based on the fact that the patient had no signs of atherosclerotic coronary artery disease and the grafts were widely open. However, the decision to use the left internal mammary artery in the left anterior descending coronary artery territory was made as a precaution measure because of its high late patency rate.

Finally, there were not any doubts about the need to rebuild the LVOT, because the neck of the PSA was large and caused distortion. Care was taken when directing the patch to the aortic root because the valved conduit had to be partially implanted on it.

In conclusion, we report a case of successful reoperation for a giant PSA of an aortic homograft previously placed in the context of postpartum acute endocarditis of the aortic valve. Perfect knowledge of the anatomy and carefully planned surgery made for a relatively trouble-free procedure and excellent result.

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FEATURE ARTICLES

Perforation of the Valsalva Sinus After Implantation of Medtronic Freestyle Aortic Bioprosthesis

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We report on structural valve deterioration in patients with the Medtronic Freestyle aortic bioprosthesis (Medtronic, Inc, Minneapolis, MN), including spontaneous perforation of the Valsalva sinus. These occurred in four prosthesis in 3 patients using the modified subcoronary method or full root technique. One patient died of ruptured pseudoaneurysm and the others survived reoperation well. Careful follow-up is required after Freestyle bioprosthesis implantation.

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Only few reports have been published regarding structural valve deterioration (SVD) of the stentless aortic bioprosthesis. The Medtronic Freestyle aortic bioprosthesis (Medtronic, Inc, Minneapolis, MN) has provided excellent hemodynamics and improved surgical outcome including good survival and very low valve-related complication [1]. We report four cases of SVD in patients who had a Freestyle bioprosthesis.

From October 1999 through December 2002, 61 aortic valve operations including aortic root replacement with the Medtronic Freestyle valve (Medtronic, Inc) were performed at the Kobe University Hospital. Informed consent was obtained from all patients and institutional review board in our hospital demonstrated that approval was received and that consent was waived.

The pathology was aortic stenosis in 36 patients, aortic insufficiency (AI) in 21, and prosthetic valve failure in 4. Four valves were implanted in 3 patients who had SVD develop postoperatively.

The implant technique included the subcoronary technique in a patient and a full root technique in 3. With the subcoronary technique, the right and left sinuses of the Freestyle valve were incised and sutured to the native sinuses, respectively. The Freestyle valve noncoronary sinus was left intact and sutured to the ascending aorta. In the full root technique, the Freestyle valve was implanted with the whole system and the coronary buttons were anastomosed to the right and left coronary ostium correspondingly with 5-0 polypropylene suture. The first row suture was 4-0 polyester, and the sutures for the second row and aortic closure were 4-0 polypropylene.

Patient 1

A 63-year-old man presented with cardiopulmonary arrest and died. He had undergone aortic valve replacement using a 23-mm Freestyle valve with full root technique 51 months ago. Autopsy showed a large pseudoaneurysm with a hole 15 × 5 mm in diameter in the Freestyle valve noncoronary sinus, resulting in aortic rupture of the pseudoaneurysm to the right thorax. Pathologic findings showed that the defect in the noncoronary Valsalva sinus was at the transitional border between the elastic tissue and collagen fibers. There was no evidence of infection and suture line dehiscence.

Patient 2

A 62-year-old man was admitted because of severe AI and congestive heart failure. He had undergone aortic

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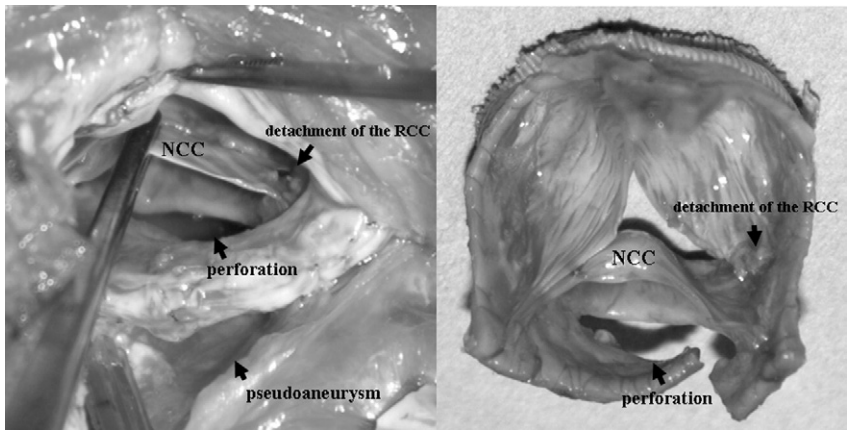

