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Redo Aortic Valve Replacement Following Bio-Bentall's Procedure

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Background Structural valve degeneration is a known sequel of aortic valve replacement with bioprosthetic valves, not infrequently leading to redo valve replacement. Reoperation on the aortic valve is associated with an incumbent increase in perioperative risk, and this risk is further increased when reoperation is performed on an already replaced aortic root.

Methods We present a technique of opening the aortic graft and explanting the bioprosthesis by dividing the plane between the stent frame and the sewing ring of the bioprosthesis, followed by re-implantation of a bioprosthesis using simple sutures incorporating the remaining valve seat.

Results The patient experienced an uneventful post operative course and was discharged on the fifth day post operatively.

Conclusions The author presents a simple and reproducible technique to replace a degenerated bioprosthetic aortic valve while preserving the previous aortic root replacement.

Keywords Re-do cardiac surgery • Aortic valve replacement

Introduction

Structural valve degeneration is a known sequel of aortic valve replacement with bioprosthetic valves, not infrequently leading to redo valve replacement. Reoperation on the aortic valve is associated with an incumbent increase in perioperative risk, and this risk is further increased when reoperation is performed on an already replaced aortic root. Technical difficulties present in redo valve replacement following a root replacement include excision of the valve without disruption of the root replacement and the challenge of positioning annular sutures following excision. Often in these circumstances both the valve and root are replaced, however this approach carries its own difficulties such as re-implantation of the coronary arteries and high post-operative mortality (between 5 and 11%) [1,2].

Reports detailing replacement of the valve alone are primarily in patients who have had stentless aortic valves placed or homografts, both of which are technically separate from replacing a stented bioprosthesis [3,4]. One report describes partial excision of a mechanical valve with replacement of a new valve in the supra-annular position in an extraordinary circumstance, with a generous annular-coronary distance [5]. Given the paucity of discussion on this topic, the author presents a simple and reproducible technique to replace a degenerated bioprosthetic aortic valve while preserving the previous aortic root replacement.

Technique

We report the case of an 81-year-old gentleman who had undergone bioroot surgery in 2007 with a 27 mm Perimount Magna bioprosthetic valve (Edwards Lifesciences, Irvine, CA, USA) and a 32 mm Dacron conduit. The bioprosthesis

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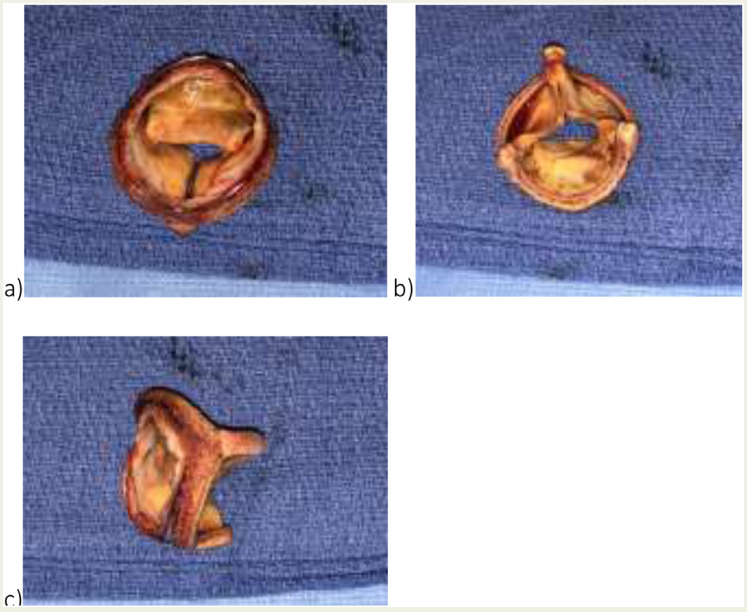

Figure 1 Explanted valve.

had failed and the patient had presented with severe aortic regurgitation due to one of the leaflets tearing from the two stent posts to which it was attached at both commissures. The patient was initially referred for transfemoral valve-in-valve aortic valve implantation (TAVI), however this was precluded by the patient's vascular anatomy. Surgery was performed via a redo sternotomy approach in January 2018. Adhesions were divided over the front and right side of the heart as well as the great vessels circumferentially. Cardiopulmonary bypass was established via an aortic inflow cannula in the proximal arch and a two-stage venous cannula in the right atrial appendage. A vent was placed in the right superior pulmonary vein and retrograde cardioplegia delivery was used to achieve myocardial protection. The cross clamp was placed at the base of the innominate artery above the previous bioroot.

