revealed 30% proximal and 70% middle third stenoses in the right posterior ventricular (RPV) branch of the right coronary artery (Figure 2) but no other significant stenosis. Left

ventriculography was not performed due to risks related to the already established diagnosis of ventricular pseudoaneurysm associated with the thrombi.

The patient underwent LV reconstruction surgery with closure of the free wall rupture and implantation of bovine pericardium patch. No complications occurred. Myocardial revascularization was not performed due to distal bed inadequacy in the RPV branch. Intraoperative transesophageal echocardiography and a Doppler examination showed correction of the ventricular discontinuity. The patient remained asymptomatic in the postoperative period and was discharged from the hospital 5 days after the surgery.

### Discussion

LV pseudoaneurysm forms when a cardiac wall rupture is blocked by adherent pericardium or scar tissue without containing endocardium or myocardium.<sup>1</sup> Due to the inflammatory and prothrombotic condition, a hematoma looking like an aneurysm forms.<sup>5</sup> This is usually a mechanical complication after classic AMI<sup>2</sup> that occurs within 5–7 days after the event when the infarcted necrotic tissue is friable, making the ventricular wall significantly fragile.<sup>6</sup>

Due to greater ventricular wall thinning in its lower portion, infarcts in this region versus the anterior wall are associated with a greater chance of pseudoaneurysm.<sup>7</sup> Some important risk factors for false aneurysm include: female sex; older age; hypertension; first AMI; transmural AMI; absence of thrombolysis, late thrombolysis; chemical thrombolysis (versus mechanical); absence of collateral circulation; and the use of corticoids, immunosuppressants, or other drugs.<sup>2</sup> The mean age at presentation is 60 years, and most patients are Caucasian.<sup>1</sup> Conditions other than AMI (cardiac surgery, chest trauma, tumor invasion, and infection) may also result in LV pseudoaneurysm.<sup>1,5,8</sup>

LV pseudoaneurysm develops in less than 0.1% of AMI<sup>8,9</sup> patients; due to its greater tendency to rupture (30–45% of untreated patients),<sup>8</sup> cardiac tamponade, shock, and death,<sup>1,3</sup> it is considered an urgent condition that requires immediate treatment.<sup>4</sup> In contrast, a true aneurysm results from cardiac wall weakening involves maintained layer integrity (endocardium, myocardium, epicardium, and pericardium) and does not require an urgent or even interventionist approach.<sup>2,7</sup>

Dyskinetic movement of the heart can result in heart failure, and the infarcted area can cause arrhythmias and form clots that can embolize.<sup>7</sup> A false LV aneurysm usually has symptoms such as chest pain, dyspnea, and hypotension.<sup>9</sup> However, more than 10% of cases may be asymptomatic and incidentally

### Keywords

Aneurysm, false; Diabetes mellitus; Echocardiography.

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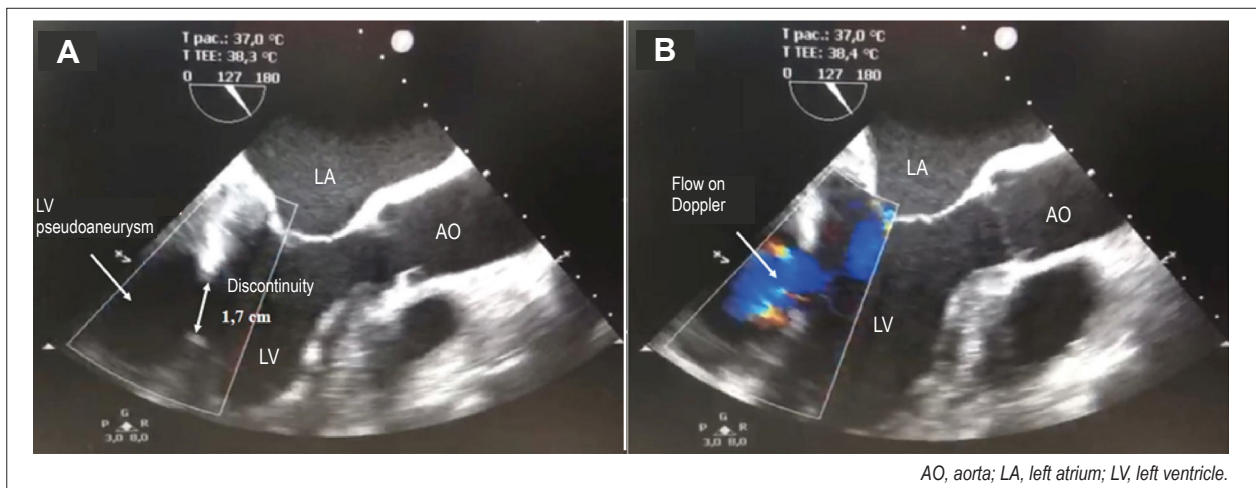
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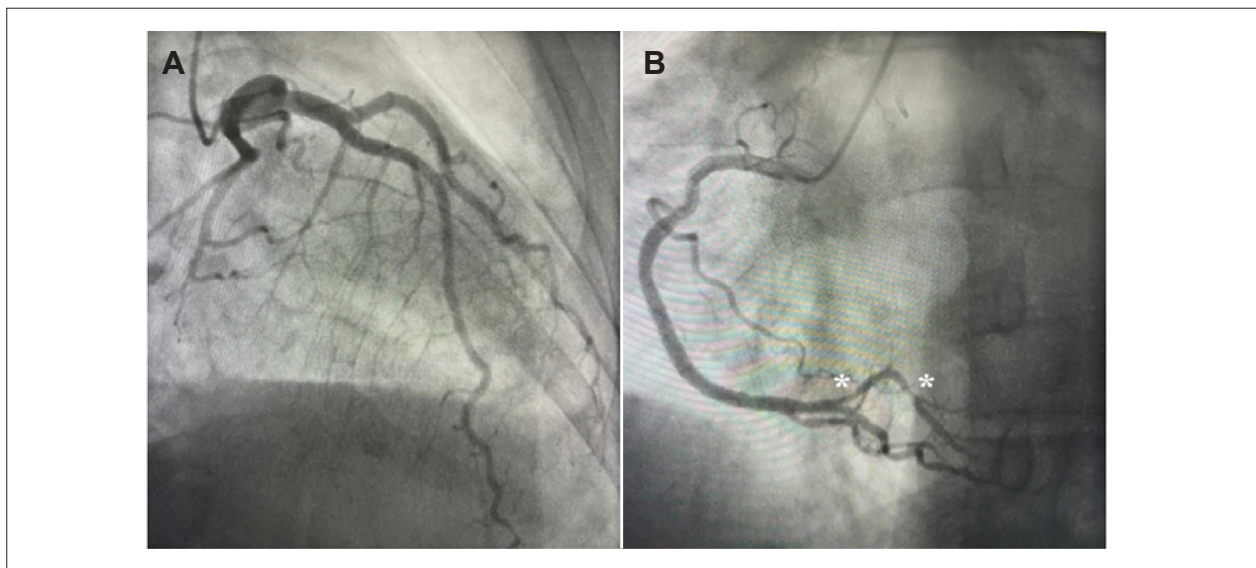
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## Case Report



