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Case Report

Iatrogenic Left Main Coronary Artery Stenosis Following Aortic and Mitral Valve Replacement: A Case Report

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Abstract

Iatrogenic coronary artery disease following prosthetic valve implantation is a rare complication. This may result from mechanical injury in the intraoperative period. Once the diagnosis of coronary ostial stenosis is established, the procedure of choice is coronary artery bypass surgery. We report a case of a young lady who underwent aortic and mitral valves replacement. Six months later she was then diagnosed with ostial left main stem coronary stenosis after presenting with non-ST elevation MI. The patient eventually underwent PTCA.

Keywords: iatrogenic; left main stenosis; Aortic and mitral valve replacement

Introduction

Surgical aortic valve replacement (AVR) remains the cornerstone of treatment for symptomatic critical aortic stenosis (AS). It is rewarding for most of the patients, but it can have several associated complications. Coronary ostial stenosis is a rare but potentially serious complication of AVR. We present a case of LMCA stenosis after aortic and mitral valve replacement; normal coronary arteries were documented by preoperative coronary angiogram.

Case Report

A 37-year-old female patient with past history of rheumatic heart disease involving mitral and the aortic valves underwent double valve replacement in view of severe aortic stenosis and severe mitral stenosis. The procedure was done using 1.8 Lof antegrade and retrograde blood cardioplegia. The mitral valve was replaced using 27 TTK CHITRA prosthesis and the aortic valve was replaced using 19 St. Jude's prosthesis (St. Jude Medical Company). Postoperative course and hospital stay was uneventful, and she was discharged home on aspirin, atorvastatin, metoprolol, and warfarin. Six months later she presented with sudden retrosternal chest pain radiating to back associated with sweating with a background history of ongoing effort angina for one month. Normal coronary arteries were documented by preoperative coronary angiogram six months back. Her cardiac enzymes were elevated, and ECG showed ST depression in lateral leads (Fig1).

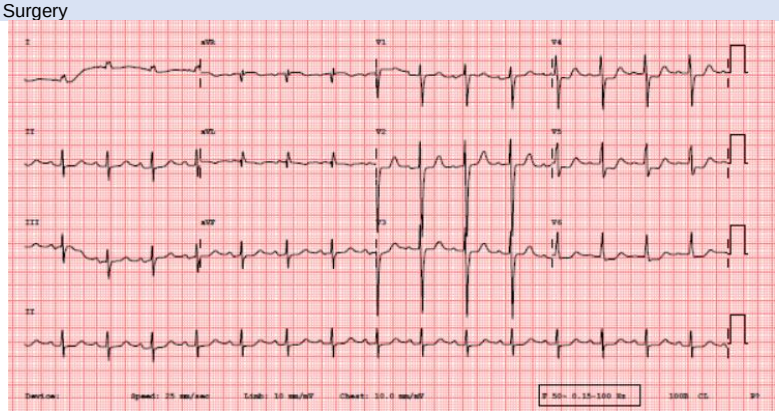

Figure 1: ECG showing ST depression in lateral leads.

She was diagnosed with non-ST elevation MI. She underwent Coronary angiogram which showed Ostium Left Main disease (discrete 50-60%lesion). (Fig 2)

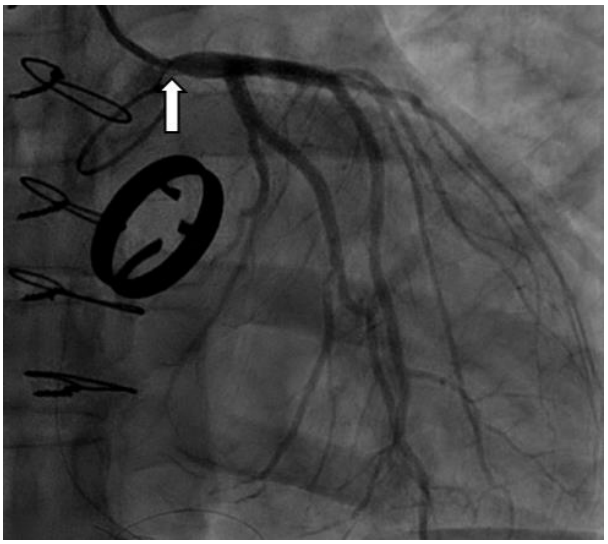

Figure 2: Coronary angiogram showing Ostium Left Main disease (white arrow)

IVUS assessment of Left Main showed calcific lesion spanning an arc of 45 degree at the ostial LMCA. FFR assessment of the Ostium Left Main lesion was done with IV adenosine at 140 mcg/min. Baseline FFR was 0.83, Adenosine FFR was 0.64. On FFR pull back, the FFR value increased to 1.0 indicating that the ostial lesion was significant, hence it was decided to stent the ostium LM lesion. She underwent PTCA to Ostium Left Main with good result. The patient recovered very well and was asymptomatic at six months follow up.

