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EMBOLIC CORONARY ARTERY OCCLUSION IN A PATIENT WITH MITRAL VALVE REPLACEMENT

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ABSTRACT

Embolic occlusion of a coronary artery subsequent to mitral valve replacement is a rare condition with undocumented incidence. Here we present a case of 55-year-old female, ex-smoker, with complain of sudden onset of severe dyspnea, left sided chest pain and signs of decreased cardiac output within eighteen months after MVR. The patient discontinued her anti-coagulants, as a result she developed sub therapeutic International normalized ratio of 1.45. The angiogram revealed triple vessel disease with complete occlusion of Left Main Coronary Artery. Due to the deterioration of general condition, hemodynamic instability and extensive occlusion of multiple coronary arteries, plan was made to operate the patient for coronary artery bypass grafting surgery. This case report highlights the importance of continuation of anti-coagulant therapy and management of multi-vessel lesion by coronary artery bypass grafting surgery.

Keywords: Embolic occlusion; Mitral valve replacement; Anti-coagulant therapy.

INTRODUCTION

Embolic Occlusion of a coronary artery subsequent to a Mitral Valve thrombosis is a rare condition with undocumented incidence, associated with significant morbidity and mortality. Replaced valves imply an increased chance of thrombi developing on the prosthesis, to prevent which oral anti-coagulant therapies are prescribed to patients who have undergone valvular replacement. While discontinuation of anti-coagulant therapy is considered the most common cause of embolic coronary artery occlusion, many other predisposing risk factors such as hypertension, diabetes and dyslipidemia may greatly contribute to the condition's development.[1] Nevertheless, in the event that it may occur, it can lead to ischemia of large areas of the myocardium resulting in widespread tissue necrosis and hence possible cardiac arrest.

Here, we report a case of a 55 year old female presenting to the hospital with an embolic coronary artery occlusion 18 months after undergoing valvular replacement surgery. The purpose of the report is to elaborate the importance of prevention and successful management of this lethal condition.

CASE REPORT

A 55 year old Asian female, ex-smoker, presented to our department in November 2016 complaining of sudden onset of severe dyspnea, left sided chest pain and signs of decreased cardiac output. The patient's past medical history was remarkable for diabetes mellitus type 2 and hypertension. The patient revealed that she had been experiencing aforementioned symptoms with increasing severity over the past month which exacerbated markedly on exertion. Past surgical history showed she had undergone a mitral valve replacement (Medtronic valve 29mm) 18 months ago due to severe valvular stenosis and regurgitation subsequent to rheumatic heart disease. Post-operatively, she was prescribed oral anti-coagulant (warfarin) therapy for life to maintain the therapeutic international normalized ratio set at 2.5.

Her vitals included a respiratory rate of 16 breaths/min with blood pressure measured at 70/40mmHg with a stable pulse rate of 79 beats/min. Electrocardiogram revealed normal sinus rhythm with ST elevation in leads V1-V4. Coronary angiograph showed an 80% blockage in Left Anterior Descending (LAD) artery both proximally and distally, 90% occlusion of Left circumflex (LCX) in the middle while the patient was non-dominant for Right Coronary artery (RCA). Echocardiograph was normal for left ventricular size and function while no valvular structural or functional abnormality was seen. Ejection fraction was 60%. Blood investigations revealed Hemoglobin of 8.8 g/dL, platelet count of 2.0×10^5 /L and total leukocyte count of 6.1x10x 9/L. Clotting profile showed an INR of 1.45 as she stopped warfarin from last 6 months. Serum urea and creatinine concentrations were 11 and 1.2 mg/dL respectively. Due to the deterioration of general condition, hemodynamic in-stability and multiple blockages of coronary arteries, plan was made to operate the patient for coronary artery bypass grafting surgery (CABG).

