CASE REPORT

A worn Björk–Shiley prosthetic valve without valve dysfunction observed during ascending aortic replacement

Misao Komi, Akira Sugaya, Hirohiko Akutsu, Hirotaka Sato, Yuichiro Kaminishi & Yoshio Misawa
Division of Cardiovascular Surgery, Jichi Medical University, Shimotsuke, Tochigi, Japan

Correspondence
Yoshio Misawa, Division of Cardiovascular Surgery, Jichi Medical University, 3311-1 Yakushiji, Shimotsuke, Tochigi 329-0498, Japan. Tel: 0285-58-7368; Fax: 0285-44-6271; E-mail: tcvmisa@jichi.ac.jp

Funding Information
No funding information provided.

Received: 3 February 2014; Revised: 24 March 2014; Accepted: 15 April 2014

Clinical Case Reports 2014; 2(5): 180–182
doi: 10.1002/ccr3.86

Introduction
The original model for the Björk–Shiley mechanical valve (Shiley Inc, Irvine, CA) is at potential risk of disc deformity or fracture. Therefore, in 1971, the disc material was changed from Delrin® to pyrolite carbon. In the present case report, we replaced a well-functioning but worn Björk–Shiley valve during an emergency surgical repair of an acute aortic dissection.

Case Presentation
A 51-year-old man presented complaining of sharp upper back pain and right leg numbness. Thirty-nine years ago, his aortic valve was replaced with a 23-mm Björk–Shiley mechanical valve, and he was since maintained on Coumadin anticoagulant therapy. We could not get any other information about the valve. Chest and abdominal computed tomography revealed a dilated sino-tubular junction associated with a type A acute aortic dissection (Fig. 1). Echocardiographic findings showed good prosthetic valve function with 2.73 m/sec peak flow velocity and 2.0 cm² of the prosthetic valve area. We inferred that the leg numbness was likely caused by impaired spinal cord blood flow.

He underwent an emergency aortic surgical repair of the type A dissection. Resternotomy was performed using cardiopulmonary bypass under the right axillary artery and right femoral vein cannulation. After the additional superior vena cava cannulation, the heart was arrested with antegrade cardioplegic solution followed by intermittent retrograde cardioplegic solution. We observed that the implanted Björk–Shiley valve disc was worn and concave at the site meeting the strut on the ventricular surface (Fig. 2). The intimal flap was recognized in the ascending aorta. We judged that the implanted valve was Björk–Shiley Delrin one, and that it was no longer capable of maintaining the patient’s life. The worn Björk–Shiley valve was removed, and a valved conduit with a mechanical valve was implanted. The bilateral coronary artery orifices were reconstructed in an ordinary fashion. The distal anastomosis of the ascending aorta was just below the brachiocephalic artery. The brain was protected during aortic reconstruction by systemic moderate hypothermia and retrograde cerebral perfusion.

Postoperative recovery was uneventful, and the leg numbness subsided. Echocardiography showed normal prosthetic and left ventricular functions. He was discharged 12 days postoperatively, and he is doing well 2 years after the procedure.

Discussion
Mechanical valves historically have overcome many structural dysfunctions such as leaflet dislodging, disc fracture,
and others. Present day mechanical valves have an extremely low rate of structural valve dysfunction.

The Björk–Shiley valve was the first tilting disc mechanical valve implanted for heart valve replacement [1]. The valve disc was initially made from Derlin® [2, 3], but the material was later changed to pyrolytic carbon because of the potential risks of disc wear or fracture [4, 5]. Some clinical studies have reported cases of structural valve dysfunction of the Björk–Shiley valve [6–8]. In Japan, 23 cases of Björk–Shiley valve dysfunction have been reported, including structural dysfunctions 18 to 41 years after the initial implantation [9].

The implanted valve in our patient was functioning well before aortic surgery, but we replaced the valve because we confirmed disc erosion 39 years after implantation. This report may be the first describing a Björk–Shiley valve with disc erosion before the appearance of structural dysfunction. A patient with the first-generation Björk–Shiley valve may undergo repeated cardiac surgeries. In these patients, we should consider replacing the implanted valve.

Conclusions

The original Björk–Shiley mechanical valve model is at potential risk of disc deformity or fracture. We should consider replacement of this Björk–Shiley valve during future cardiac surgeries.

Figure 1. Preoperative Chest computed tomography. The ascending and descending aortae were dissected, including the aortic arch (A–D). The aortic root was dilated (D) and bilateral pleural effusion was present (B, C, and D).

Figure 2. Explanted Björk–Shiley Delrin valve. The explanted Björk–Shiley valve disc was worn and concave at the site meeting the strut on the ventricular surface.
Conflict of Interest

Misawa Y serves as a consultant to Terumo Co. and Edwards Lifescience Co.

References

1. Björk, V. O. 1970. Central flow tilting disc valve for aortic valve replacement. Thorax 25:439–444.
2. Sansone, F., E. Zingarelli, G. M. Actis Dato, G. Punta, R. Flocco, S. Del Ponte, et al. 2012. The 37-year durability of a Björk-Shiley Delrin-disc aortic valve prosthesis. Tex. Heart Inst. J. 39:284–285.
3. Brizzio, M. E., A. Zapolanski, J. Pantazopoulos, and M. Mentakis. 2010. Unexpected durability of a Björk-Shiley first-generation aortic valve after 40 years of implantation. J. Heart Valve Dis. 19:149–151.
4. Björk, V. O. 1971. Disc wear in the Björk-Shiley tilting disc valve. Experiment and clinical observation. Scand. J. Thorac. Cardiovasc. Surg. 5:87–91.
5. Björk, V. O. 1972. The pyrolytic carbon occluder for the Björk-Shiley disc valve prosthesis. Scand. J. Thorac. Cardiovasc. Surg. 6:109–113.
6. Larmi, T. K., and P. Kärkölä. 1974. Shrinkage and degradation of Delrin occlude in the tilting disc valve. J. Thorac. Cardiovasc. Surg. 68:66–69.
7. Masumoto, H., M. Shimamoto, F. Yamazaki, M. Nakai, S. Fujita, and Y. Miura. 2009. A case report of valve dysfunction. A case report of valve dysfunction associated with abrasion of Delrin disk used in early Björk-Shiley mitral valves requiring resurgery. Ann. Thorac. Cardiovasc. Surg. 15:126–128.
8. Lijoi, A., E. Parodi, and G. C. Passerone. 2001. An old Delrin tilting disc: eroded but strong. Tex. Heart Inst. J. 28:232–233.
9. Motoki, T., T. Matsueda, A. Kurushima, T. Otani, and Y. Fukumura. 2013. Prosthetic valve dysfunction resulting from a Björk-Shiley Delrin disc fracture in the mitral position: a case report. Tokushima Red Cross Hosp. Med. J. 18:36–39.