Fig 1. Operative findings showing a 15-mm hole in the Freestyle valve noncoronary sinus and a right cusp tear (right, intraoperative findings; left, specimen). (NCC = noncoronary cusp; RCC = right coronary cusp.)

valve replacement for AI with a 21-mm Freestyle bioprosthesis using the subcoronary technique 20 months ago. At the second surgery, a 15-mm hole in the Freestyle valve noncoronary sinus that was left intact at the prior operation was noted (Fig 1). Severe AI was due to a right cusp tear and a 2-mm noncoronary cusp fenestration close to the right noncoronary commissure. He had a new 21-mm Freestyle valve with the full root technique. Pathologic findings showed that noncoronary Valsalva sinus hole was in the transitional zone between the elastic tissue and collagen fibers (Fig 2). There was no evidence of infection in pathologic examination. His postoperative course was uneventful.

Patients 3 and 4

A 63-year-old woman with annulo-aortic ectasia complicating moderate AI and the ascending and arch aneurysm had a 25-mm Freestyle aortic valve replacement using full root fashion, the total aortic arch replacement with the 26-mm quadrifurcated graft. Seventeen months after the operation she had a pseudoaneurysm of the aortic root observed on the computed tomography (Fig 3). At the second surgery, two large holes (20 mm in diameter) were noted in the Freestyle valve left and noncoronary sinuses. She had aortic root replacement again with a 25-mm Freestyle valve using the full root technique. Histologic examination showed more or less the same findings as patients 1 and 2 in that the defects in the noncoronary and left Valsalva sinuses were located in the shift from the aortic elastic wall to the collagen fibers (Fig 4A). She had an uneventful recovery.

One year later, an identical false aneurysm was noted and she underwent the third operation, which revealed the same findings, with large holes (20 mm in diameter) in the Freestyle valve left and noncoronary sinuses (Fig 4B). The modified Bentall procedure with a 23-mm Carpentier-Edwards (Edwards Lifesciences, Irvine, CA) pericardial valve and a 28-mm straight graft was performed. Consistently there was no evidence of infection, rejection, degeneration, and suture line trouble. She has been well for 25 months.

Comment

Very few cases of structural valve deterioration have ever been reported after the implantation of Freestyle aortic valves. Bach and colleagues [1] published 8-year data of 700 patients at eight centers and reported the SVD incidence to be 0.4% [1]. There were three cases of SVD, all occurring with the subcoronary technique. The main causes were cusp tears of Freestyle valve, and there was no case of perforation of the Freestyle valve wall as seen in the present cases. Recently one report regarding perforation of the Freestyle valve wall was published [2]. In their case, aortic wall perforation occurred in the left and noncoronary sinuses of Valsalva as seen in our cases. They suspected the cause to be careless manipulation of the Freestyle valve. Large holes in the noncoronary sinus spontaneously occurred in four of our cases, one by the

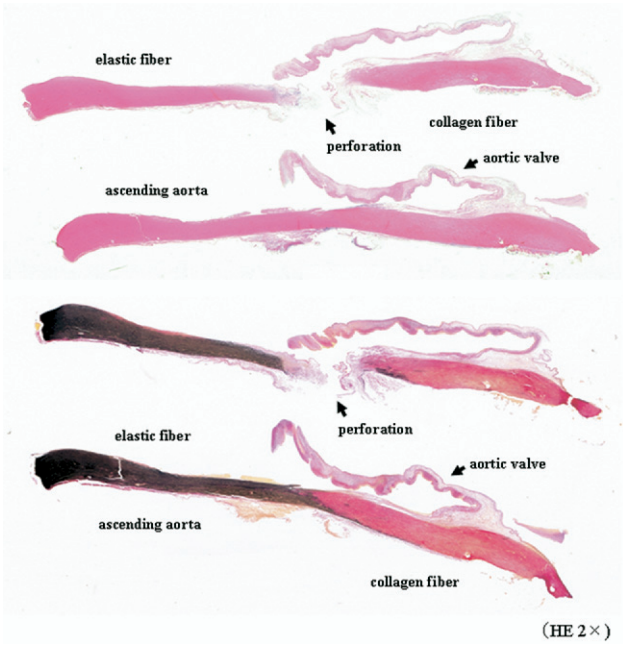

Fig 2. Pathologic findings showing noncoronary Valsalva sinus defect in the transitional zone between the elastic tissue and collagen fibers.