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# Surgical treatment of a giant left ventricular aneurysm- A case report

## Tratamento cirúrgico do aneurisma gigante de ventrículo esquerdo - Relato de caso

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### Abstract

An aneurysm of the left ventricle is a complication of acute myocardial infarction. We report a case of a giant aneurysm of the left ventricle after myocardial infarction in a 59 year-old male patient. The surgery to correct the aneurysm was performed with the use of cardiopulmonary bypass under normothermia. A bovine pericardial patch was used for the geometric reconstruction of the ventricular wall affected by the aneurysm. After the procedure, echocardiography and magnetic resonance imaging revealed improvement in left ventricular ejection fraction and volume reduction.

**Descriptors:** Aneurysm. Heart Aneurysm. Myocardial Infarction.

### Resumo

O aneurisma de ventrículo esquerdo é uma complicação do infarto agudo do miocárdio. Relatamos um caso de um aneurisma gigante de ventrículo esquerdo pós-infarto de miocárdio em um paciente de 59 anos do sexo masculino. A cirurgia para correção do aneurisma foi realizada com uso de circulação extracorpórea sob normotermia. Utilizou-se uma placa de pericárdio bovino para a reconstrução geométrica da parede ventricular acometida pelo aneurisma. Após o procedimento, ecocardiografia e ressonância magnética revelaram melhora da fração de ejeção com redução do volume ventricular esquerdo.

**Descritores:** Aneurisma. Aneurisma cardíaco. Infarto do Miocárdio.

### INTRODUCTION

Although a left ventricular aneurysm is a common complication following a myocardial infarction, its incidence has declined, primarily due to the treatment of a myocardial infar-

tion with coronary angioplasty performed in the acute phase of the event. The condition can be classified as a true aneurysm when the aneurysm forms at the damaged wall of the myocardium and as a pseudoaneurysm when the cardiac rupture is contained by adherent pericardium or scar tissue<sup>[1,2]</sup>.



Watch the videos accessing the link below:

<http://www.rbccv.org.br/article/2306/Tratamento-cirurgico-do-aneurisma-gigante-de-ventriculo-esquerdo---Relato-de-caso>

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# Abbreviations, acronyms & symbols

CPB	Cardiopulmonary bypass
MRI	Magnetic resonance imaging
NYHA	New York Heart Association
TEE	Transesophageal echocardiography

The main complications of a left ventricular aneurysm are heart failure, ventricular arrhythmias, systemic embolization, cerebrovascular accident, and ventricular rupture. The main surgical indications occurring in patients with a true aneurysm, intractable ventricular arrhythmias and heart failure unresponsive to drug treatment. Other possible indications include refractory angina and systemic embolization in patients who cannot take oral anticoagulants. In cases of pseudoaneurysm, surgical treatment is the best option, given its high probability of symptom dissolution<sup>[2,3]</sup>.

Surgical techniques currently in use for correction of a left ventricular aneurysm are based on reconstruction of the left ventricle or a reduction of its volume with the goal of restoring normal cardiac geometry<sup>[4,5]</sup>.

The present article reports a case of a giant ventricular aneurysm post-myocardial infarction in a 59 year-old male patient and shows an example of a positive outcome of surgical correction with the ventricular remodeling technique. The case report contains full imaging documentation with cardiac magnetic resonance imaging and transesophageal echocardiography images.

## CASE REPORT

A 59 year-old male patient suffered from hypertension and dyslipidemia. He was a smoker and had a positive family history for coronary artery disease. Following an acute myocardial infarction in February 2013, he underwent a circumflex coronary stent implantation. Twenty-five days after stent implantation, the patient presented with acute coronary symptoms, which were found to be due to stent occlusion; however, another angioplasty proved to be impossible due to technical difficulties.

In August 2013, the patient suffered heart failure, functional class III (NYHA). A giant aneurysm of the left ventricle was present. Transesophageal echocardiography (TEE) and cardiac magnetic resonance imaging (MRI) were performed (ejection fraction: 19% [Simpson]; left-end diastolic volume: 402.7 cm<sup>3</sup>; left-end systolic volume: 324 cm<sup>3</sup>; ejection fraction: 19%; left-end diastolic volume: 490 ml; left-end systolic volume: 398 ml). Left ventricle weight was 144 gm<sup>2</sup>. The aneurysm was 7.3 x 6.4 x 7.5 cm with tapered walls towards the base of the left ventricle; a thrombus was present (Figures 1A and 1B).

