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CASE REPORT

Left Main Coronary Artery Stenosis following Bentall Procedure: A case report.

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Abstract

Since its introduction, Bentall procedure has remained the standard of care for management of ascending aortic aneurysms with associated aortic valve pathologies. It involves replacement of aortic root, ascending aorta and the aortic valve, using a hybrid vascular graft with built in valves. The openings of the main coronary arteries are then rejoined with the graft. The procedure has satisfactory long term survival rate. However, there are some complications including graft infection, stroke from dislodged plaques and coronary insufficiency due to kinking of the reconnected main coronary arteries.

Here, we report a rare and life-threatening complication following Bentall procedure. A 76-year-old female developed left main stenosis following Bentall procedure, successfully treated with percutaneous coronary intervention (PCI). We discuss various etiologies and treatment options for this complication. We recommend routine surveillance with coronary angiography at six months post Bentall.

Keywords

Ostial Left Main Stenosis, Bentall Procedure, Aortic Valve, Valve Replacement, Complication.

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Introduction

The incidence of thoracic aortic aneurysms has increased over the past 2 decades. This is attributable to aging population, increase in smoking and better screening[1]. Most thoracic aortic aneurysms are asymptomatic, and diagnosis is often incidental.

Current guidelines state that elective surgery for aortic aneurysms can be performed if the size of the aneurysm is >5.5 cm. Surgical repair is also advisable if there is symptomatic aortic regurgitation that is attributable to the aneurysm. Since its introduction, Bentall procedure has remained the gold standard for the surgical repair of ascending aorta and aortic valve pathologies, with good overall patient outcomes[1].

None the less, there are some complications associated such as graft infection, strokes due to embolization of atheromatous plaques and coronary insufficiency secondary to bending of the implanted coronary ostia. Here, we present a case of a 76-years-old lady who underwent Bentall procedure, and one year later developed anginal symptoms, that were later discovered to be secondary to an ostial lesion of left main coronary artery. The lesion was then corrected with a drug eluting stent (DES). Thus, possibility of such a lesion should be kept in mind among patients who have undergone Bentall procedure.

Case Presentation

History:

A 76-year-old woman with documented pre-operative normal coronary arteries underwent Aortic Valve Replacement (AVR) Bentall procedure for aortic regurgitation (stented composite graft Saint Jude Epic Supra 23mm inside a 28mm Valsalva graft) (Figure 1).

One year prior to the procedure, she presented to the clinic for evaluation of moderate mitral regurgitation and moderate aortic stenosis with mild to moderate aortic regurgitation. With the consultation of a cardiothoracic surgeon, it was decided in February 2020 to proceed with Mitral and Aortic Valves replacement, and possible tricuspid valve repair. While planning the surgery, it was also noted that her aortic root measured 40 mm and it was decided to undertake the Bentall procedure to address both the aortic root dilation and aortic valve pathology. After the procedure, she had a complicated 21 days stay in the hospital due to acute kidney failure and also received a pacemaker in March 2020 for complete heart block.

One year later, she presented with exertional shortness of breath and jaw pain that radiated to her left arm and neck. The clinical presentation was suggestive of classical angina; therefore, a nuclear stress test was performed which revealed abnormal perfusion, with a moderate sized, partially reversible lateral defect. Subsequently, a coronary angiography was performed, which showed a 99% ostial stenosis of left main coronary artery (Figure 2).

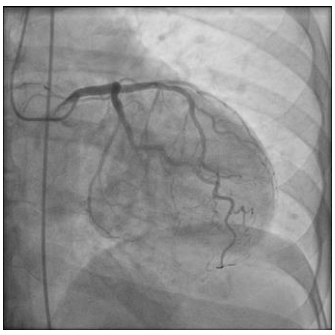

Figure 1: Normal coronary vessels prior to AVR Bentall Procedure (12/2019)

