

A total of 404 cases of aortic valve reconstruction with glutaraldehyde-treated autologous pericardium

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Objective: To determine the feasibility of original aortic valve reconstruction, 404 consecutive cases were reviewed. The early results are reported here.

Methods: Aortic valve reconstruction was performed for 404 patients from April 2007 through September 2011. The results for all 404 patients were reviewed retrospectively. There were 289 patients with aortic stenosis and 115 patients with aortic regurgitation. One hundred two patients had bicuspid aortic valves, 13 patients had unicuspid valves, and 2 patients had quadricuspid valves. There were 201 males and 203 females. Mean age was 69.0 ± 12.9 years. Preoperative echocardiography revealed an average peak pressure gradient of 79.6 ± 32.5 mm Hg with aortic stenosis. Surgical annular diameter was 20.3 ± 3.2 mm. The surgical procedure is based on the independent tricuspid replacement by autologous pericardium. First, the distance between the commissure is measured with an original sizing apparatus, then the pericardial cusp is trimmed using an original template, and it is sutured to the annulus.

Results: There were no conversions to prosthetic valve replacement. There were 7 in-hospital mortalities resulting from a noncardiac cause. Postoperative echocardiography revealed an average peak pressure gradient of 19.8 ± 10.2 mm Hg 1 week after surgery and 13.8 ± 3.7 mm Hg 3.5 years after surgery. Two patients needed reoperation because of infective endocarditis. The other 402 patients showed less than mild aortic regurgitation. No thromboembolic events were recorded. The mean follow-up period was 23.7 ± 13.1 months. Freedom from reoperation was 96.2% at 53 months of follow-up.

Conclusions: Original aortic valve reconstruction was feasible in patients with various aortic valve diseases. Long-term data will be disclosed in the future. (*J Thorac Cardiovasc Surg* 2014;147:301-6)

Atrioventricular valve repair has become more popular than valve replacement with its standardization and reproducibility. For aortic valve disease, bioprosthetic valves are being used increasingly for replacement because of the problems with anticoagulation of mechanical valves. However, despite the progress of the design and construction of prosthetic valves, hemodynamic performance is not yet comparable with that of native aortic valves.¹ In recent years, much attention has been given to repairing aortic valve disease, with consequent improvement in postoperative results.

Many reports of aortic valve repair are limited to the treatment for aortic regurgitation (AR).^{2,3} Our new style of aortic valve reconstruction can be applied to a wide spectrum of aortic valve diseases, including aortic stenosis (AS), AR, infective endocarditis (IE), prosthetic valve endocarditis (PVE), and annulo-aortic ectasia.

We basically replace all 3 aortic valve cusps by glutaraldehyde-treated autologous pericardium. We assume this technique is more like valve reconstruction than replacement because there is no use of foreign material and no need for postoperative anticoagulation. The main reason why we call this technique a reconstruction is that we can make new cusps, one by one, from the distance between each commissure in the operative field. There have been some reports of aortic valve reconstruction with autologous pericardium or stentless autologous pericardial aortic valve replacement.^{4,5} These reports mentioned the advantage of direct suturing of the pericardium to the annulus.⁶⁻⁹ With this method, surgeons can preserve the natural aortic root expansion in the systole with maximal effective orifice area,¹⁰⁻¹² but they still replace the aortic valve as 1 whole structure. The difference in our original aortic valve reconstruction from others is the independent replacement of 3 cusps by 3 native-size autologous pericardial cusps. We consider the size of the aortic cusp to be defined by the distance between the commissures. In addition, aortic valves may represent a collection of different-size cusps. We believe independent replacement of cusps is more effective in preserving the natural motion of the aortic valve annulus and the coordination of the left ventricle, aortic annulus, sinus of Valsalva, and aorta.

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