Discussion

Coronary ostial stenosis is a rare but potentially serious complication of AVR. It was first described by Roberts and Morrow in 1967. It is estimated to occur in about 1–5% of all AVR procedures.[1] Coronary ostial stenosis after AVR occurs most commonly in the LMCA, but it can affect RCA as well. [2,3] Exact pathophysiologic mechanism of coronary ostial stenosis is yet to be determined. Few of the proposed mechanisms are as follows. One theory proposes the possibility of microinjuries, and local hyperplastic reaction related to the infusion pressure of the cardioplegic fluid and overdilation of the vessel by the tip of the cardioplegic catheters. [4,5] Another hypothesis is that the stenosis may be an immunologic reaction to the heterograft.[6] Another theory is that turbulent flow around prosthetic valves can provoke intimal thickening and fibrous proliferation near the aortic root, which can be a mechanism of coronary ostial stenosis.[7-9] The use of balloon tip perfusion catheter provides the initial insult with local vessel wall hypoxia through compression of vasa vasora in the conjunction with a relatively high perfusion pressure. But the appearance of ostial narrowing in the right coronary artery argues against perfusion as the only etiologic factor. Intimal-medial separation related to direct trauma from manipulation with subsequent hyperplasia should also be considered.[10]

The usual clinical manifestation includes severe angina, ventricular arrhythmias, congestive heart failure and sudden death. Sometimes patient can experience atypical symptoms non-exertional chest pains with palpitations and that can delay the diagnosis. It normally appears within the first six months but may occur up to thirty months after the procedure.[5]

Any patient whose aortic valve has been replaced and if he develops angina pectoris a few months after operation stenosis of the proximal coronary artery should be suspected. Coronary angiography should be performed immediately. Once the lesion is recognized, emergent reperfusion strategies are essential because these lesions are life threatening owing to their proximal location and rapid evolution. It is important to recognize that valve prosthesis may obscure the ostium of

either coronary artery and coronary angiographic multiple injections in various positions may be required to demonstrate the lesion.

The complication can be avoided by not instrumenting the coronary ostia for direct antegrade cardioplegia but using retrograde delivery as an alternative method of myocardial protection.[11] In the same paper they suggested that there might be a genetic predisposition for developing such lesion, as 70% of the affected population in their series had an epsilon 4 allele apolipoprotein E genotype compared to 10-15% in control group.

Given the proximity of the prospective graft sites to the region of the previous operation and the difficulty of protecting the myocardium adequately, CABG is not always safe: it can result in perioperative infarction, a high operative mortality rate, or a poor long-term outcome.[12] Among the case reports describing use of PCI for ICOS [13,14], several have reported good mid- and long-term outcomes. Percutaneous transluminal coronary angioplasty in iatrogenic left main coronary artery stenosis can be considered as alternative of coronary artery bypass surgery. However, it should be only considered in patients who would otherwise be deemed inoperable, refused reoperation, and are willing to take the risk involved.

Further clinical studies of the long-term outcomes in more patients will be required to evaluate the role of PCI for ICOS in the future.

Conclusion

Though rare, coronary ostial stenosis after AVR should be suspected in patients presenting with new angina symptoms. Mostly, such cases have been reported to occur within 1–6 months after AVR, but it can manifest even later. It can be lethal due to potential complications of acute coronary syndrome, left ventricular heart failure, or ventricular arrhythmias. Immediate reperfusion strategies are crucial in management. CABG is the typical treatment, however PCI is an alternative approach, because several patients (including ours) have experienced very good immediate and short-term results. Further clinical studies are needed to evaluate the role of PCI with drug eluting stents for the treatment of coronary ostial stenosis after AVR.

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