



Case Report

IATROGENIC LEFT MAIN CORONARY ARTERY STENOSIS AFTER AORTIC VALVE REPLACEMENT: A CASE REPORT

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SUMMARY:

Iatrogenic left main coronary artery stenosis after aortic valve replacement is an infrequent but potentially life-threatening complication.

A 50-years-old woman who had normal coronary arteries documented by preoperative coronary angiogram, developed severe stenosis of the left coronary artery three months after the operation. The diagnosis was confirmed by coronary angiography and she underwent left main angioplasty.

Keywords: Iatrogenic left main coronary artery stenosis; Aortic valve replacement

INTRODUCTION

Iatrogenic left main coronary artery (LMCA) stenosis after aortic valve replacement (AVR) is an infrequent but life-threatening complication because of coronary perfusion related trauma to the vessel wall with cannulation of the coronary Ostia.^{1,2} It was first described by Roberts and Morrow³ in 1967.

We present a case of severe LMCA stenosis after aortic valve plus mitral valve replacement. Coronary arteries were normal documented by preoperative coronary angiogram.

CASE REPORT

A 50-years-old woman with a history of aortic valve plus mitral valve replacement in May 2014 was admitted with acute coronary syndrome (ACS) on 29-08-2014. Preoperatively she had tight mitral stenosis, tight aortic stenosis and moderate AR. She had normal left ventricular ejection fraction. Preoperative coronary angiogram was normal (done on 22-05-2014). She had undergone operation with ante grade delivery of cold blood cardioplegia and direct cannulation of both coronary ostia. The patient had complete recovery. She was discharged on oral anticoagulant therapy. Three months later she presented with ACS and her left ventricular ejection fraction dropped down to 30-35% how-

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ever both valves were functioning normally. Her repeat coronary angiogram was performed on 02-09-2014 and showed severe ostial stenosis of the left main coronary artery.

The patient underwent left main angioplasty with Everolimus eluting stent on 06-09-15 and after stenting, her left ventricular ejection fraction returned to normal.

DISCUSSION

Iatrogenic coronary ostial stenosis (ICOS) after aortic valve replacement is a potentially life threatening complication owing to its proximal location and rapid evolution. Prompt diagnosis and treatment are essential for the patient's survival.

The usual clinical picture includes severe angina, ventricular arrhythmias, congestive heart failure and sudden death. It usually appears within the first six months⁴. The incidence of this complication has been estimated to be less than 3%³, but the real incidence is not known, considering that cases of undiagnosed sudden death following aortic valve replacement could be attributed to iatrogenic main coronary stenosis. In a published retrospective study, dating from 1987 to present⁵, seven cases of iatrogenic left main coronary stenosis were observed at the Montreal Heart Institute, after 2158 AVR, representing 0.3% of all the cases. The interval between AVR and symptoms ranged from 4 to 11 months (mean: 7.3). It is believed that the occurrence of ostial stenosis is the result of a strong hyperplastic reaction of the vessel wall, in response to micro-injuries from the catheters used for cardioplegia administration. The micro-injuries are related to the infusion pressure of the cardioplegia fluid and over dilation of the vessel by the catheter tip⁵. Recently, Funada et al⁶ concluded by using virtual histology that iatrogenic coronary ostial stenosis following AVR may be caused by fibrous tissue formation, and therefore be distinct from conventional atherosclerosis. The safest technique for morphological and functional preservation of the coronary artery endothelial and muscular layers remains to be established, but the smallest soft catheters inserted gently with intermit-

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tent administration of cardioplegia at low pressure (100 mmHg) should be the preferred choice, if antegrade cardioplegia is necessary. However, left main ostial stenosis has been described after aortic valve replacement, without selective administration of cardioplegia via the coronary ostia, as the result of extension of fibrosis from the aortic annulus. It seems likely that certain individuals may have a predisposition to a strong hyperplastic reaction following injuries.

Although the problem of left main ostial stenosis after aortic valve replacement was described in the 60s and 70s, it remains a problem even today, in spite of the developments in the manufacture of catheters for selective cardioplegia solution infusion and in techniques for myocardial preservation. Cardioplegia administration by other means, such as via the coronary sinus, reduces the need for manipulation of the coronary ostia and could perhaps provide a solution ^{7,8}.

In view of the location of the new stenosis in the left main coronary artery, the rapid progression of the hyperplastic lumen encroachment during the first months following surgery and the existence of hypertrophic myocardium with increased oxygen demand, treatment of this entity requires immediate reperfusion.

This case shows that LMCA stenosis following ostial cannulation at the time of AVR is a rare yet morbid complication. Reoperation for this condition is fraught with a high operative morbidity rate.

