Replacement of an Aortic Starr-Edwards Ball Valve Prosthesis 28 Years After Implantation

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A 53-year-old woman who had undergone aortic valve replacement with a Starr-Edwards (S-E) valve (Model 1260) and open mitral commissurotomy 28 years previously was hospitalized with cardiac failure. Echocardiography showed mitral stenosis, mitral regurgitation, and a normally functioning S-E prosthesis. At reoperation, the mitral and aortic valves were replaced with St Jude bileaflet mechanical prostheses. Examination of the explanted S-E prosthesis revealed no structural abnormality other than lipid infiltration of the silastic ball. (Circ J 2004; 68: 507–508)

Key Words: Aortic valve replacement; Evaluation of explanted valve; Starr-Edwards silastic ball prosthesis; St Jude bileaflet mechanical prosthesis

The Starr-Edwards (S-E) ball valve prosthesis (Baxter Health Care Corp, Edwards Division, Santa Ana, CA, USA) has been widely used for aortic and mitral valve replacement since its introduction in the 1960s. McGoon et al reported that the S-E valve prosthesis was durable over a prolonged follow-up period, but thromboembolism remained a persistent problem. Other published data have reported such postoperative complications as hemolytic anemia, valve dysfunction caused by granulomatous hyperplasia, degeneration or lipid infiltration of the silicon ball and wearing out of the cloth cover.

The present paper describes the case of a female patient who underwent replacement of an aortic S-E valve prosthesis that had been implanted 28 years previously, and the postoperative evaluation of the explanted valve.

Case Report

A 53-year-old woman who had undergone aortic valve replacement with a S-E ball valve prosthesis (Model 1260, 9A, 23 mm) for aortic valve stenosis, together with open mitral commissurotomy for mitral stenosis, 28 years previously, was admitted to Kurume University Hospital because of worsening dyspnea on effort over the previous year. Auscultation of her heart disclosed a loud pansystolic murmur with prosthetic click, and a diastolic murmur characteristic of mitral stenosis at the apex of the heart. A chest X-ray showed marked cardiomegaly, and an electrocardiogram demonstrated inverted T wave in leads II, III, aVF and V1–6, as well as atrial fibrillation. Transesophageal echocardiography, including Doppler flow mapping, delineated the stenotic mitral orifice (mitral valve area 1.13 cm²) with moderate mitral regurgitation, dilatation of the left atrium without thrombus, and severe tricuspid regurgitation. It also showed a normally functioning S-E prosthesis. Coronary angiograms revealed severe stenosis of the proximal right coronary artery and a normal left coronary artery; blood examination revealed no signs of hemolytic anemia. On the basis of these findings, bypass grafting to the right coronary artery, mitral valve replacement and tricuspid annuloplasty, as well as prophylactic replacement of the aortic S-E prosthetic valve, were scheduled.

The operation was performed through a median sternotomy. There was a palpable systolic thrill in the aortic root. Cardiopulmonary bypass was established by cannulation of the ascending aorta and both caval veins. After cardioplectic arrest, distal anastomosis of the right coronary artery with bypass grafting using autologous saphenous vein was performed. The aortic prosthetic valve was replaced with a 19 mm St Jude (SJM) bileaflet prosthesis (St Jude Medical, Heart Valve Division, St Paul, MN, USA); the mitral valve was replaced with a 27 mm SJM prosthesis via the transseptal approach, and tricuspid annuloplasty (TAP) by Kay’s method was completed. The patient recovered uneventfully, and was discharged from the hospital 3 weeks
after operation. An echocardiogram before discharge confirmed that the prosthetic valves were functioning normally. Postoperative visual and X-ray evaluation of the explanted S-E prosthesis revealed no abnormality other than lipid infiltration (Fig 1).

**Discussion**

The S-E ball valve prosthesis was successfully introduced clinically in 1961–62 and since then has been widely used for aortic and mitral valve replacement. It is one of the artificial valves for which there are very long-term results; furthermore, the design of this prosthesis has remained basically unchanged over the years: Model 1260 is a caged ball with a sewn, cloth-covered ring and bare metal struts. McGoon et al reported that the S-E valve prosthesis was durable over a prolonged follow-up period, but that thromboembolism remained a persistent problem, and McGoon et al also reported that the S-E ball valve prosthesis was not possible because we believe that the hemodynamic functional of the bileaflet SJM valve prosthesis, which we use currently, is better. In the present case it was not possible to measure accurately the preoperative left ventricular (LV) outflow gradient because the presence of the silastic ball meant that true axial flow was not achieved; therefore, the LV outflow gradients of the 23 mm S-E prosthesis and the 19 mm SJM prosthesis were not able to be compared. However, the postoperative echocardiographic examination showed remarkable improvement of LV function: the LV ejection fraction changed from 68% to 81%, LV mass index changed from 212 g/m² to 169 g/m², LV end diastolic volume index changed from 87 ml/m² to 79 ml/m² and LV end systolic volume index changed from 34 ml/m² to 21 ml/m².

The present report describes a rare opportunity for evaluation of an explanted S-E ball valve prosthesis that had been implanted 28 years previously. There was no abnormality other than of lipid infiltration of the silastic ball and no ball variance, demonstrating that the S-E ball valve is durable for at least 28 years in some patients.

**References**