Case report

Aortic valve translocation for treatment of a deteriorated stentless valve

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Abstract

A 54-year-old woman was admitted to our hospital with recurrent chest pain for 1 month. She had a history of aortic root replacement with a stentless valve following aortic valve replacements done twice 12 years ago, and coronary artery bypass grafting 6 years ago. The stentless valve was implanted with the full-root technique. After admission, she was diagnosed with a saphenous vein graft aneurysm in the proximal anastomotic site and severe aortic regurgitation due to stentless valve deterioration. These lesions were successfully treated using aortic valve translocation. The advantage of this procedure is that it avoids dissection and removal of the stentless valve implanted using the full-root technique. Aortic valve translocation can be one of useful alternatives for stentless valve reoperation.

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1. Introduction

Stentless aortic bioprostheses are a useful alternative for aortic root reconstruction. Coronary artery reconstruction is indispensable for aortic root replacement with a stentless valve using the full-root technique. In some cases of infectious disease, in situ reconstructions of coronary ostia are difficult and coronary artery bypass grafting (CABG) is required. In such patients, a redo operation for deteriorated stentless valve can be a complex procedure. On the other hand, true- and pseudo-aneurysms of saphenous vein grafts (SVGs) are rare but potentially dangerous complications after CABG [1]. Symptomatic SVG aneurysm (SVGA) usually requires surgical treatment. We report a case of successful treatment using aortic valve translocation for structural stentless valve deterioration complicated with SVGA.

2. Clinical summary

2.1. Case

A 54-year-old woman was admitted to our hospital with recurrent chest pain for 1 month. She had a history of aortic valve replacement done twice, followed by aortic root replacement using a 27-mm stentless valve (Freestyle stentless valve, Medtronic, Inc, Minneapolis, MN, USA) with CABG done 12 years ago, and re-CABG 6 years ago. The first three operations were treatments for infective endocarditis. In the third operation, the stentless valve was implanted using the full-root technique because of aortic root destruction, and the three individual SVGs were grafted to the left anterior descending (LAD), the circumflex, and the right coronary artery. All proximal anastomoses were made on a Dacron vascular graft used for distal ascending aortic replacement. Although an early postoperative coronary angiogram revealed occlusion of the SVG to the circumflex coronary artery, the postoperative course was uneventful. A fourth operation was performed for acute myocardial infarction due to occlusion of the SVG to the LAD. In this CABG, a proximal anastomosis of the SVG to the LAD was made on the aortic arch.

On admission, laboratory data showed elevated serum C-reactive protein levels but blood culture showed negative results. Echocardiography showed severe aortic regurgitation due to a structurally deteriorated stentless valve. Enhanced computed tomography showed two aneurysms at anastomotic sites of the occluded SVGs. The SVG to the LAD in the fourth operation and the SVG to the right coronary artery in the third operation were patent (Fig. 1). Aortic valve translocation was performed to treat the structural stentless valve deterioration with SVGAs.

2.2. Surgical technique

Prior to a median sternotomy, the right axillary artery was anastomosed with an 8-mm vascular graft in an end-to-side fashion, and cardiopulmonary bypass was established between the axillary vascular graft and cannulation into
the right atrium through the right femoral vein. After median sternotomy, dissection from the severe pericardial adhesions was begun. The left ventricle was vented through the right superior pulmonary vein. During the dissection, the SVGs were found as pseudo-aneurysms at the proximal anastomoses. Myocardial protection was ensured by retrograde cold blood cardioplegia. Cardiopulmonary bypass was discontinued when the rectal temperature reached 25 °C. The aorta was transected at the Dacron vascular graft. Selective antegrade cerebral perfusion was achieved by restarting perfusion to the right axillary graft with clamping the brachiocephalic artery, with direct cannulation to the left carotid artery and left subclavian artery. A tear was observed in one leaflet of the stentless valve. All leaflets of the stentless valve were excised. Consequently, a Dacron graft at ascending aorta was circumferentially transected 1 cm above the previous suture line. While the new SVG was anastomosed to the right coronary artery, a 23-mm prosthetic mechanical valve (St. Jude Medical Inc, St. Paul, MN, USA) was sawed inside the 26-mm polyester tube graft (J Graft Shield Neo, Japan Lifeline Co., Ltd., Tokyo, Japan). After replacement of the ascending aorta using this composite polyester graft, a proximal anastomosis of the new SVG was made on this composite graft (Fig. 2).

The postoperative course was favorable. After 4 weeks of antibiotic therapy, the patient was discharged from hospital 5 weeks after surgery.

3. Discussion

The number of implanted stentless valves has increased and they are reaching the limits of their durability [2]. Borger and colleagues [3] showed that the operative mortality rate was 11% in reoperations for deteriorated stentless aortic valves. This mortality rate is higher than that of other studies of redo aortic root replacement using other valve prostheses. A redo operation after stentless valve replacement is a complex procedure. Trauma to the coronary artery, aortic wall and annulus, mitral valve, and membranous septum can occur when severe adhesions or calcification are present. Pathological studies have shown calcification in the porcine aortic wall, muscle shelf, and valve leaflets, and pannus and fibrosis are often present on the exterior portion of the valve [2,4]. These changes make dissection and removal of the prosthesis more complicated. To avoid these troublesome procedures, we adopted aortic valve translocation. There were some other possible alternatives such as trans-catheter or conventional valve-in-valve implantation. However, transcatheter aortic valve implantation is not conventionally available in Japan. Since it was unknown whether the annulus of stentless valve was durable for conventional implantation of the prosthetic valve, we did not try conventional valve in valve. Nottin and colleagues [5] reported a similar technique in surgical repair of aortic root damage after prosthetic valve endocarditis. To the best of our knowledge, this is the first case report of aortic valve translocation for stentless valve deterioration. The root of stentless valve may be calcified in the future. However, since all valve leaflets were excised,
the calcification of porcine aortic wall will not affect the hemodynamics. Aortic valve translocation may be one of useful alternatives for stentless aortic valve reoperation.

CABG is indispensable for aortic translocation. Reitz and colleagues [6] recommended the use of three bypass grafts, because the circumflex artery might be inadequately supplied from the left anterior ascending artery. However, in our patient, there was no ischemia before the operation, even with one SVG graft to the left coronary artery. Bypass to the circumflex artery requires dissection of severe pericardial adhesions from the entire left heart. For these reasons, circumflex artery bypass was not performed in our case. For this issue, careful follow-up will be necessary.

SVGAs usually develop at the anastomotic site [1]. Pseudo-aneurysm at the distal or proximal suture line can be associated with technical problems or with infectious processes. In our case, since the first disease was infective endocarditis, infection was the most possible cause of the pseudo-aneurysm. Therefore, we administered 4 weeks of antibiotics postoperatively, although we did not detect culture or pathological findings of infectious disease.

References