Balloon angioplasty, without stenting, has been reported in three patients with left main coronary artery stenosis following aortic valve replacement. All had a good outcome ⁹. At long term follow up (4, 6, 11 years, respectively) no clinical or angiographic signs of restenosis were seen. Despite

those good results the authors recommended that PCI only be considered in patients who would otherwise be deemed inoperable, or who refused re-operation but were willing to undergo PCI. In recent years PCI has been used more frequently as revascularization therapy for unprotected left main coronary artery stenosis. Although long-term follow-up may sometimes reveal angiographic restenosis, the need for repeat revascularization, or even cardiac death, in selected patients with normal LV function and large reference vessel diameter the long-term prognosis has been reported to be favorable. In such carefully selected cases coronary stenting of unprotected LMT stenosis is a safe and effective alternative to bypass surgery. In addition, SES implantation for unprotected LMT stenosis may be even more effective in preventing restenosis because of the stent's immunosuppressive effects ¹⁰. Among the case reports describing use of PCI for ICOS ^{10, 11, 12} several studies have reported good mid- and long-term outcomes. 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. Our patient was an ideal candidate for the PCI.

CONCLUSION:

Iatrogenic left main coronary ostial stenosis following aortic valve replacement should be avoided by limiting the manipulation of the ostia of coronary vessels as much as possible during the surgical procedure. This complication should be

diagnosed and treated immediately, with either aortocoronary bypass or angioplasty. In view of the high incidence of complications associated with aortocoronary bypass under extracorporeal circulation with an arrested heart, beating heart surgery or angioplasty with stenting should be considered as possible alternatives.

REFERENCES

- 1- Sethi GK, Scott SM, Takaro T. Iatrogenic coronary artery stenosis following aortic valve replacement. *J Thorac Cardiovasc Surg* 1979; 77:760-767.
- 2- Winkelmann BR, Ihnken K, Beyersdorf F, Eckel L, Skupin M, März W, Herrmann G, Spies H, Schröder R, Sievert H. Left main coronary artery stenosis after aortic valve replacement: genetic disposition for accelerated arteriosclerosis after injury of the intact human coronary artery? *Coron Artery Dis* 1993; 4: 659-667.
- 3- Roberts WC, Morrow HG. Late postoperative pathological findings after cardiac valve replacement. *Circulation*. 1967 Apr;35(4 Suppl):148-62
- 4- Midell AI, De Boer A, Bermudez G: Post perfusion coronary Ostial stenosis: incidence and significance. *J Thorac Cardiovasc Surg* 1976; 72: 80-85.
- 5- Chavanon O, Carrier M, Cartier R, Hébert Y, Pellerin M, Perrault LP. Early reoperation for iatrogenic left main stenosis after aortic valve replacement: a perilous situation. *Cardiovasc Surg* 2002;10:256-263.
6. Funada A, Mizuno S, Ohsato K, Murakami T, Moriuchi I, Misawa K, Kokado H, Shimada Y, Ishida K, Ohashi H. Three Cases of Iatrogenic Coronary Ostial Stenosis After Aortic Valve Replacement. *Circ J* 2006; 70: 1312-1317
- 7- Lemole G, Beesam C, McNicholas K, Serra AJ, Shapira N: New technique for infusion of cardioplegic solution in aortic valve incompetence. *J Cardiovasc Surg (Torino)* 1991; 32:555-556.
- 8- Menasché P, Kural S, Fauchet M, Lavergne A, Commin P, Bercot M, Touchot B, Georgiopoulos G, Piwnica A.: Retrograde coronary sinus perfusion: a safe alternative for ensuring cardioplegic delivery in aortic valve surgery. *Ann Thorac Surg* 1982; 34(6): 647-658.
9. Marti V, Auge JM, Garcia PJ, Guiteras P, Ballester M, Obrador D. Percutaneous transluminal coronary angioplasty as alternative treatment to coronary artery bypass surgery in iatrogenic stenosis of the left main coronary artery. *J Interv Cardiol* 1995; 8: 229-231.
10. Placci A, Balducelli M, Casanova R, Maresta A. Percutaneous treatment of the left main coronary artery ostial obstruction following aortic valve replacement. *Ital Heart J* 2005; 6: 775- 777.
11. Balbi M, Olivotti L, Scarano F, Bertero G, Passerone G, Brunelli C, Barsotti A.. Percutaneous treatment of left main coronary stenosis as a late complication of Bentall operation for acute aortic dissection. *Catheter Cardiovasc Interv*. 2004 Jul;62(3):343-5.
12. Park SJ, Kim YH, Lee BK, Lee SW, Lee CW, Hong MK, Kim JJ, Mintz GS, Park SW. Sirolimus-eluting stent implantation for unprotected left main coronary artery stenosis: Comparison with bare metal stent implantation. *J Am Coll Cardiol* 2005; 45: 351 - 356.