**Figure 1** – Transesophageal echocardiogram revealing a longitudinal median esophageal cut. (A) Left ventricle inferolateral wall discontinuity measuring 1.7 cm in this projection. (B) Color Doppler image in the same projection showing flow (in blue) toward the pseudoaneurysm.



**Figure 2** – Coronary computed tomography angiogram. (A) Left view shows no significant obstructive coronary artery disease. (B) Right view shows significant stenosis in the middle-distal segment of the right posterior ventricular branch.

diagnosed.<sup>1,4,9</sup> In such cases, the patients are diagnosed in the chronic phase since pseudoaneurysm can progress for years without rupturing. Nevertheless, a significant proportion of patients will not have their diagnosis established in the acute phase due to early and fatal rupture.<sup>10</sup>

An incidental detection on angiography or transthoracic echocardiography is common due to the greater availability and routine use of this exam during the initial evaluation of patients with chest pain, murmur, and heart failure.<sup>4</sup> LV angiography is the method of choice since it can show the narrow orifice that leads to a saccular structure in addition to the absence of coronary arteries around it. Left ventriculography has a diagnostic acuity of 85% despite the real risk of embolizing any thrombotic material present. On the other hand, transthoracic

echocardiography can show the endocardial discontinuity, the connection of the LV turbulent systolic flow to the aneurysmal sac, and a ratio between the size of the orifice and the diameter of the pseudoaneurysm greater than 0.5.<sup>7</sup>

Computed tomography and cardiac magnetic resonance imaging (CMRI) can also be used for diagnosis. In practice, these methods can further detail the characteristics of the discontinuity. For instance, CMRI can show the absence of endocardium and myocardium near the aneurysm in addition to effectively assessing myocardial function, contractility, tissue perfusion, and turbulent blood flow in the cardiac chambers through a false aneurysm.<sup>1,2,5,9</sup>

DM patients, as described in this case report, are at significant risk of developing coronary artery disease and have

a higher incidence of silent AMI.<sup>12</sup> Renal failure and the use of immunosuppressive drugs after kidney transplantation are risk factors for the development of ischemic heart disease and the occurrence of ventricular rupture after infarction.<sup>13</sup>

Surgery is the most appropriate treatment for pseudoaneurysm due to the possibility of its removal and the restoration of LV morphology.<sup>14</sup> Due to its high tendency to rupture (30–45%) and the risk of sudden death, surgical treatment should be recommended and performed as early as possible.<sup>2</sup> The mortality rate of cases treated surgically is lower than of cases treated clinically (23% versus 48%).<sup>7</sup>

The medical team considered the patient's clinical condition and the pseudoaneurysm's morphological characteristics and chose surgical correction. After the surgery and discontinuity correction, the patient became asymptomatic and stable and was discharged from the hospital after 5 days.

LV pseudoaneurysm is a rare condition that usually occurs after AMI and has a high mortality rate when not accurately diagnosed and treated. It requires immediate treatment due to the possibility of rupture. Knowledge of all diagnostic methods and treatment

strategies for LV pseudoaneurysm is extremely important to ensuring its appropriate management and decreasing its high morbidity and mortality rates. The present report also reinforces the importance of a good preoperative evaluation that considers all risk factors for the development of ischemic heart disease and stabilizes the patient before major surgeries.

### Authors' contributions

Research conception and design: Carrijo AMM, Souza MG, and Costa MVS; data collection: Carrijo AMM, Souza MG, and Costa MVS; data analysis and interpretation: Carrijo AMM, Souza MG, Costa MVS, and O'Connell JL; manuscript writing: Carrijo AMM, Souza MG, Costa MVS, and O'Connell JL; and critical review of the manuscript for important intellectual content: O'Connell JL.

### Conflict of interest

The authors have declared that they have no conflict of interest.

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