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## Case Report

# *An Uncommon Complication of an Aortic Valve Replacement*

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## ABSTRACT

Acute myocardial infarction after an isolated aortic valve replacement is uncommon. An iatrogenic coronary dissection during coronary cannulation should be kept in mind, and the diagnosis and management of this complication are challenging in such a setting. The patient under analgesia is usually free of symptoms, and the interpretation of troponin elevation during the postoperative period could be complex. We herein describe a male patient who showed a cardiogenic shock and an electrical storm a few hours after an isolated aortic valve surgical operation. Transthoracic and transesophageal echocardiographic examinations demonstrated a very low left ventricular systolic function, no sign of prosthesis dysfunction, and no sign of aortic dissection. Coronary angiography revealed an extensive coronary artery dissection. This dissection concerned the left main and the entire left anterior descending artery. A bailout stenting was performed successfully. We herewith discuss the technical aspects of the management of this case and explain the mechanism of this complication. ***(Iranian Heart Journal 2021; 22(2): 115-118)***

**KEYWORDS:** Iatrogenic coronary dissection, Aortic valve replacement, Angioplasty, Cardiogenic shock, Electrical storm

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Myocardial infarction after isolated aortic valve surgery is a rare, albeit life-threatening, complication. Diagnosis during the immediate postoperative period is difficult regarding the lack of pain in patients under analgesia and the possible rise of troponin in this setting. The management is challenging as few cases have thus far been reported in the literature. [1–3] We report here a severe case of iatrogenic left main dissection after aortic valve replacement. We also discuss the mechanism of dissection and the management of this serious complication.

## CASE PRESENTATION

A 58-year-old man, with no risk factors, underwent an aortic valve replacement. Preoperative echocardiography showed severe rheumatic aortic valve regurgitation with an enlarged left ventricle (LV) and moderate LV systolic dysfunction (left ventricular ejection fraction [LVEF]=50%). The native aortic valve was tricuspid and calcified, the annulus was calcified, and the ascending aorta was not enlarged. Preoperative coronary angiography was normal. The surgery was uneventful. Selective cardioplegia cannulation was performed with a 12-F cannula.

Cardiopulmonary bypass lasted for 45 minutes, and the duration of aortic cross-clamping was 32 minutes. Hemodynamic parameters were stable throughout the procedure. Weaning from the cardiopulmonary pump was performed with a low dose of dobutamine.

Two hours after the surgery, the patient developed ventricular fibrillation, which was reduced with external electrical shocks. Electrocardiography showed a new left bundle branch block. Echocardiography demonstrated good parameters of the mechanical aortic valve, severe left ventricular dysfunction (LVEF=20%), large anterior hypokinesis, and no pericardial effusion. Highly elevated cardiac enzymes (troponin I ≥20 times the upper normal limit) were detected. Transesophageal echocardiography revealed no signs of aortic dissection or prosthetic thrombosis.

Thirty minutes later, the patient developed an electrical storm with incessant ventricular tachycardia. The ventricular fibrillation was reduced by many external electrical shocks. Emergent coronary angiography was performed, and it revealed an extensive dissection in the left main and the proximal part of the left anterior descending (LAD) with the total occlusion of the mid LAD (Fig. 1). The circumflex artery was free from dissection. Consequently, angioplasty was performed on the left main and the proximal LAD with a drug-eluting stent. The initial plan was to use intravascular ultrasound to distinguish the true lumen. Nonetheless, when a Balance Middle Weight (BMW) Guide Wire was inserted, it went directly into the circumflex artery, which was a normal coronary artery. The team was confident at that moment that the true lumen had been crossed; accordingly, the wire was withdrawn slightly and then crossed the LAD without any difficulties. There was no need for additional imaging. The patient's hemodynamic parameters worsened, necessitating a rapid bailout stenting of the left main in the direction of the LAD. The result was satisfactory in that thrombolysis in myocardial infarction (TIMI) flow Grade III was achieved in the LAD (Fig. 2). At the end of the procedure, the systolic pressure of the patient improved, and the dose of catecholamine was reduced. The postprocedural course was favorable, and the patient was discharged home 8 days later. Four months later, the patient underwent echocardiography, which showed an LVEF of about 45% with anterior hypokinesis.

## DISCUSSION

Iatrogenic coronary dissection is an uncommon complication of valve aortic surgery. There are no data in the literature about the incidence of this event, and only a few cases have been reported so far. Selective cardioplegia is the main cause of this phenomenon. [4, 5] In patients with aortic valve regurgitation, the selective cannulation of the coronary arteries is necessary. For our patient, we used a 12-F cannula adapted to the size of the left main coronary artery. Moreover, there were no atheroma plaques in the ostial left main. Certainly, the surgeon should verify the ostium of the left main before selective cannulation. In the case of ostial atheroma, the surgeon should opt for retrograde cardioplegia via the coronary sinus.

