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CASE REPORT

Percutaneous coronary intervention of a saphenous vein graft ostial stenosis in a patient with Bentall procedure

Mohammed Mukhaini, Prashanth Panduranga *

Department of Cardiology, Royal Hospital, Muscat, Oman

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KEYWORDS

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Abstract Composite graft replacement of the aortic root and coronary reimplantation with or without coronary artery bypass surgery is the standard treatment for a variety of aortic root pathologies. Previously, percutaneous coronary intervention of either reimplanted coronary arteries or left/right coronary artery through cabrol graft has been described in post-Bentall patients. We describe percutaneous coronary intervention of a saphenous vein graft ostial stenosis in a patient with previous Bentall procedure and a vein graft to right coronary artery, which was complex and challenging.

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1. Case report

A 59-year-old male hypertensive presented with three months history of exertional angina class II. He had undergone a Bentall procedure in 2001 in UK for aortic aneurysm and severe aortic regurgitation. His coronary angiogram at that time had revealed normal left system but significant right coronary artery (RCA) disease. The right and left main coronary ostia were then reimplanted onto the sides of aortic tube graft and he had

a saphenous vein graft (SVG) to distal RCA with proximal implantation in the composite graft. His clinical examination was normal with well heard prosthetic clicks. His electrocardiogram showed left ventricular hypertrophy with no ischemic changes and an echocardiogram done revealed normally functioning single disc mechanical prosthetic valve with no leaks, mild concentric left ventricular hypertrophy, no resting regional wall motion abnormalities, and an estimated ejection fraction of 60%. He underwent stress myocardial perfusion scan which revealed reversible perfusion defects in mid inferior and mid infero-lateral segments. His medications included aspirin, isosorbide dinitrate, atenolol, amlodipine and warfarin. He was given loading dose of clopidogrel 300 mg and underwent percutaneous coronary intervention (PCI).

A standard Judkins right (JR) diagnostic catheter managed to cannulate the right coronary, which showed multiple tight 90% lesions in proximal and mid RCA. The left system was cannulated with Judkins left diagnostic catheter and was normal. It was not able to cannulate the SVG graft with diagnostic JR4, multipurpose (MPA), Amplatz right or right coronary bypass (RCB) catheters. An ascending aortogram done

* Corresponding author. Address: Department of Cardiology, Royal Hospital, P.O. Box 1331, Muscat-111, Oman. Tel.: +968 92603746; fax: +968 24599841.

E-mail address: prashanthp_69@yahoo.co.in (P. Panduranga).

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showed tight 95% ostial stenosis of SVG to RCA with no significant disease distally. During intervention various guide catheters were used unsuccessfully to cannulate SVG including JR, RCB, MPA, Amplatz right/left, and MRESS radial catheters. Once again, a 6F RCB guiding catheter was tried and successfully engaged the SVG graft and the angiogram confirmed tight focal nonthrombotic ostial lesion (Fig. 1A).

The ostial stenosis was crossed with a 0.014 inch PT Graphix Standard wire (Boston Scientific Corp.) after repeated attempts, and was passed into the distal RCA. As the restenosis rate is high in older venous grafts as well as in those involving aortic origin, and as it would be difficult to cannulate and cross SVG if repeat procedure is needed in future, it was decided to deploy a drug-eluting stent (DES) after discussing with the patient. The lesion was pre-dilated with 1.5×15 mm then 2.5×15 mm balloons (Fig. 1B) followed by ostial deployment of 3.0×12 mm Taxus® (Boston Scientific Corp.) at 14 atmospheres (Fig. 2A). This was followed by post dilatation using 3×10 mm noncompliant balloon with ostial flaring. An optimal angiographic result was obtained with 0% stenosis and TIMI 3 flow distally (Fig. 2B). The patient tolerated the procedure well and was discharged on dual antiplatelets along with his other medications. Patient is doing well at one year follow-up.

2. Discussion

Since the original description of the Bentall–DeBono procedure in 1968 (Bentall and De Bono, 1968), composite graft replacement of the aortic root with coronary reimplantation has become the standard treatment for a variety of aortic root pathologies. Coronary artery bypass surgery (CABG) using arterial or venous grafts is done in Bentall patients with either significant coronary artery disease or if coronaries are involved in dissection. Previously, PCI of either reimplanted coronary arteries (Worthley et al., 2005) or left/right coronary artery through cabrol graft (Hussain et al., 2006) have been described in patients with prior Bentall procedure. Given the few number of patients who have undergone Bentall and coronary bypass graft surgery with venous conduits and the well-documented continuous rate of attrition in these grafts, treating post-Ben-

tall patients with saphenous vein graft stenosis is complex and challenging.

Anastomotic complications of the coronary ostia after successful Bentall-type surgery for aortic root replacement have been reported, with an estimated incidence of 5–6% (Milano et al., 2003). In a study by (Sako et al., 2003) 33 venous bypass grafts were analyzed in 24 survivors of Bentall procedure. There was one early SVG occlusion of 16 anastomosed to the left anterior descending artery (LAD). All 14 venous grafts anastomosed to the RCA and 3 to the left circumflex artery were patent. Spiral computed tomography performed for long-term follow-up revealed occlusion of two vein grafts (3.5 years and 9.7 years) anastomosed to the LAD. They concluded that the patency rate of vein grafts anastomosed from prosthetic grafts of the ascending aorta to the native coronary arteries was similar to that of conventional CABG using SVGs.

