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Iatrogenic occlusion of the left circumflex artery due to mitral valve repair surgery: a not well-known, but potentially fatal complication

Oclusão iatrogênica da artéria coronária circunflexa decorrente da cirurgia valvar mitral: uma complicação pouco conhecida, mas potencialmente fatal

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ABSTRACT – Mitral valve surgery has become an increasingly common procedure for patients with mitral valve disease. Iatrogenic coronary artery lesion has been reported as an uncommon and potentially fatal complication of mitral valve surgery. Its diagnosis must be considered during perioperative care, and coronary angiography helps in deciding the best therapeutic strategy. In the present clinical report, we describe a patient with iatrogenic occlusion of the left circumflex artery after surgery for mitral valve replacement due to rheumatic disease.

Keywords: Mitral valve/surgery; Coronary angiography; Coronary stenosis; Rheumatic diseases/complications

RESUMO – A correção cirúrgica da valva mitral tem se tornando um procedimento cada vez mais frequente em pacientes com lesão mitral. A lesão coronariana iatrogênica é relatada como uma complicação incomum e potencialmente fatal dessa cirurgia. Seu diagnóstico deve ser considerado durante o perioperatório, e a angiografia coronariana auxilia na decisão da melhor estratégia terapêutica. Neste trabalho, apresentamos um caso de estenose iatrogênica da artéria coronária circunflexa após substituição valvar mitral por doença reumática.

Descritores: Valva mitral/cirurgia; Angiografia coronária; Estenose coronária; Doenças reumáticas/complicações

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BACKGROUND

In Brazil, heart valve disease represents a significant fraction of the total number of patient hospitalizations for cardiovascular disease. Unlike developed countries, in Brazil rheumatic fever is the main etiology of heart valve diseases and is responsible for up to 70% of cases.[1]

Surgical treatment of valvular heart disease, in the situations foreseen by the guidelines, modifies the natural course of the disease, enabling reverse remodeling of heart chambers, recovery of ventricular function and remission of symptoms.[1]

Iatrogenic coronary artery lesion during mitral valve surgery has been reported as a rare and potentially severe complication, due to the proximity of the left circumflex artery (LCx) to the posterior segment of the mitral valve annulus.

Several mechanisms suggest that coronary artery injuries are related to direct lesion to a vessel by surgical suture or due to distortion of the surrounding tissue, resulting in dynamic, functional stenosis or occlusion of the artery.[2]

This potentially fatal complication should be considered and promptly recognized during the perioperative period of repair or replacement of the mitral valve in order to reduce morbidity and mortality.

CASE REPORT

In February 2017, a 60-year-old female patient with a history of rheumatic fever during childhood, percutaneous mitral valvuloplasty performed in 1991, permanent atrial fibrillation, presenting with symptomatic mitral stenosis (MS) and tricuspid regurgitation (TR) was scheduled for elective mitral valve replacement and tricuspid valve repair.

The preoperative transthoracic echocardiogram showed severe MS, with a rheumatic characteristics; a thickened tricuspid valve with leaflet coaptation failure, causing severe TR; pulmonary artery systolic pressure of 45mmHg; preserved left ventricular systolic function; right ventricular systolic dysfunction, and left atrial enlargement. Preoperative coronary angiography did not reveal obstructive lesions (Figure 1).

The surgery was performed by median sternotomy, with cannulation of the ascending aorta and inferior and superior vena cava, extracorporeal circulation (EC), clamping of the ascending aorta, and cardioplegic solution infusion. The mitral valve showed rheumatic features, with severe stenosis due to fusion of commissures. The anterior and posterior leaflets were resected and a 29 mm mechanical prosthesis was implanted in addition to left atrial appendage closure. Tricuspid valve repair was attempted, but was unsuccessful. We then opted for the implantation of a 31 mm biological prosthesis. The intraoperative transesophageal echocardiogram showed a satisfactory surgical result.

EC and clamping time were 158 and 125 minutes, respectively. Junctional heart rhythm was observed at EC weaning, requiring use of epicardial pacemaker and vasoactive drugs. After the surgical procedure, the patient was transferred to the postoperative care unit, and the electrocardiogram showed a junctional rhythm with ST segment elevation in DII, DIII, aVF, V5, V6, V7 and V8 upon admission (Figure 2).

