Homograft subclavian interposition graft to left main coronary artery ostium in aortic root replacement

Alex Zapolanski, Cyrus E. Kuschner, Mariano E. Brizzi and Juan B. Grau

INTRODUCTION

Prosthetic valve endocarditis (PVE) is associated with a significant mortality and morbidity, accounting for a high percentage of all cases of infective endocarditis. In cases of PVE with extensive destruction of surrounding structures, the Society of Thoracic Surgery recommends the use of a homograft to replace the aortic root in its entirety [1, 2]. Alternative techniques include the freestyle porcine bioprosthesis and a combination of aortic valve replacement with additional pericardial patch reconstruction of the infected areas. The freestyle porcine bioprosthesis is prepared with alpha-oleic acid to prevent calcification, and is readily available in multiple sizes. In addition, porcine roots provide comparable late survival to homografts, and are a useful option when storage and availability of homografts are limited [3]. Both techniques require the removal and reattachment of coronary buttons.

During reoperative cases, the presence of significant scarring and inflammation can make the adequate mobilization of coronary buttons hazardous. Surgeons may use the Cabrol procedure to create a direct anastomosis from the immobilized coronary buttons to an 8–10 mm Dacron graft. Since its development in 1981, several configurations of the Cabrol procedure have emerged and it remains an essential tool for every aortic surgeon [4]. We describe an alternative technique that utilizes a segment of left subclavian artery from the homograft (hLSCA) as an interposition graft from the reconstructed root to the left main coronary artery ostium. This approach circumvents the need for full mobilization of the left coronary button when surrounded by both inflammation and fibrosis, providing a safe anastomosis with an infection-resistant biological conduit [5].

PATIENT

The patient was a 69-year old man with a history of hypertension, aortic stenosis and atrial fibrillation. He underwent an isolated AVR with a 23 mm (Edwards Lifesciences, Irvine, CA, USA) bioprosthetic pericardial valve 2 months prior to presenting to the hospital with fever, chills and rigour. The patient was diagnosed with Staphylococcus epidermidis aortic valve endocarditis with multiple vegetations, large annular abscess and severe mitral insufficiency with a 3+ mitral regurgitation. He was subsequently scheduled for urgent reoperative aortic root replacement (ARR) and mitral valve repair.

METHODS

The aortic valve and surrounding structures were found to be severely infected and extensive debridement of compromised tissue was carried out. The decision was made to replace the aortic root with a homograft to reduce the risk of reinfection. The left and right coronary arteries were separated from the aorta as buttons. While the homograft was being prepared for implantation, attention was turned towards the mitral valve repair. A pericardial patch was used to replace a segment of the anterior leaflet. Bovine pericardium was used for the mitral annuloplasty.

At this time, it became apparent that the left main coronary artery was too heavily embedded in the surrounding inflammation to be mobilized in the classical manner. The decision was...
made to anastomose a segment of the hLSCA to the left coronary ostium (Fig. 1). The homograft was then implanted using a running technique of 3-0 polypropylene suture. The hLSCA interposition graft was then tailored to the appropriate length, and anastomosed to the homograft using 5-0 polypropylene sutures. The right coronary artery was connected in the typical fashion.

RESULTS

The patient tolerated the procedure well, the postoperative transoesophageal echocardiogram in the operating theatre revealed 1+ mitral regurgitation, no aortic insufficiency and normal left ventricular function. The patient did not require any blood transfusions during or after the procedure. The patient was treated with intravenous antibiotics throughout his hospital stay, and was discharged on postoperative day 10.

DISCUSSION

Current guidelines recommend the use of a homograft replacement in cases of active endocarditis or when the potential for reinfection is elevated [1]. Alternative techniques include the freestyle porcine bioprosthesis. While the homograft and freestyle approach offer equivalent short- and long-term survival, porcine roots are associated with lower rates of aortic valve dysfunction and need of reoperation [3]. Both techniques require the removal and reattachment of the coronary buttons.

Reoperative ARR surgery, especially in the first few months after the original operation, can be challenging due to significant inflammation and scarring. When extensive mobilization of the structures around the aortic root is required, there is an increased risk for serious injuries to the surrounding tissues, especially both coronary buttons. While utilizing either the homograft or freestyle approach, surgeons may prefer the placement of an interposition graft when mobilization of the coronary ostia becomes too hazardous.

The Cabrol procedure provides multiple configurations in which a prosthetic conduit can act as an interpositional graft [4]. However, in cases of extensive endocarditis, the use of polyethylene or other synthetic materials is not ideal. Our present method offers an alternative to the Cabrol procedure in cases of infective endocarditis. As a biological conduit, the hLSCA is less prone to potential reinfection [5]. This option also maintains the coronary anatomy, and offers an ideal size match. In addition, this approach adds no additional cost when arch vessels are present on the delivered homograft. The presented technique is not technically demanding, but requires careful tailoring of hLSCA segment to avoid kinking. The long-term results of this approach will be reported in the future.

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REFERENCES