

# Percutaneous coronary intervention for iatrogenic occlusion of the circumflex artery following mitral valve replacement surgery

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Iatrogenic coronary artery occlusion is a rare and frequently overlooked but life-threatening complication of mitral valve surgery [1]. The incidence is reported to be 0.15% to 1.8% of all cardiac procedures [4].

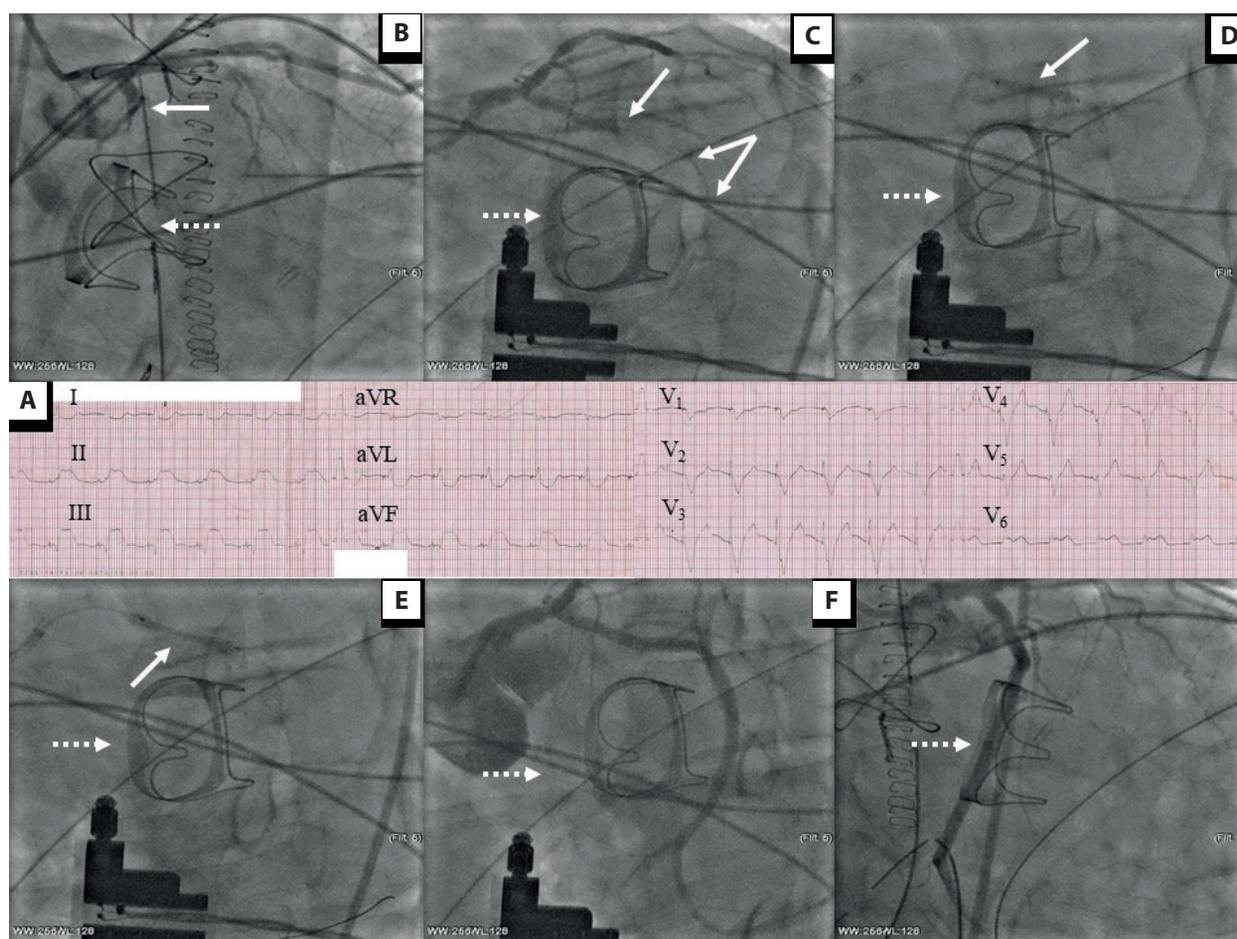
Although the possibility of such a complication has been known for a long time, an increasing number of cardiac surgeries makes the awareness of this complication lose its importance, which is confirmed by the current prevention and management algorithms published in 2021 [4]. There are still no uniform standards or guidelines for the treatment in such clinical situations. Even expert opinions are missing [5]. The risk of damage to the circumflex coronary artery (Cx) is caused by its proximity to the posterior segment of the mitral annulus [2]. The most common pathomechanism is direct damage to the circumflex artery through suture ligation, laceration, or annuloplasty device distortion during mitral valve repair [3].