The patient was referred for tcoronay angiography, which revealed occlusion in the proximal segment of the LCx and we decided to perform a primary coronary angioplasty. The left main coronary artery was catheterized with a JL 3.5, 6F guiding catheter, and a 0.014" PT Floppy® guidewire (Boston Scientific, Marlborough, USA) was introduced beyond the occlusion. The stenosis was pre-dilated using 2.0×10 mm Pantera PRO® and 2.5×8 mm Pantera LEO® balloons (Biotronik, Berlin, Germany), under high pressures. A conventional 2.75×28 mm MultiLink stent (Abbott Vascular, Illinois, USA) was deployed in the proximal segment of LCx under 12 atmospheres. During the stent release, a waist in the balloon was evident at the site of the stricture. The procedure was completed with in-stent post-dilation with a non-compliant Pantera LEO® 3.0×12 mm balloon, under 26 atmospheres. A satisfactory angiographic result was achieved, with a residual lesion of 30% (Figure 3). The subsequent postoperative period went uneventful, with gradual weaning of vasoactive drugs and no episodes of angina or new electrocardiographic changes.

The 8-month follow-up showed a satisfactory surgical procedure result and absence of symptoms related to coronary artery injury.

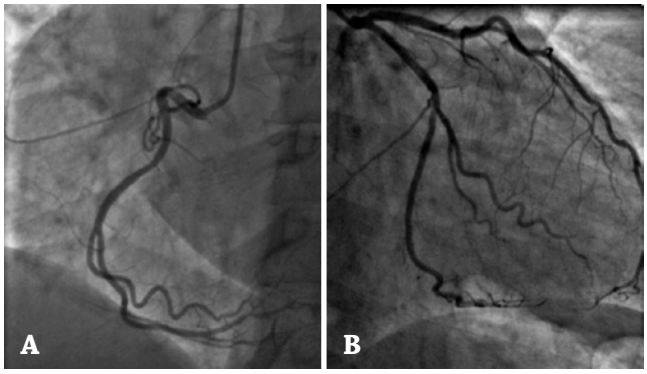

Figure 1. Preoperative coronary angiography. (A) Right coronary artery. (B) Left coronary artery.

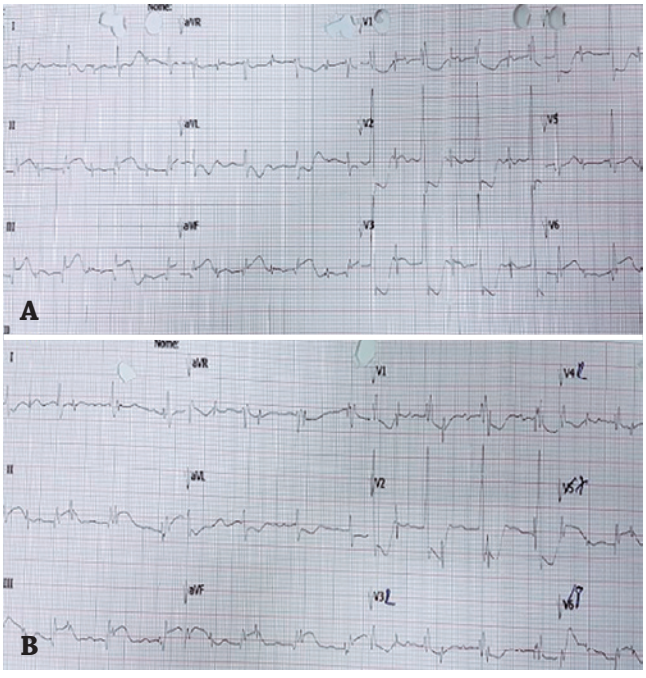

Figure 2. Immediate post-operative electrocardiogram.