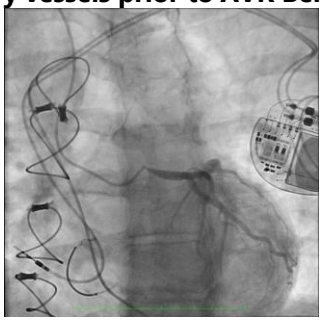

Figure 2: Left main stenosis- generic 99% ostial lesion in left main (06/2021)

Management & Results

Following coronary angiography, the patient was admitted to the hospital. After consultation with the surgical team, it was decided to proceed with PCI of the left main. The next day, the patient underwent successful PCI of the left main with a 4.0 x 8 mm Onyx DES (Figure 3, 4). The patient's post-operative stay was uneventful and was discharged the following day. Following PCI of the left main, the patient had a notable improvement in symptoms. The patient followed-up a year later with no new symptoms or complications and coronary angiography showed a widely patent left main stent. (Figure 4).

Figure 3: Ostial LM was ballooned with a 3.0 Angiosculpt and a 4x8mm Onyx DES was placed. (06/2021)

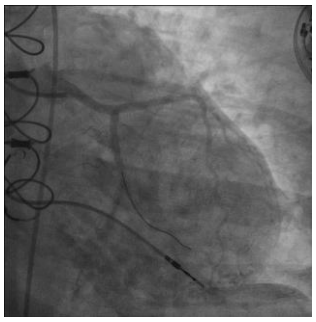

Figure 4: Patent Left main on one year follow-up with a 4x8mm Onyx DES present. (03/2022)

Discussion

The Bentall procedure is usually employed for aortic aneurysms or dissection with concurrent involvement of the aortic valve, which is very commonly associated with Marfan syndrome[2,3]. This procedure has transformed surgical management of aortic valve and root disease and is considered the gold standard treatment for patients requiring aortic root replacement with excellent long-term results[1,4,5]. The Bentall procedure consists of applying a graft between the aorta and the left ventricular outflow tract, thus replacing the aortic valve with the valve built in the graft. Following the procedure, the coronary ostia are reimplanted or reconstructed, which is one of the key challenges of the procedure[5]. Over time, the need for reoperation has decreased thanks to modifications[3]. However, despite these developments, several possible complications, including coronary dissection, thromboembolism, major bleeding, infection, and ostial coronary stenosis remain a concern[3, 6-8]. The complications after the Bentall procedure such as coronary ostial stenosis are hypothesized to be due to suture techniques, Gelatin-resorcin-formaldehyde-glutaraldehyde (GRF) glue, and instrumentation during the procedure[6].

Coronary artery disease and angina should not be excluded in a patient who has normal coronary arteries on angiography a year before the Bentall procedure. Clinicians should remain vigilant of this rare complication of the Bentall procedure. Boccolani et al. discuss two cases similar to ours. The first in which a 70-year-old with no previous history of coronary artery disease developed STEMI due to mid-LAD occlusion one month after the procedure, the other in which the patient was found to be having left main stenosis at the five-month follow-up after the Bentall procedure.[9] While GRF glue is a common cause of stenosis, interestingly, our case did not use GRF glue, but employed sutures instead. Possible causes apart from inflammatory reactions may include suture methods and instrumentation. Anastasius et al. discuss a case similar to ours where such a complication was encountered even though they had used sutures to secure the anastomosis.[6] The treatment options in patients with coronary artery stenosis post-Bentall procedure include Coronary Artery Bypass Graft (CABG) and PCI intervention. Although CABG is the preferred treatment of choice, our patient had a high operative risk score hence revascularization was performed via high-risk PCI. A similar approach was used by Komatsu et al. which resulted in a successful PCI with no restenosis for up to one year[10].

Conclusion

This case highlights the importance of remaining watchful of this rare and potentially fatal complication of the Bentall procedure even in patients who may not have traditional coronary artery disease risk factors. While CABG has been the treatment option for these patients, left main stenting is also a viable option with less morbidity and good long-term results. We recommend remaining vigilant for this potentially life-threatening complication and having a lower threshold for proceeding to coronary angiography, in the appropriate setting.

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