Case Report

Postoperative diffuse coronary spasm after two valve surgery – A rare phenomenon

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1. Introduction

Postoperative coronary artery spasm is a potentially life-threatening complication of cardiac surgery. Most published cases document this complication following coronary artery bypass surgery and its occurrence after valve replacement surgery is uncommon. We describe the case of a 63 year old male patient developing postoperative spasm of the entire coronary tree after aortic & mitral valve replacement, manifesting as significant electrocardiographic changes. Urgent coronary angiography was performed which revealed diffuse spasm of the entire coronary tree. It resolved completely with intracoronary injection of Nitroglycerine. The present case highlights the likelihood of postoperative coronary spasm even after valve replacement surgery, and not just coronary bypass surgery. It also illustrated the usefulness of coronary angiography for both diagnosis and treatment of this entity.

2. Case report

A 63-year-old male patient was admitted with complaints of dyspnea on exertion, orthopnea and palpitations of 2 years duration which had increased for last 6 months. Transthoracic echocardiography showed rheumatic heart disease, severe mitral regurgitation and severe aortic regurgitation. Preoperative coronary angiography revealed normal coronary arteries (Fig. 1). Double valve replacement surgery was done using 25-
mm SJM mechanical prosthesis (St. Jude Medical, St. Paul, MN, USA) for mitral valve through trans-septal approach (with posterior mitral leaflet preservation) and 21-mm SJM mechanical prosthesis for aortic valve. A routine cardiopulmonary bypass using aorto-bicaval cannulation was used. The myocardial protection strategy involved was mild systemic hypothermia (32°C) and direct ostial cardioplegia (in view of severe aortic regurgitation). The cardioplegia solution used was cold sanguineous cardioplegia (4:1 dilution) at around 6–7°C (Saint Thomas solution II) and was repeated every 15 min. First dose had 25 mEq/kg of potassium (K) and subsequent dose 15 mEq/kg of K.

The intraoperative course was uneventful and patient was shifted to Cardiac Intensive care unit with minimal inotropic support. After about 4 h, patient developed significant electrocardiogram (ECG) changes of ST segment elevation in inferior limb leads with reciprocal changes in anterior chest leads (Fig. 2). Nitroglycerine infusion and increase in inotropes didn’t help. Patient was maintaining stable hemodynamics on minimal inotropic support. A bedside echocardiogram revealed normally functioning prosthetic valves and hypokinesia of inferior wall of left ventricle (LV). Cardiac enzyme biomarkers test was not done due to significant ECG changes & correlating echo findings. In this emergent situation, it was decided to get an urgent coronary angiogram before patient developed hemodynamic instability. Patient was transferred to the catheterization lab and angiogram revealed severe spasm of the right coronary (RCA) and left anterior descending (LAD) arteries (Fig. 3). Intracoronary injection of Nitroglycerine (100 mics) resulted in immediate amelioration of the spasm (Fig. 4) and resolution of the electrocardiographic changes (Fig. 5). Diltiazem infusion was started. Patient was extubated next day morning and switched over to oral Diltiazem. Further postoperative course was uneventful.
Fig. 3 – Postoperative coronary angiogram showing severe spasm of RCA & LAD.

Fig. 4 – Coronary angiogram showing amelioration of the spasm after intracoronary NTG injection.

Fig. 5 – ECG showing resolution of the ischemic changes.
3. Discussion

The mechanism of early postoperative coronary spasm remains uncertain, but several factors have been suggested as the possible mechanism. These include sympathoadrenergic stimulation, respiratory alkalosis, cold, local trauma, release of vasoconstricting substances by platelets, high local concentration of potassium, and plasma vasopressin and histamine liberation due to allergic reactions to protamine and blood products. Another report suggests the importance of stabilizing hemodynamics as this leads to amelioration of the spasm.

The manifestations of spasm range from asymptomatic ST elevation to hypotension and circulatory collapse, related to arrhythmias or myocardial injury. It must be considered in the differential diagnosis of acute postoperative circulatory instability because rapid recognition and specific therapy may be lifesaving. In this case, emergency coronary angiography was performed considering the significant ECG changes & correlating echo findings and diffuse coronary artery spasm was evidenced.

The myocardial protection strategy used was mild systemic hypothermia (32°C) and direct ostial cold sanguineous cardioplegia (Saint Thomas solution II). We regularly use same blood cardioplegia in all our adult patients but we came across this situation in the present case.

Postoperative coronary artery spasm must be differentiated from coronary artery embolism. Air embolism into the coronary artery occurs to some extent in all patients after removal of the aortic cross clamp. Its appearance is usually temporary, easily diagnosed, and self-limiting. In exceptional cases, the embolus is particulate. This can occur in relation to aortic valve decalcification or left atrial thrombectomy.

We suggest that in case of sudden postoperative ECG changes in valvular patients; an intravenous infusion of nitrates should be initiated followed by an urgent echocardiography to confirm normal prosthetic function and to exclude aortic dissection. Instead of rushing the patient back to surgery, the evaluation should include postoperative angiography in case of hemodynamic failure or ventricular arrhythmias.

In conclusion, this case shows that postoperative coronary spasm should be considered as a cause of unexplained electrical or hemodynamic instability after any cardiac surgery and adequate measures should be promptly undertaken. The present case highlights the likelihood of postoperative coronary spasm even after valve replacement surgery, and not just coronary bypass surgery. It also illustrated the usefulness of coronary angiography for both diagnosis and treatment of this entity.

Conflicts of interest

All authors have none to declare.

References