The bioroot was dissected down to within 1 cm of the right coronary button. It was then opened in a transverse fashion, giving exposure to the aortic bioprosthesis. The bioprosthesis was explanted by dividing the valve in a plane between the stent frame and the sewing ring of the bioprosthesis using a scalpel (Figure 1 a, b and c). A 25 mm Perimount xenograft was then seated satisfactorily using interrupted 2/o Ticron non-pledgetted simple sutures incorporating the remaining valve seat (Figure 2). The aortotomy was closed using a continuous 3/0 prolene suture. A tack vent was placed in the ascending aorta, routine de-airing was performed and the cross clamp was removed. The case was completed in a routine manner and post-pump transoesophageal echocardiography demonstrated a well-seated normally functioning aortic bioprosthesis with preserved cardiac function. Cross clamp and cardiopulmonary bypass times were 42 and 59 minutes respectively. The postoperative course was uneventful and the patient was discharged on the fifth day postoperatively.

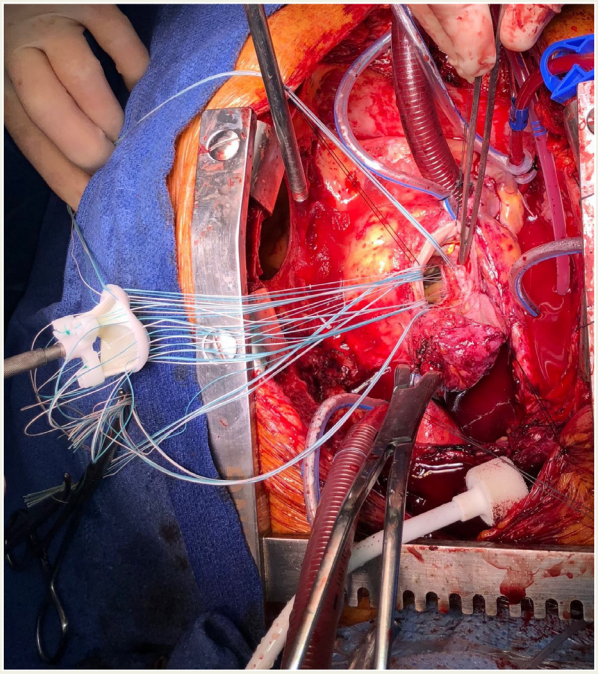

Figure 2 Operative set up.

Comment

This case demonstrates a simple and reproducible approach to what can be a technically challenging presentation, replacement of a stented bioprosthetic valve in the setting of a previous bio-Bentall's procedure. To the authors' knowledge, this is the first report of this technique. This technique may be more challenging in the setting of a small aortic root,

as resection of the bioprosthesis results in the retention of a portion of the sewing ring, which can reduce the size of the subsequent valve implanted. The number of these cases is likely to increase in the future, given both the ageing population and increasing use of bioprosthetic valves in younger patients [6]. While the transcatheter aortic valve-in-valve replacement is progressively becoming an option for structural valve degeneration in high risk surgical patients, there have not yet been any cases reported of valve-in-valve replacement in the setting of previous root replacement with a stented bioprosthesis [7]. Similarly, the implementation of a sutureless aortic valve in this circumstance has only been demonstrated in previous stentless aortic valve prostheses [4]. Therefore, we recommend this approach for patients requiring redo aortic valve replacement in these cases, as a means of avoiding the complexity of a redo aortic valve and root replacement, with its inherent complications. In the future, the implementation of this technique and the ease of redo aortic valve replacement could be improved by manufacturer alterations to the valve prostheses by increasing the distance between the valve sewing ring and the stent frame supporting the leaflet tissue.

Declarations of Interest

None.

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