Negative results - Valves

Built-in defect of a biological pericardial aortic prosthesis?

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Abstract

We report a case on an early complication of a biological pericardial tissue valve in the aortic position that required emergency replacement. One of the three leaflets of the valve was stuck open in a fixed-open position and would not unfold in diastole. This resulted in severe aortic insufficiency, diagnosed by standard postoperative echocardiography and confirmed in the operating room.

Keywords: Aortic valve; Pericardial tissue heart valve; Aortic insufficiency

1. Case report

A 73-year-old man with a long history of calcific aortic stenosis associated with ascending aorta aneurysm was scheduled for aortic valve replacement in our department. In May 2006, he underwent a standard median sternotomy and cardiopulmonary bypass procedure. A 25-mm Carpentier-Edwards pericardial tissue heart valve was placed and the aortic aneurysm was replaced with a 30 mm Hemashield Platinum woven double velour vascular graft. The patient’s recovery and immediate postoperative course were uneventful. On day 5, standard echocardiography examination revealed severe aortic regurgitation: the images clearly showed that one of the three leaflets of the valve was in a fixed-open position and that it would not unfold in diastole. The following day, a second operation was performed: after opening the aortic vascular graft, the prosthesis appeared intact, no macroscopic alterations were visible, the three cusps were in a closed position and the valve was apparently in perfect condition. The sewing ring and the native annulus regions were also examined and there were no paravalvular leak sites. Upon examination of the three valve leaflets, it appeared that the non-coronary leaflet would open and stay open, contrary to the normal movement of the other two (Fig. 1). Although the closed valve appeared ‘normal’, the non-coronary leaflet remained folded in an open position, similar to that of a rolled-up cuff. Apparently, the diastolic pressure was unable to unfold the leaflet of the valve, and this abnormality resulted in severe aortic regurgitation. The defective valve was replaced with another 25 mm Carpentier-Edwards pericardial valve and the aortic graft was closed with 4-0 prolene sutures. The patient did well in the postoperative period and was discharged from the hospital 10 days after the second operation. The defective valve was placed in medical material vigilance status, returned to the manufacturer and submitted to the pulse duplicator test at 5 l per min, 70 bpm and 100 mmHg mean aortic pressure. The leaflet in question folded after opening (Fig. 2a) and a crease in the leaflet belly was noted (Fig. 2b), but no explanation about the possible mechanism of this event.

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Fig. 1. The defective valve immediately after its removal.
was given. From the retrospective lot analysis, the valve passed all production controls before its release.

2. Comment

Early complications of pericardial tissue valves are not common. In the literature, we found no similar case affecting an aortic prosthesis even though it has been published that the opening and closing times of pericardial valves are prolonged compared to porcine or natural tissue valves [1]. Sarabu and Parker described patients requiring re-operation at 42 and 4 months, respectively, after their initial mitral valve replacement with a 29-mm Hancock valve and a 29-mm Carpentier-Edwards porcine valve [2]. Tolis et al. presented a porcine mitral valve in which all three leaflets were blocked [3]. Ours is not a case of immediate structural valve deterioration of pericardial tissue valves, which has already been described [4]. We presume that the pericardial heterograft in our case had a built-in defect that prevented the leaflet from unfolding. This problem can be detected by checking single leaflet movement and competition with a non-traumatic soft tissue tester before and after implantation. A leaflet that opens should also close spontaneously. We propose that this type of inspection be done routinely. In this kind of routine aortic valve replacement we do not routinely perform intra-operative TEE, which would reveal the defect earlier. Thrill search by touching the aorta would also reveal a problem that could be confirmed by TEE.

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References


EComment: Early postoperative failure of a pericardial aortic prosthesis

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As the authors herein have stated, the structural abnormalities of bovine pericardial prosthesis resulting in an immediate postoperative failure are very rare (~0.1%) [1]. It seems to be obvious though that one of those rare instances has happened in their practice. As a consequence of what they have mentioned in their paper, I have a couple of things to ask to the authors.

First of all, have they initially closely inspected or noticed that crease on the non-coronary leaflet of the prosthesis in the first operation? I imagine their answer will be "no" to this question but then in the reoperation they have mentioned that when they opened the aortic vascular graft the prosthesis appeared intact with no macroscopic alterations. According to what they have said in their paper, it was not until the laboratory studies were completed that they were aware of that fold, in opposition to what is perceived in their Fig. 1 which is an immediate postoperative view of the initial prosthesis. In any case, having witnessed this rare situation, what has prompted the authors to re-replace the prosthesis with the same type and brand of prosthetic valve?

Secondly, if they have used pledgeted sutures in the first operation, did they have any difficulty in retrieving those pledgets in the reoperation and what technique have they used to catch them before they fall back in the left ventricular cavity?

Finally, would this unlucky occasion be a milestone in their preference to not routinely perform an intraoperative transeosophageal echocardiogram in their aortic valve replacement group of patients, especially in those with calcific aortic stenosis and dense annular calcifications where an insufficient debridement will more than likely result in a small paravalvular leak which may not be that apparent when grossly looking at the ventricle following discontinuation of cardiopulmonary bypass or looking at the pulse pressure on the monitor. I would like to congratulate the authors on their work and presentation.

Reference