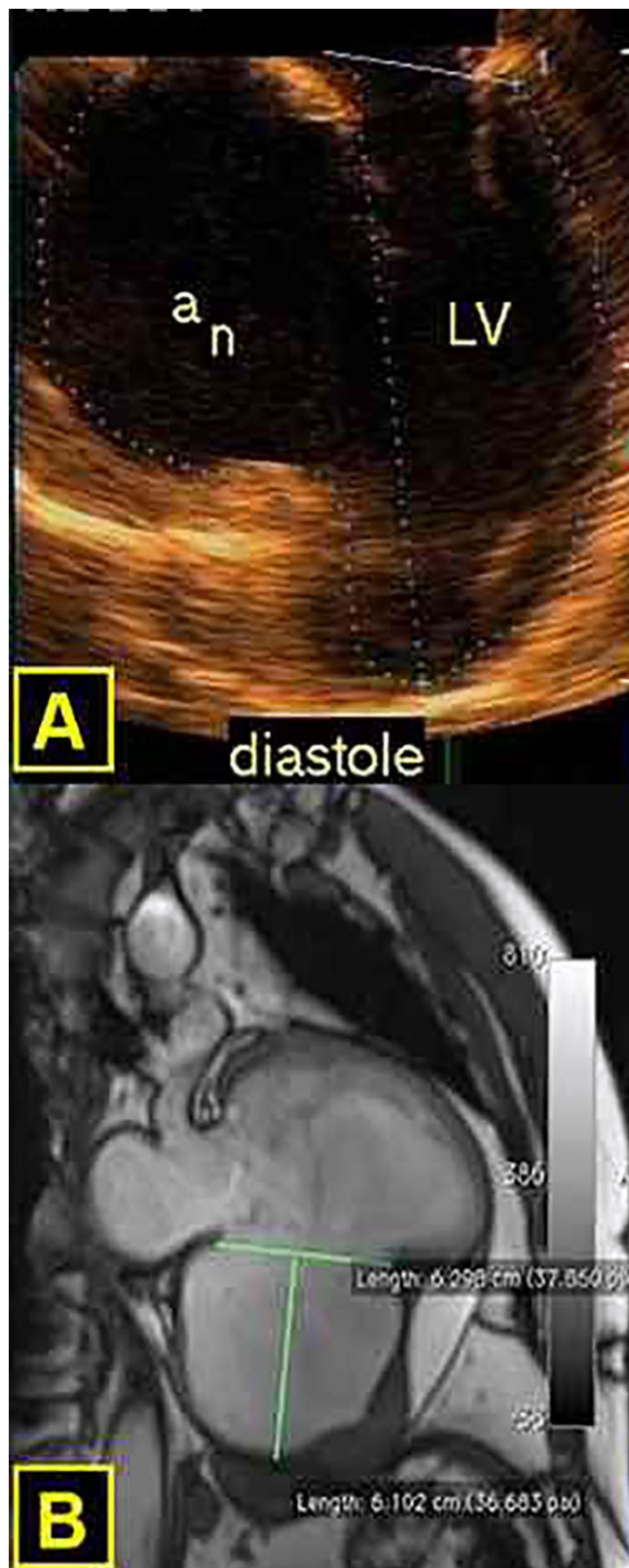


Fig. 1 – A) Preoperative transesophageal echocardiography.

Fig. 1 – B) Preoperative cardiac magnetic resonance imaging.



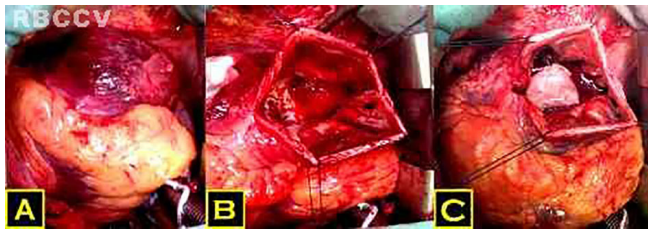


Fig. 2 – A) Giant aneurysm of the left ventricle after the establishment of cardiopulmonary bypass.

Fig. 2 – B) Aneurismectomy performed with removal of thrombus and identification of the transition zone between the healthy myocardium and fibrotic area.

Fig. 2 – C) Pericardial patch implanted in the transition zone between healthy myocardium and fibrotic area.