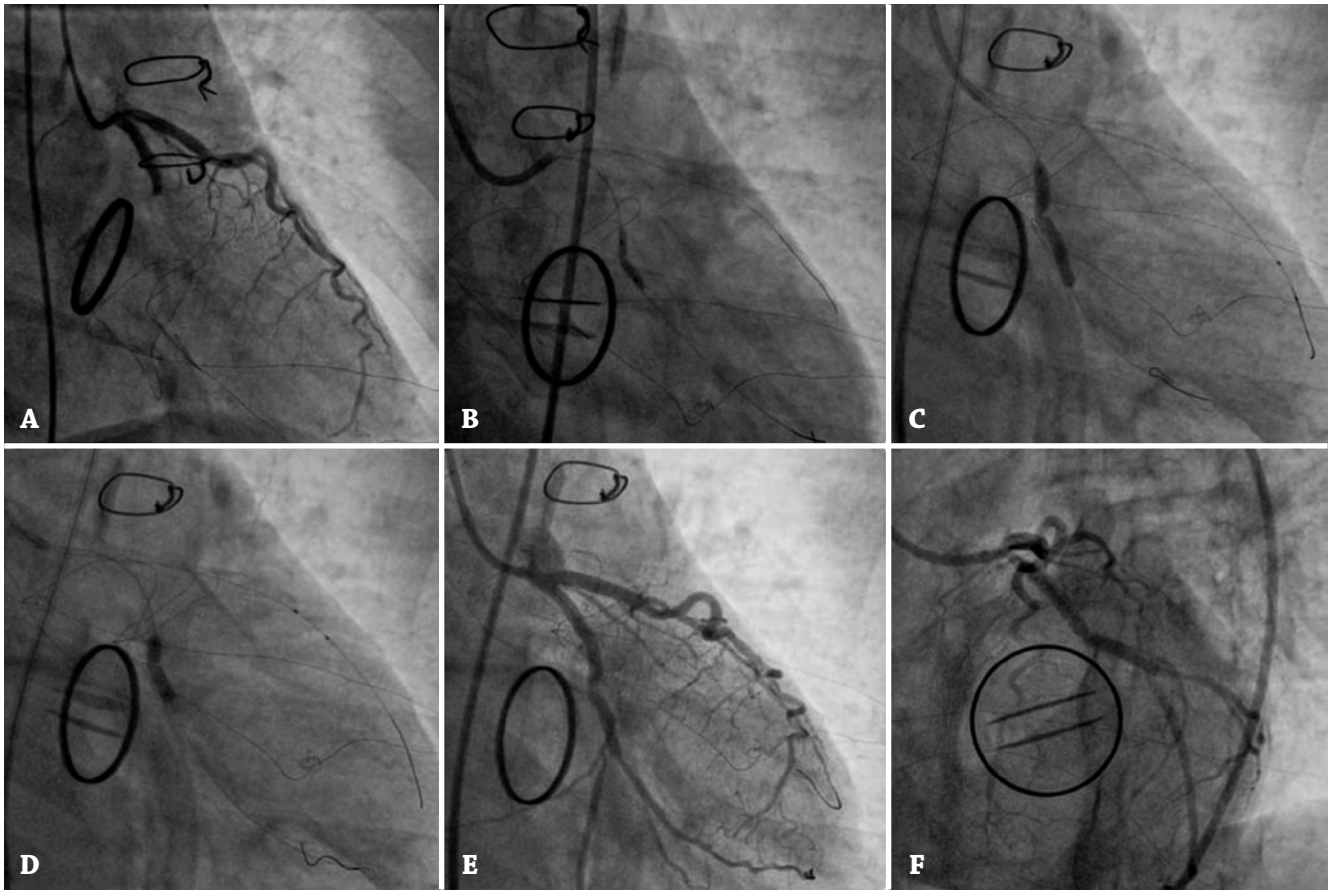

Figure 3. Immediate postoperative coronary angiography. (A) Occlusion of the left circumflex artery. (B) Pre-dilation of coronary stenosis with non-compliant balloon. (C) Bare-metal stent implanted, illustrating a waist in the balloon at the site of the stricture. (D) Post-dilatation of the stent using non-compliant balloon. (E and F) Angiographic views after the procedure.

DISCUSSION

The left circumflex artery runs through the left atrioventricular groove and is in close relation with the posterior portion of the mitral valve ring. LCx lesion associated with mitral valve replacement or annuloplasty is rare, and its incidence ranges from 0.5 to 1.8%.[2-4]

Anatomical studies have documented that the distance between the mitral annulus and the LCx can be only 1 mm. This very close distance between the structures has been described in the anterior commissure area, indicating that the proximal segment of the LCx is at a higher risk of iatrogenic injury during mitral valve surgery.[5,6]

The risk of LCx injury is higher when the artery anatomy shows left dominance or codominance.[5,7,8]

There are several mechanisms of coronary injury, such as artery entrapment due to suture involvement, arterial obliteration due to suture through the arterial lumen, coronary perforation, thrombosis due to endothelium laceration, vascular distortion caused by tissue retraction leading to dynamic or fixed occlusion, external compression by the annuloplasty ring, laceration of the artery resulting in localized hemorrhage or subintimal hematoma causing extrinsic compression of the LCx.[2,5,9]

The possibility of iatrogenic LCx injury should always be highly suspected, for it is essential to immediately indicate coronary angiography to detect the location of injury and to help determine the best therapeutic strategy.

CONCLUSION

Although uncommon, the iatrogenic lesion of the left circumflex artery should be considered as the etiology of acute coronary syndrome in the immediate postoperative period of mitral valve repair or replacement. Early recognition of this complication helps to determine the best treatment to restore coronary blood flow and to reduce morbidity and mortality of patients.

SOURCES OF FINANCING

None.

CONFLICTS OF INTEREST

The authors declare there are no conflicts of interest.

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