Our patient developed ostial SVG stenosis 8 years after aortic procedure and was treated successfully with percutaneous intervention. For venous graft stenosis the underlying pathophysiology is complex, with degenerated atheromatous lesions and often superimposed thrombus. Stenosis results from intimal hyperplasia, atherosclerotic plaque build-up, and graft remodeling similar to that observed in native coronary arteries. With the introduction of bare metal stents (BMS), PCI has become a standard strategy for treatment of SVG failure. However, use of BMS is associated with restenosis rates as high as 50% at 6 months (De Jaegere et al., 1996). With the introduction of DES, it has been used “off-label” for the treatment of SVG disease. The RRISC (Reduction of Restenosis in Saphenous vein grafts with Cypher SES) trial (Vermeersch et al., 2006) and the study by (Ge et al., 2005) showed significant benefit of DES compared to BMS at 6 months of follow-up for treatment of SVG disease. Recently, there has been much controversy about the long-term safety of DES in SVG disease. The publication of the secondary post hoc analysis results from delayed RRISC trial (Vermeersch et al., 2007) showed that over a follow-up of 32 months, use of BMS was associated with lower long-term mortality than the use of DES in SVG disease. Another study by Bansal et al. over a mean follow-up of 33 months showed no difference in the long-term outcomes of PCI on SVG irrespective of the type of stent used (Bansal et al., 2008).

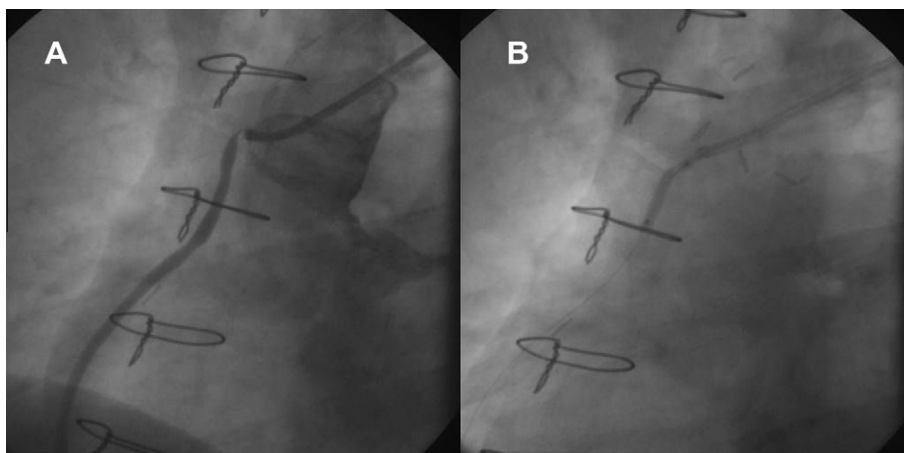


Figure 1 (A) Saphenous vein graft injection in left anterior oblique projection showing tight ostial stenosis in a patient with previous Bentall procedure. (B) Predilatation of ostial vein graft stenosis.

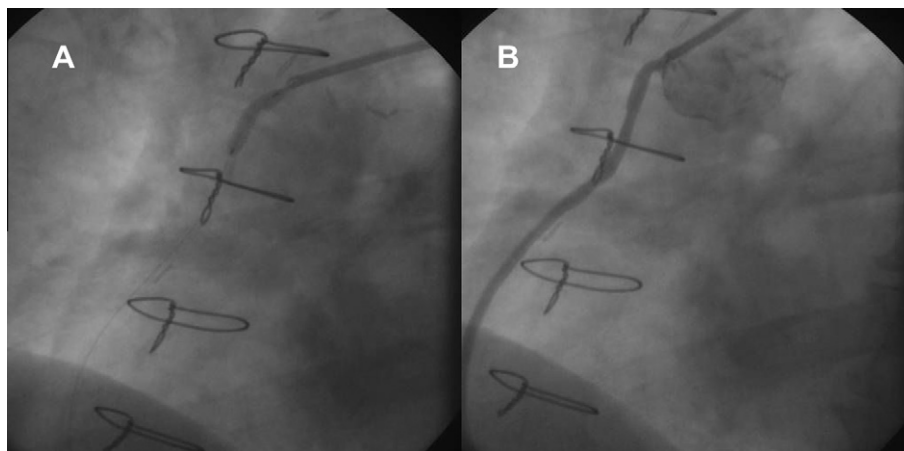


Figure 2 (A) Stenting of ostial vein graft lesion. (B) Final angiogram following stenting of ostial vein graft stenosis in a patient with previous Bentall procedure.

PCI in patients with aortic root repair may pose technical problems. Specifically, coronary graft cannulation, catheter backup support and ease of proper stent deployment. Challenge in this case was engaging the vein graft with appropriate catheter. Repeated attempts at cannulation of the SVG ostium with various guiding catheters are commonly required. Multiple catheters were tried, but finally we could engage with RCB guide with good backup support and this guide seems to be ideal for RCA grafts in post-Bentall patients. As our patient had predominantly focal stenosis with no significant vein degeneration we did not use distal protection device. Proper stent apposition, expansion and coverage have to be done in SVG ostial lesions and intravascular ultrasound may help in these situations, but it is not available with us. However, our final result was excellent. To our knowledge, this is the first case of PCI in an ostial SVG graft after complete aortic root replacement.

3. Conflict of interest

There is no conflict of interest or financial disclosure for our article.

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