The patient underwent repair surgery of the left ventricle with geometric correction through a median sternotomy (video 1). Cardiopulmonary bypass (CPB) from the aorta to the right atrium was established under normothermia (Figure 2A). Myocardial protection was held with antegrade and retrograde cardioplegia under continuous normothermic esmolol, potassium, and magnesium.

After incising the aneurysm (video 2) and extracting a large thrombus (video 3) measuring 8 x 3 cm (Figure 2B), a 7 x 5 cm bovine pericardial patch was placed and anchored with Teflon wires (videos 4 and 5). A transition zone was established between the healthy myocardium and an area of fibrosis (video 6) using 2.0 ethibond thereby excluding the infarcted region and a geometric correction was performed (Figure 2C). The mitral valve was competent. Cardiopulmonary bypass time was 56 minutes and the aorta was clamped for 48 minutes. The patient was weaned from the CPB with a low dose of intravenous dobutamine, which was maintained until closure of the incision.

A new transesophageal echocardiography was performed and revealed a 30% (Simpson) ejection fraction; left-end diastolic volume of 138.6 cm<sup>3</sup>, and left-end systolic volume of 96.87 cm<sup>3</sup> (Figure 3A).

The patient was extubated in the operating room and transferred to the intensive care unit where he remained for 36 hours. Intraoperative blood loss was 450 ml. He was discharged 72 hours later with prescriptions for carvedilol 12.5 mg daily and acetylsalicylic acid 100 mg daily. At the one month follow-up examination, the patient was at functional class I (NYHA). He underwent an MRI that identified: ejection fraction of 41%, left-end diastolic volume of 198 ml, left ventricular systolic volume of 115 ml, and left ventricular weight of 144 gm<sup>2</sup> (Figure 3B).

## DISCUSSION

Although left ventricular aneurysm is a common complication following myocardial infarction, its incidence has de-



Fig. 3 – A) Postoperative transesophageal echocardiography.

Fig. 3 – B) Postoperative cardiac magnetic resonance imaging.

clined, primarily due to the treatment of myocardial infarction with coronary angioplasty performed in the acute phase of the event. The condition can be classified as a true aneurysm when the aneurysm forms at the damaged wall of the myocardium and as a pseudoaneurysm when the cardiac rupture is contained by adherent pericardium or scar tissue<sup>[1,2]</sup>.

The main complications of a left ventricular aneurysm are heart failure, ventricular arrhythmias, systemic embolization, cerebrovascular accident, and ventricular rupture. The main surgical indications occur in patients with a true aneurysm; include intractable ventricular arrhythmias and heart failure not responsive to drug treatment. Other possible indications are refractory angina and systemic embolization in patients who cannot take oral anticoagulants. In cases of pseudoaneurysm, surgical treatment is the best option, given its high probability of symptom dissolution<sup>[2,3]</sup>.

Surgical techniques currently in use for correction of a left ventricular aneurysm are based on reconstruction of the left ventricle or a reduction of its volume with the goal of restoring the normal cardiac geometry<sup>[4-6]</sup>. This case exemplifies a positive outcome of surgical correction with the ventricular remodeling technique. When appropriate indications are present, the procedure can result in improved ejection fraction of the left ventricle and ventricular volume reduction.

Video 1 - *Giant left ventricular aneurysm before the establishment of the cardiopulmonary bypass. The aneurysm is clearly delimited by the surgeon fingers.*

Video 2 - *The aneurysm wall is opened revealing its extension.*

Video 3 - *A large thrombus measuring 8 x 3 cm is removed from the aneurysm wall.*

Video 4 - *After the thrombus removal, the bovine pericardial patch was placed and anchored with Teflon wires in order to reconstruct the geometry of the ventricular wall impaired by the aneurysm formation.*

Video 5 - *Bovine pericardial patch fully anchored to the wall.*

Video 6 - *A transition zone was established with 2.0 Ethibond between the healthy myocardium and an area of fibrosis, excluding the infarcted region.*

#### Authors' roles & responsibilities

GAS	Conception and study design, performing the procedures and/or experiments, writing of the manuscript or review of its content
JRFN	Conception and study design, performing the procedures and/or experiments
JCF	Drafting of the manuscript or review of its content
CPB	Drafting of the manuscript or review of its content
HG	Performing the procedures and/or experiments
BO	Performing the procedures and/or experiments
LFM	Final approval of the manuscript, performing the procedures and/or experiments
LCSG	Final approval of the manuscript, performing the procedures and/or experiments

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