In some cases, coronary dissection could be secondary to the extension of Type I aortic dissection during nonselective cannulation. In this setting, the phenomenon is recognized during surgery and corrected promptly. [2] The other mechanism of aortic dissection during valve surgery is the manipulation of the aorta as is the case in aortic perfusion, cardioplegia of the root,

and cross-clamping. These settings could cause intimal tears. [6] The rupture of a weakened aortic wall, especially in the context of aortic endocarditis complicated by an annular abscess, is another presumed mechanism. A few microorganisms have been reported to be associated with this condition, most commonly *Staphylococcus spp*, *Enterococcus spp*, *Streptococcus spp*, and *Salmonella spp*. [7]

The diagnosis of acute myocardial infarction in the postoperative period of cardiac surgery could be difficult because of a lack of pain during sedation and analgesia, as well as the possible rise of myocardial necrosis markers by surgical manipulation. When in doubt, we should not hesitate to perform coronary angiography or coronary tomography.

The evolution of this complication is fatal if it is not rapidly diagnosed and treated. [8] Extracorporeal membrane oxygen use is strongly indicated in the case of cardiogenic shock. Our patient was stable under a low dose of dobutamine before coronarography.

The percutaneous treatment of such a complication is challenging. The risk is to introduce the guide wire into the false lumen and to extend the coronary dissection. If we succeed in inserting the wire into a non-dissected coronary, it means that it has crossed the true lumen, which is what happened in our case. We initially planned to use intravascular ultrasound. Nevertheless, as the wire was introduced from the beginning into the circumflex artery, we were confident that it was in the true lumen. Otherwise, coronary imaging would have been useful to differentiate between the true lumen and the false lumen. [2] The management could be also surgical with the grafting of the dissected coronary. [4, 9]

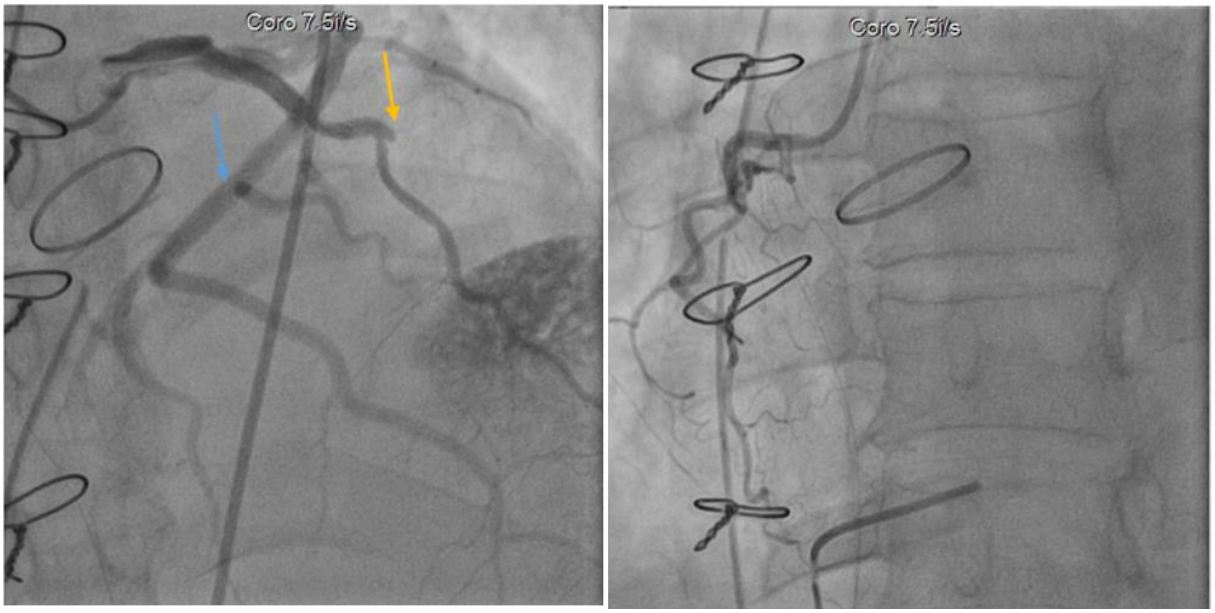


**Figure 1:** The image depicts an extensive dissection in the left main and occlusion in the mid-left anterior descending coronary artery (yellow arrow). The circumflex artery is normal (blue arrow), and the right coronary artery is normal and dominated.

**Figure 2:** The image shows the final result after the bailout stenting of the left main, obtaining thrombolysis in myocardial infarction (TIMI) flow Grade III in the distal portion of the left anterior descending coronary artery.

## CONCLUSIONS

Iatrogenic coronary dissection during aortic valve surgery is a dramatic complication. Diagnosis is difficult in the postoperative setting. Coronary angiography should be performed after the exclusion of the aortic dissection. Percutaneous coronary intervention could be efficient. The most important challenge is to introduce the wire into the true lumen; otherwise, surgery is the safest option provided that the patient is hemodynamically stable.

**Conflict of Interest:** None declared.

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