The surgical procedure was carried out by doing the redo midline sternotomy. After which Internal Mammary artery (IMA) and Great Saphenous vein (GSV) were harvested. Patient was heparinized and was put on cardiopulmonary bypass (CPB). Moreover, the aorta was clamped and blood cardioplegia was given. The grafting was performed with IMA for diagonal and GSV for LAD and Obtuse Marginal Artery (OMA). After de-aeration and clamping off, the patient was taken off from cardiopulmonary bypass. Protamine was given, cannulation was removed and an Intra-aortic Balloon Pump (IABP) was placed in right femoral artery which led to secured hemostasis. Finally, the sternum was closed with steel wire and wounds were also closed in layers. Aseptic dressing was applied and the patient was shifted to the Intensive Care Unit (ICU). The patient then followed adequate anticoagulation treatment with warfarin and the INR was maintained above 2.5. No episode of atrial fibrillation and other risk factors for thrombus formation were identified. Patient was also educated on compliance of anti-coagulant drugs.

The postoperative course was unremarkable and transthoracic echocardiograph (TTE) showed proper functioning of the prosthetic valve. Postoperative echo revealed normal function of mitral valve with a mean gradient of 2 mm Hg, pulmonary arterial systemic pressure reduced to 65 mm Hg from 90 mm Hg after surgery, no LA/LV clot or vegetation and normal LV function. Moreover, the patient had improved exercise tolerance, and was discharged on indefinite warfarin therapy after achieving an INR of 2.5. Follow up after every 6 weeks was recommended.

DISCUSSION

After being first reported by Virchow in 1856, coronary embolism has been brought to clinical attention, although infrequently.[2] Later, D E Ward stated in his review that a mere 6 patients (0.04%) out of 11900 had total left coronary artery occlusion highlighting the rarity of this condition.[3] The advent of valvular replacement surgeries has added to the list of sources and risk factors for coronary emboli in addition to bacterial endocarditis, rheumatic fever and cardiac arrhythmias.[4,5] Prompt diagnosis and treatment of this lethal condition is highly essential as it can lead to sudden cardiac death and myocardial infarction leading to cardiogenic shock.[6]

According to Virchow's triad, factors predisposing to thrombus formation can be divided into endothelial, haemodynamic and haemostatic factors.[7] Endothelial factors represent biocompatibility of the prosthesis and it's interaction with the suture zone. This factor was significant with our patient who had undergone a prosthetic valve replacement 18 months ago. Furthermore, a deranged haemodynamic status also promotes thrombosis as in our case where the patient presented with low blood pressure and low cardiac output. More over haemostatic factors involve the inadequacy of the anti-coagulation treatment. In our case, the patient is also in a hyper-coagulable state, signified by her INR of 1.45 which is highly sub-therapeutic and should have been ideally maintained at the set value of 2.5. Our patient was prescribed warfarin to be taken on a daily basis albeit the patient failed to show compliance, not having followed dosage guidelines for the past six months. Hence, her significantly sub-therapeutic INR subsequent to discontinuation of oral anti-coagulants became the main reason for development of thrombi which resulted in coronary artery occlusions. This signifies that failure to comply with anti-coagulant therapies is a major cause of thromboembolic event in patients with valve replacement procedures.

As mentioned in another case report, currently no official guide line exists for management of coronary embolism but

usual treatment options include thrombolysis by fibrinolytic agents, angioplasty of affected artery, thrombus extraction via an aspiration catheter and Coronary artery bypass grafts (CABG) for more severely affected patients.[4] Combined regimen of intracoronary urokinase along with intravenously delivered Abciximab have been reported to have resulted in full resolution of emboli in patients with valvular replacement, while complete restoration of coronary blood flow by just a thrombus extraction using an aspiration catheter is also documented.[4,9] CABG surgery is considered the treatment of choice when the left main coronary artery is occluded but its use is restricted by difficulty in visualization of the artery and suitability for application of a vascular graft. [10] Small vessel size of arteries occluded and presence of a small ductus arteriosus ruled out the use of angioplasty in our patient while multiple vessel occlusion warranted the choice of CABG surgery.

CONCLUSION

In summary, embolic occlusion of a coronary artery subsequent to MVR is a unique condition that can occur as a result of discontinuation of anti-coagulant therapy. Therefore patients must be educated to adhere to oral anti-coagulation therapy post operatively.

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