Early Pericardial Valve Deterioration as a Result of Adhesions With Native Mitral Valve

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We report an unusual case of early pericardial tissue valve prosthesis deterioration that required replacement. Four years after mitral valve replacement, 1 of the 3 leaflets of the valve was thickened and retracted in a fixed open position, which resulted in severe mitral insufficiency. The cause of this was adhesion of the leaflet and the patient’s own retained posterior mitral valve leaflet. The finding was confirmed at operation and by histologic examination.


The pericardial heart valve was invented by Ionescu and colleagues in the early 1970s [1]. Since then, bovine pericardial tissue valves have been used with excellent hemodynamic results. They are the preferred prostheses in elderly patients because of their hemodynamic performance and reduced bleeding complications from short-term anticoagulation therapy [2]. Structural valve deterioration (SVD) represents the major limitation to their use in patients with longer life expectancy. However, patients aged 65 years and older had a less than 10% chance of explantation for SVD by 15 years after implantation [3].

We report a case of a 71-year-old patient with significant SVD of a mitral pericardial valve prosthesis caused by fusion of the prosthetic leaflet and the retained native posterior mitral leaflet.

A 68-year-old woman patient underwent mitral valve replacement with a pericardial prosthesis (27-mm Carpentier-Edwards PERIMOUNT, Edwards Lifesciences, Irvine, CA) 4 years previously. The postoperative course was uneventful and she recovered well. She was regularly followed by a cardiologist and improved functionally from New York Heart Association class III to New York Heart Association class I. In the past year, however, shortness of breath reappeared. On echocardiography, intraprosthetic mitral regurgitation was detected.

The patient was then referred to our center. On admission, examinations with transthoracic and transesophageal echocardiography were performed. Both revealed mitral regurgitation grade 4+, functional tricuspid regurgitation 3+, with a dilated annulus and severely dilated atria. She also had atrial fibrillation. A redo operation was indicated. During the operation, we found that 1 leaflet of the prosthesis adjacent to the original posterior leaflet of the mitral valve was stiff, immobile, and a little short. Macroscopically, there were no signs of infection. We removed the prosthesis and found that the retained original posterior leaflet was firmly healed with the valve replacement (Figs 1, 2). Replacement of the mitral valve with a porcine bioprosthesis, tricuspid valve annuloplasty with a flexible ring, and resection and suturing of the left atrial appendage was performed.

Histologic examination confirmed our suspicion that there were adhesions of both leaflets (native and prosthetic) and consequently their accelerated degeneration (Fig 3).

Six months later, the patient is doing well, with no dyspnea. The echocardiographic findings on both operated valves are normal.

Fig 1. Prosthesis with 1 leaflet retracted was removed (view from the left atrium).

References

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Late survival after valve replacement depends on a multitude of factors that are related both to the patient and to the artificial valve implanted [3]. Ionescu and co-workers [4] reported in 1982 a series of 366 patients with actuarial freedom from valve failure at 11 years of 90.4%. The new generation of bovine pericardial valves promises an even longer SVD-free interval because of progress in the fields of anticalcification treatment and valve design and concept [3, 5, 6]. It is generally considered that tissue valves are subjected to a higher mechanical challenge and are associated with a greater propensity for structural deterioration when used in the mitral position. Marchand and coworkers [7] reported that in the mitral position at 12 years, the freedom from SVD was 78% for all patients and was 100% for patients older than 60 years of age.

In our patient, we found typical clinical signs of SVD early after implantation, after only 4 years. At the time operation, we found the true cause of the degeneration of the prosthesis—adhesions between the retained native posterior mitral valve leaflet and 1 of the cusps of the prosthesis. The consequence of this was retraction and accelerated degeneration of the cusp.

In 2012, Takeda and Lee [8] reported a case similar to ours. In their patient, who had rheumatic disease, both mitral leaflets were spared. The patient had possible endocarditis on the prosthetic valve treated with antibiotics early after operation. Four years later, a redo operation because of SVD was necessary. They found total adhesion of the anterior and posterior leaflets of the native mitral valve to the cusps of the prosthesis. In 2000, Fasol and Lakew [9] reported a case with early postoperative pericardial valve dysfunction that was caused by thrombosis from blood turbulence between the preserved posterior leaflet and the cusps of the prosthesis. They proposed a technique for detachment of the posterior leaflet from the annulus and reimplantation of only islands of tissue with the attached chordae.

Mitral valve replacement with preservation of the subvalvular apparatus corresponds entirely with European Society of Cardiology/European Association for Cardiothoracic Surgery guidelines [10]. At the first operation of our patient, posterior mitral leaflet with apparatus was left in place and free under the implanted prosthesis. We prefer the technique of anchoring and fixation of the leaflet by stitches under the sewing ring. We think that this unusual complication could be a warning to highlight the importance of proper implantation technique.

References
Porcine Xenograft Aortic Root Replacement in a Three Month Old With Severe Truncal Insufficiency

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Outcomes for truncus arteriosus repair are impacted significantly by the severity of truncal valve dysfunction. When satisfactory repair of the regurgitant truncal valve is unattainable, replacement is required. Given our experience in children with stentless porcine xenografts in the aortic position and the incidence of early valve failure for aortic homografts in infants, we replaced a severely regurgitant truncal valve with a full-root porcine xenograft in a 3-month-old infant. The initial and early result are encouraging, suggesting that the stentless porcine xenograft may be considered an option in cases where primary repair of the truncal (or aortic) valve is not possible.


Although surgical repair of truncus arteriosus is associated with improving outcomes, patients with severe truncal valve insufficiency have significantly increased morbidity and mortality [1]. When primary repair of the truncal valve is not achievable, replacement is required to improve survival and quality of life [2]. The ideal prosthesis for systemic semilunar valve (SSV) replacement in children remains elusive. Earlier, we reported the successful application of a stentless porcine xenograft for aortic valve replacement in a 7-year-old patient [3]. Herein we report the successful replacement of the SSV with a stentless porcine xenograft (Fig 1; Freestyle [Medtronic, Inc., Minneapolis, MN]) in a 3-month-old born with truncus arteriosus and severe truncal valve insufficiency.

A newborn child (3.4 kg; 39 weeks gestation) presented to our center from an outside hospital with truncus arteriosus, severe truncal valve insufficiency, and compromised perfusion. On day of life 6, the child underwent salvage palliation by the following: (1) truncal valve repair employing commissural plication and leaflet resuspension; and (2) bilateral branch pulmonary artery banding. At 4 weeks of life, re-repair of the truncal valve was performed along with bands removal and pulmonary artery isolation to a 6-mm, polytetrafluoroethylene right ventricle to pulmonary artery Sano conduit. The postoperative echocardiogram revealed mild to moderate insufficiency and mild stenosis of the truncal valve. The child responded well initially and was extubated. However, at 3 months of life the child demonstrated failure to thrive and feeding intolerance, necessitating a Nissen funduplication and feeding gastrostomy. A subsequent echocardiogram demonstrated recurrent, severe truncal valve insufficiency and ventricular dilation (Fig 2) necessitating surgical intervention. A 19-mm full-root, stentless porcine xenograft was used for truncal...