Outcomes in Aortic and Mitral Valve Replacement With Intervalvular Fibrous Body Reconstruction

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Background. **Surgery for intervalvular fibrous body reconstruction in aortic and mitral valve replacement is a complex operation, although mandatory in some circumstances. The long-term result of this operation remains unknown. The objective of this study was to analyze the outcomes of this technique.**

Methods. **A descriptive and retrospective study was carried out to analyze operative morbidity and mortality in fibrous body reconstruction with the "David technique" and to evaluate the midterm and long-term results regarding durability and survival.**

Results. **A total of 40 consecutive patients underwent the David technique between 1997 and 2014. The mean age was 58 ± 15 years and 62.5% were male. The indications were active endocarditis with paravalvular and fibrous body abscesses in 26 patients (group A) and massive calcification of the intervalvular fibrous body in 14 patients (group B). Mean European system for cardiac operative risk evaluation I predicted risk of mortality was 36 ± 24 and 16 ± 15, respectively. The hospital mortality rate was 15.3% in group A and 7.1% in group B. Survival rate after 1, 5, and 10 years was 65.4%, 57.7%, and 50% for group A and 92.9%, 85.7%, and 78.6% for group B. Freedom from reoperation at 1, 5, and 10 years was 92.3%, 84.6%, and 76.9% for group A and 90.9%, 90.9%, and 90.9% for group B. Mean follow-up was 53 ± 8 months.**

Conclusions. **Although this complex operation is associated with high perioperative mortality, the long-term results are acceptable in patients where there are not suitable alternative procedures.**

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The intervalvular fibrous body (IFB) is a fibrous structure between both trigones that marks the junction of the left and right atrial attachments with the posterior annulus of the aortic valve. It separates the anterior mitral leaflet from the aortic root and its destruction presents a surgical challenge. The IFB can be compromised in 2 surgical scenarios; after acute infective endocarditis (IE), and in cases of aortic and mitral valve replacement with pathologic involvement of this structure (extensive calcification of the aortic annulus and IFB, lack of fibrous tissue to secure a new prosthetic valve because of previous valve operations or for enlargement of small mitral-aortic annulus to avoid prosthetic valve-patient mismatch). Infective endocarditis is a life-threatening disease that, in approximately one-third of patients, requires surgery in order to eradicate the infection of the valves [1, 2]. The extension of the infective process into the annulus, together with the presence of paravalvular abscesses and IFB destruction, varies between 25% and 39% [3, 4]. This condition presents a major surgical challenge and, in this scenario, the mortality ranges between 20% and 30%, with a high incidence of recurrent infection [5–7]. In these cases conventional surgery does not solve the problem and it is mandatory to remove all the infectious tissues to prevent persistent IE. Otherwise, extensive calcification of the aortic annulus and IFB in patients who require a double valve replacement also demands a reconstruction of the IFB. David and colleagues [5] described a technique for the restoration of the IFB in these circumstances. They reported in 76 patients an operative mortality of 10%, 10-year freedom from reoperation was 73% ± 7%, and 10-year survival was 50% ± 9% [8]. Due to the uncommonness of the involvement of the IFB, very few large studies have been published in the literature [8, 9]. In the present report IFB reconstruction was accomplished in both scenarios according to the David technique. This retrospective study analyses the early and late outcomes, defines variables associated with prognosis, and determines rates of late reoperation due to recurrent IE at our institution.

Patients and Methods

We conducted a retrospective and observational study. Between 1997 and 2013, a total of 40 consecutive patients at the Hospital Universitario 12 de Octubre underwent replacement of the mitral and aortic valves with

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reconstruction of the IFB. This was secondary to IE or to an extensive calcification or lack of fibrous tissue to secure new prosthetic valves because of previous operations. During this period a total of 4,690 patients underwent heart valve surgery (aortic valve in 2,630, mitral valve in 1,647, and both valves in 413) and 218 patients suffering from IE were admitted to our institution for surgical treatment. The informed consent of the patients was obtained and the study was approved by our Institutional Ethics Committee.

Our primary outcome was operative mortality, which was defined as death of any cause occurring within 30 days of the operation. Secondary endpoints included operative morbidity, survival in the short-term, midterm, and long-term and the incidence of reoperation secondary to IE or paravalvular dysfunction.