We present a case of a 73-year-old male patient with severe mitral regurgitation, clinically known single-vessel ischemic heart disease, chronic New York Heart Association (NYHA) class III heart failure, and persistent atrial fibrillation (AF). He was admitted to the Department of Cardiac Surgery for surgical treatment. Transthoracic echocardiography (TTE) examination revealed mildly reduced left ventricular ejection fraction (LVEF, 48%), enlarged left atrium (LA, 5.6 cm), enlarged left ventricle (LV, 5.7 cm), and interventricular septum hypertrophy (IVSD, 1.3 cm). The patient underwent surgical implantation of a biological mitral valve prosthesis (Perimount-27,

Edwards-Lifesciences) combined with coronary artery bypass grafting (Left-Internal-Mammary-Artery to Left Anterior Descending-Artery, LIMA-LAD), and surgical ablation of the AF substrate in the left atrium.

Cardiac surgery was conducted under extremely challenging anatomical conditions, which may explain the occurrence of the complication. The procedure was performed via medial sternotomy and extracorporeal circulation. The heart was enlarged. There were poor anatomical conditions: a deeply located atrium with a corrugated wall. Due to chordal rupture and a restricted anterior-mitral-valve-leaflet in the mitral valve, plastic surgery was not performed. The subvalvular apparatus was left. The bioprosthetic valve was implanted with single mattress sutures.

After surgery, a 12-lead-electrocardiogram showed acute inferior myocardial infarction with ST-segment elevation (Figure 1A). In laboratory tests, a significant increase in cardiac troponin I was detected (18043.3 ng/l; n <46.47 ng/l). TTE revealed decreased left ventricular systolic function (EF, 43%), hypokinesia of the inferior wall, proper valve function with no paravalvular leak, mean gradient of 6 mmHg, and maximum gradient of 17 mm Hg. Urgent coronary angiography was performed, confirming iatrogenic closure of Cx (Figure 1B–D). Since the Cx closure was diagnosed after the end of cardiac surgery, according to the currently proposed algorithm, we decided to attempt percutaneous intervention [4]. At the same time, a successful percutaneous coronary intervention of Cx was performed after numerous attempts at



**Figure 1.** A. ECG: effective ventricular pacing with visible ST-T segment elevation on the inferior wall (leads II, III, and aVF) and lateral wall (lead V<sub>6</sub>) with ST-T and reciprocal mirror reflections on the anterior wall (leads I and aVL). ECG recorded at a paper speed of 25 mm/s and a voltage of 10 mm/mV. B. CA (RAO 26, CAU 24): occlusion in the proximal part (eleventh segment) of the CX (the arrow is pointing at the occlusion site) close to the mitral valve bioprosthesis (dashed arrow). C. PCI (LAO 26, CAU 18): occlusion in the proximal part (eleventh segment) of the CX (the arrow is pointing at the occlusion site) close to the mitral valve bioprosthesis (dashed arrow); the double solid arrows are pointing at the guidewire. D. PCI (LAO 32, CAU 18): angioplastic balloon inflation in the proximal part (eleventh segment) of the CX (solid arrow); the dashed arrow is pointing at the mitral valve bioprosthesis. E. PCI (LAO 32, CAU 18): the initial stage of stent expansion at the lesion site with visible modeling in the center of the balloon in the proximal part (eleventh segment) of the CX (solid arrow); the dashed arrow is pointing at the mitral valve bioprosthesis. F. (on the left) CA (LAO 36, CAU 13) and (on the right) — CA (RAO 8, CAU 31): good final angiographic result with TIMI 3 flow; the dashed arrow is pointing at the artificial valve

Abbreviations: CA, coronary angiography; CAU, caudal view; CX, circumflex branch of the left coronary artery; ECG, electrocardiogram; LAO, left anterior oblique view; PCI, percutaneous coronary intervention; RAO, right anterior oblique view; TIMI, Thrombolysis in Myocardial Infarction

predilatation with balloons of progressively larger sizes by slowly escalating the inflation pressures and carefully observing the modeling of the vessel on the balloon.

The gradation of the balloon sizes (Mini Trek, 2.0/15; Trek, 2.5/20, Abbott, Chicago, IL, US) was applied as an equivalent of intravascular ultrasound (IVUS) assessment, as it was not possible to perform it in the on-call situation. Another justification for this approach was an intention to carefully test for a potentially possible tear or cut on the Cx balloon caused by its stitching. Finally, after using the last balloon (NC, Solarice 3,0/20; Medtronic, Minneapolis, MI, US), due to the “recoil” of the vessel, a drug-eluting stent (DES, Xience 3.5/25, Abbott) was implanted with a very good angiographic effect (Figure 1E–F). The patient was discharged home 9 days after surgery in good condition.

## Article information

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