Partial Aortic Valve Replacement: A New and Simple Approach for Endocarditis

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We describe the replacement of a single cusp in two patients with severe aortic regurgitation due to endocarditis with a one third stentless bioprosthesis, with excellent results in both.

Replacement remains the gold standard for aortic valve surgery in adults. The choice between either a mechanical prosthesis, entailing long-term use of anticoagulants, or a bioprosthesis, with the risk of reoperation, remains difficult at times. In case of aortic regurgitation with limited damage, conservative surgery can be an attractive option. We describe the replacement of a single cusp using one third of a stentless bioprosthesis in two patients with endocarditis.

Technique

The first patient, a 67-year-old man, presented with a Streptococcus gallolyticus aortic endocarditis. Echocardiography showed severe aortic regurgitation because of right coronary cusp prolapse with 2 cm of vegetation on its ventricular side. Surgery was performed after 1 month of treatment with antibiotics.

The second patient was a 51-year-old man with Pneumococcus aortic endocarditis. Echocardiography initially showed moderate aortic regurgitation with non-coronary cusp prolapse. The patient received antibiotics for 4 weeks. Echocardiographic control performed 1 month after the end of treatment revealed severe aortic insufficiency with perforation of the noncoronary cusp. Practicing martial arts, the patient was refractory to long-term anticoagulation. Surgery was performed approximately 2 months after the end of antibiotic treatment.

Normothermic cardiopulmonary bypass was used for both patients. Myocardial preservation was performed with antegrade cold blood cardioplegia through the coronary ostia. Transverse aortic incision was made approximately 1 cm above the sinotubular junction. Inspection of the valve confirmed unreparable damage to a single cusp without annular abscess. The damaged cusp was resected. The aortic annulus was measured with a Hegar probe. In both cases, one third of Freedom Solo aortic bioprosthesis (25 mm diameter; Sorin Biomedica, Sallugia, Italy) was implanted (Fig 1 A and B). It was sutured in an annular position with two half-running sutures of polypropylene 4-0 (Fig 1 C and D), as described previously for the Pericarbon Freedom (Sorin Biomedica) [1]. After verification of satisfactory coaptation of the three cusps, the aortotomy was closed with two half-running polypropylene 5-0 sutures. In both cases, separation from cardiopulmonary bypass was simple with satisfactory perioperative transesophageal echocardiography. Aortic clamping and cardiopulmonary bypass times were, respectively, 43 and 55 minutes for the first patient and 36 and 47 minutes for the second patient.

Both patients were extubated early. The first patient left the intensive care unit on postoperative day (POD) 5 and hospital on POD 10. Echocardiography performed on POD 8 showed one microleak between the prosthetic cusp and the noncoronary cusp and a minimal transvalvular gradient.

The second patient left intensive care on POD 2, and he was discharged from the hospital on POD 6. Echocardiography performed on POD 6 found an average gradient of 15 mm Hg, a grade I central leak, and a grade I leak between the prosthetic cusp and the right coronary cusp.

For each patient, echocardiography performed at 2 years was comparable to that achieved at hospital discharge. Both remain free from anticoagulation.

Comment

If repair has become the treatment of choice for atrioventricular valve damage, replacement remains the commonly accepted treatment for aortic valve. Many techniques for aortic valve repair have nonetheless been widely reported in the literature, and they mainly involve pediatric or young adult series with rheumatic valvular disease [2-4]. When conservation of the cusp is not possible, a single replacement may be considered; this was described by Tao et al. [5], using a patch of bovine pericardium.

However, these different techniques using autologous or bovine pericardium are not necessarily easy for surgical
teams such as ours, when surgeons are unfamiliar with aortic valve repair. We are convinced that use of one third of a stentless bioprosthesis is technically more accessible. Indeed, after the diameter of the annulus is measured with a Hegar probe, no other work of measuring or cutting is required. In our center, we have been using the Freedom Solo since 2009. Suturing the third valve with two half-running sutures of polypropylene is then simple and rapid [1].

This technique allows for implanting less prosthetic material and is of particular interest in cases of endocarditis [6]. It is obviously necessary to verify the absence of annular abscess. It has also been suggested that stentless valves give results for infectious recurrence that have been similarly reported for homografts, of which the difficulty of access is well known [7].

In addition, we can expect a greater longevity than with a biological valve, whereas the long-term anticoagulation required for a mechanical valve is avoided. Indeed, we can assume that even if the third valve degenerates, the two native cusps will maintain good coaptation and opening.

Having been commercially available since 2006, Freedom Solo has shown good results in short- and medium-term applications [8].

In conclusion, we describe the replacement of a single cusp using one third of a stentless bioprosthesis in two patients with endocarditis. We have had excellent results in both with no greater than +1 aortic insufficiency. This original, rapid, and reproducible technique is highly accessible to surgeons without experience in aortic valve repair; however, its results over time still need to be evaluated.

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References