Case report

The freestyle stentless aortic bioprosthesis: more about the subcoronary technique

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Abstract

Two years after aortic valve replacement with a Freestyle stentless aortic xenograft using the partial scallop inclusion technique, late prosthetic valve endocarditis developed with abscess formation in the space between the porcine and native human aortic wall. The presence of such a periprosthetic dead space exposes the patient to increased postoperative pressure gradients and the risk of superinfection. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

The Freestyle stentless aortic xenograft (Medtronic Inc, Minneapolis, MN) is a gluteraldehyde-fixed entire porcine aortic root. Therefore, the Freestyle valve behaves like an aortic allograft or a pulmonary autograft, and can be implanted by the freehand complete subcoronary, the modified subcoronary, the inclusion root, and the free-standing total aortic root replacement techniques [1]. We report the case of a patient who underwent aortic valve replacement using the Freestyle valve, and who needed reintervention for late prosthetic valve endocarditis.

2. Case report

A 65-year-old male patient, previously asymptomatic with a known low-grade chronic aortic regurgitation, presented with recent onset dyspnea complicated by one episode of pulmonary edema. Upon evaluation, the patient was diagnosed with grade 2–3 aortic regurgitation and preserved left ventricular function. Coronary artery angiography revealed significant three-vessel disease.

On October 27th, 1997, the patient underwent aortic valve replacement by another group using a 27 mm Freestyle valve with concomitant double coronary artery bypass grafting to the left anterior descending and right coronary arteries. The valve was implanted using the modified subcoronary technique. The inflow suture line was made with three continuous sutures of 4-0 Prolene (Ethicon, Inc, Somerville, NJ). After excision of the right and left porcine aortic sinuses, the outflow suture line was performed using three continuous sutures of 4-0 Prolene. The immediate postoperative period was uneventful. The patient did not undergo an early postoperative transesophageal echocardiographic examination. However, three transthoracic echocardiographic examinations were performed by three different investigators at three different time points. None of these revealed a malfunctioning valve or noted a periprosthetic collection.

Two years later, the patient underwent a series of dental procedures, each under adequate antibiotic prophylaxis. Shortly thereafter, the patient developed low-grade fever. Blood cultures remained negative, except for one, which was positive for Staphylococcus aureus. Other laboratory features revealed slightly increased acute phase reactants including white blood cell count, erythrocyte sedimentation rate and C-reactive protein. Transesophageal echography showed a newly developed perivalvular collection with an otherwise normal functioning valve, no vegetations and no prosthetic valve dehiscence (Fig. 1). The strong suspicion of late prosthetic valve bacterial endocarditis led to the rapid institution of intravenous antibiotics on December 1st 1999.

On December 16th, 1999, the patient underwent resternotomy. After initiating cardiopulmonary bypass, the ascending aorta was dissected free, and the previous aortotomy was reopened. Examination of the Freestyle valve confirmed the absence of vegetations and valvular lesions.
Excision of the Freestyle valve was facilitated by the existence of a clear separation plane between the porcine and the human aortic wall. This space contained some fibrino-cruoric material, which was taken for culture. The proximal and distal suture lines were covered with thick pannus, which was also resected. After meticulous preparation, the patient’s aortic annulus fitted only a 23 St-Jude HP sizer. Thus, a 23 mm St-Jude Silzone mechanical prosthesis was implanted, using interrupted 4-0 Prolene sutures. The rest of the operation was conducted in a standard fashion. The postoperative course was uneventful. All bacteriological cultures remained negative. Antibiotic treatment was pursued for an overall duration of 6 weeks.

3. Comment

There remains some controversy about the best technique for implantation of the Freestyle valve in the aortic position [2]. Among the several available surgical techniques, the modified subcoronary [3,4] and the free-standing total aortic root replacement techniques [5] have gained wide acceptance.

In contrast to the free-standing total aortic root replacement, the use of the modified subcoronary technique creates an obligatory space between the porcine and native human aortic wall. Theoretically, this space remains virtual when a valve size is chosen to provide a snug fit within the human aortic root. However, on postmortem studies up to 8 months postoperatively, Westaby et al. [6] noticed the persistence of a clear separation plane between the porcine and the human aortic walls. In the present case, we made a similar observation more than 2 years after the initial operation.

Furthermore, in case of a short distance between the native valve annulus and the native right coronary ostium, buckling of the inflow cloth beneath the porcine right coronary artery has been reported [4–6]. More generally, over- or undersizing of the prosthetic valve increases the risk of periprosthetic dead space. In our case, we were very surprised that the patient’s aortic annulus only fitted a 23 mm sizer, although a 27 mm Freestyle valve had been implanted. This important size discrepancy suggests that there has been at least some degree of oversizing at the initial intervention. The existence of a periprosthetic dead space appears to be a potential source of postoperative complications. Thus, several clinical reports have shown a progressive decrease in ventriculo-aortic pressure gradients during the first 3–6 postoperative months after Freestyle implantation using the modified subcoronary technique [2,4,6]. This observation has been related to the resolution of post-surgical tissue edema and resorption of hematoma collected between the native aortic root and the bioprosthesis [2,4,6]. Furthermore, as illustrated by the present case-report, the persistence of a periprosthetic dead space exposes the patient to the risk for superinfection. Obliteration of the periprosthetic dead space with biological glue might be a desirable adjunct to the modified subcoronary technique. Alternatively, the use of the free-standing total aortic root replacement, which avoids the occurrence of such a periprosthetic dead space, should be more extensively evaluated as suggested recently [5].

References