Surgical Technique

After a median sternotomy, the patient was connected to cardiopulmonary bypass, the temperature lowered to 32°C, and antegrade plus retrograde blood cardioplegia was infused at 20-minute intervals. According to the technique described by David and colleagues [5], an oblique aortotomy was performed and the aortic or prosthesis valve was excised. The aortotomy was enlarged through the noncoronary cusp and extended into the anterior mitral leaflet and onto the roof of the left atrium. The infected or calcified tissues were radically resected and the mitral or prosthesis valve was removed. A prosthetic mitral valve was secured to the mitral annulus posteriorly after which the intertrigonal mitral aortic junction was reconstructed using 1 triangular single-folded glutaraldehyde-fixed bovine pericardium patch, as we have described previously [10], (Fig 1) .The sides of the inner half patch were sutured to the lateral and medial fibrous trigones and aortic root with a continuous 3-0 polypropylene suture (Ethicon Johnson & Johnson, Livingston, Scotland) and the central part of the patch was secured to the mitral prosthesis with pledgeted stitches. The left atriotomy was closed with the outer half of the patch. A prosthetic aortic valve was secured to the aortic annulus and to the pericardial patch (Fig 2). The remaining inner half patch was used to close the right side of the aortotomy.

Follow-Up

The follow-up was 100% complete. The cardiac surgery database was reviewed for demographic, operative, perioperative, and outcome data. Follow-up was obtained through telephone interviews and personal review. The closing interval for this study was between January 2013 and May 2014. The mean follow-up was 53 ± 8 months (longest follow-up was 180 months). Most patients had multiple echocardiographic studies through the years and every patient had at least 1 study.

Statistical Analysis

Qualitative variables are expressed as percentages and continuous variables as mean ± SD or median (25th to 75th percentile) according to data distribution evaluated with graphical methods and the Kolmogorov-Smirnov test. Baseline clinical and operative characteristics, as well as postoperative results in both subgroups (IE vs IFB calcification), were compared using the χ^2 test or Fisher exact test. A χ^2 test or Fisher exact test was also used for univariate analysis of clinical variables and mortality

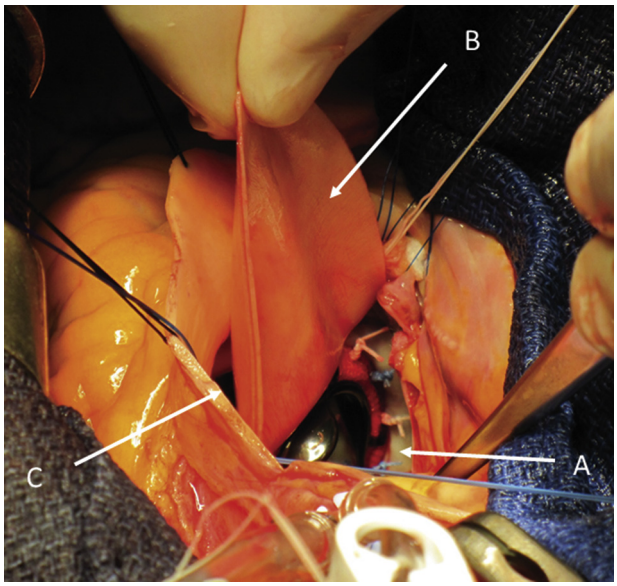

Fig 1. After the implant of the prosthetic valve (A) to the posterior mitral annulus, the intertrigonal mitral aortic junction is reconstructed using a triangular single-folded glutaraldehyde-fixed bovine pericardium patch (B). The left ventricular outflow tract is marked as (C).

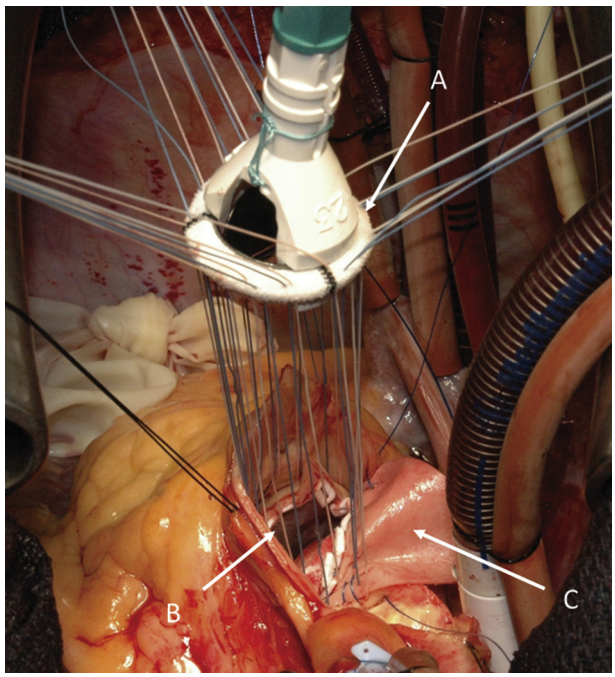

Fig 2. The prosthetic aortic valve (A) is settled in the usual way to the aortic annulus (B), and to the pericardial patch (C).