Case Reports

Preserving a Well-Functioning 33-Year-Old Starr-Edwards Aortic Prosthesis

in Repeat Aortic Root Aneurysm Repair

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We report the case of a 61-year-old obese male patient in whom we found a well-functioning 33-year-old Starr-Edwards aortic prosthesis during repeat aortic surgery. Rather than explant the prosthesis, we remodeled the aortic root, almost completely removing the aortic sinuses and leaving only a pillar of aortic tissue around the coronary ostia. The proximal end of a HEMASHIELD *tube-graft was then scalloped to accommodate the remaining aortic tissue.*

The patient's heart function was excellent after his weaning from cardiopulmonary bypass. Simplifying the repeat aortic root repair, by preserving a well-functioning Starr-Edwards valve, might lead to a better outcome in similar cases.

We also discuss other instances of this valve's durability. ***(Tex Heart Inst J 2016;43(6): 534-6)***

Repeat aortic root aneurysm repair presents a complex technical challenge that can result in high morbidity and mortality rates. Simplifying the procedure by preserving a previously placed prosthesis might lead to a better outcome.

We report the case of a patient who had a well-functioning Starr-Edwards aortic prosthesis during repeat aortic surgery. Echocardiograms before his discharge from the hospital and at his 6-month follow-up evaluation confirmed that the Starr-Edwards caged-ball valve had excellent function, with an aortic gradient of 22 mmHg. We discuss other instances of this valve's durability.

Case Report

In June 2015, a 61-year old obese man (body mass index, 35 kg/m^2; body surface area, 2.2 m^2) was admitted for an elective repair of a 6-cm aortic root aneurysm. As a baby, he had undergone a commissurotomy of his congenitally stenotic aortic valve. Thirty-three years before this present admission, he had undergone replacement of his native aortic valve with a Starr-Edwards caged-ball valve of unknown size (Fig. 1). A recent transthoracic echocardiogram showed the prosthesis to be functioning normally, with a mean gradient of 19 mmHg and a left ventricular ejection fraction of 0.60 to 0.65. Table I shows other hemodynamic characteristics of the valve as revealed by echocardiogram.

Because of the aneurysm's adherence to the sternum, a femoral arterial and venous-to-right atrial cannulation was used for cardiopulmonary bypass (CPB), before opening the sternum. The Starr-Edwards prosthesis appeared to be totally intact and unrestricted (Fig. 2), but there was tiny fibrinous material on the struts near the base. These were washed out and cleared easily. The aortic aneurysm was restricted to the root. On the basis of these findings, we remodeled the aortic root, almost completely removing the aortic sinuses and leaving only a pillar of aortic tissue around the coronary ostia.

The prosthesis was not explanted. The proximal end of an appropriate size 34-mm HEMASHIELD® tube-graft (MAQUET Cardiovascular, LLC; Wayne, NJ) was scalloped to accommodate the remaining aortic tissue (via Yacoub's remodeling technique).[1] The proximal and distal lines between the graft and the aorta were sutured with 3-0 Prolene.

Key words: *Aortic valve/surgery; heart valve prosthesis; reoperation; time factors; treatment outcome*

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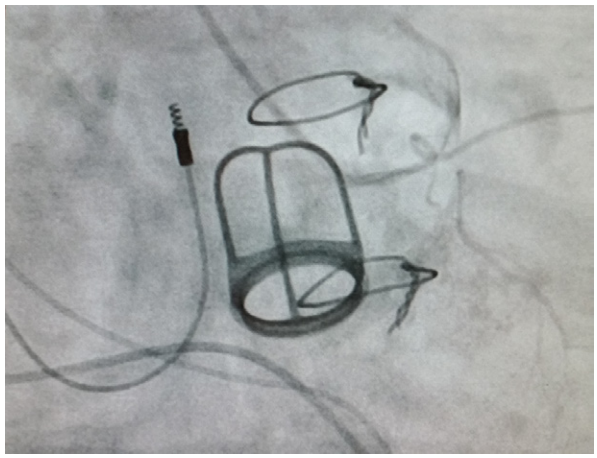

Fig. 1 *Angiogram shows the Starr-Edwards caged-ball prosthesis.*

TABLE I. Preoperative Hemodynamic Values Yielded by the Starr-Edwards Aortic Prosthesis

Variable	Value
LVOT diameter (cm)	2.4
LVOT mean pressure gradient (mmHg)	1.64
LVOT maximal velocity (m/s)	0.81
LVOT mean velocity (m/s)	0.6
LV stroke index (mL/m^2)	40.18
LV stroke volume (mL)	86
LV ejection fraction	0.60–0.65
AV mean velocity (m/s)	2.02
AV area (cm^2)	1.81

AV = aortic valve; LV = left ventricular; LVOT = left ventricular outflow tract

The patient's heart function was excellent after his weaning from CPB. The CPB time was 250 min, and the aortic cross-clamp time was 133 min. Because of diffuse coagulopathy, we administered platelets, fresh frozen plasma, and cryoprecipitate. The patient's postoperative recovery of 5 days was uneventful. Echocardiograms before his discharge from the hospital and at his 6-month follow-up evaluation confirmed that the Starr-Edwards prosthesis had excellent function, with an aortic gradient of 22 mmHg.

Discussion

Repeat aortic root replacement presents complex technical challenges that affect selection of the best operative approach. For this middle-aged patient, a composite

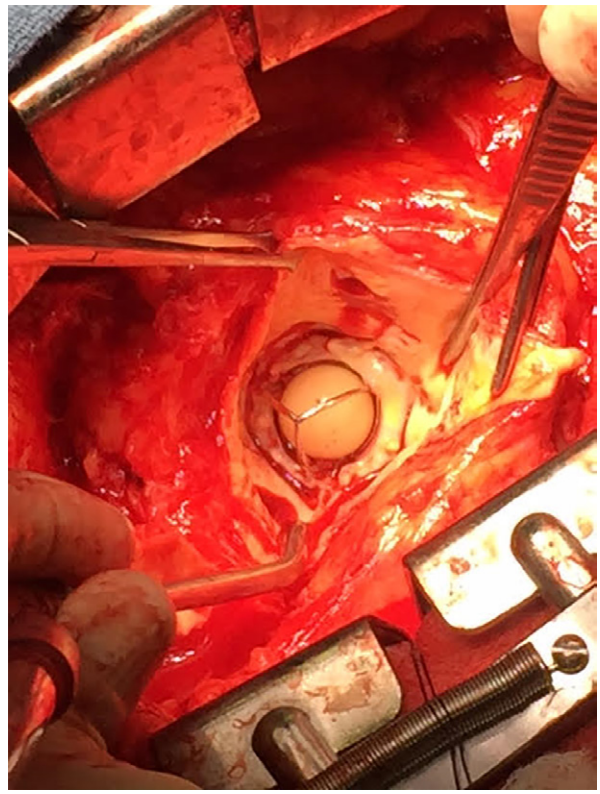

Fig. 2 *Intraoperative photograph shows a pristine Starr-Edwards prosthesis, implanted 33 years earlier.*

mechanical graft replacement would have been our intended option. Explanting this very old aortic prosthesis would have prolonged the operation, thereby increasing the risk of postoperative adverse events. Furthermore, we knew that a second mechanical valve replacement in this patient—who had a high body mass index and surface area—would risk a higher mechanical prosthetic gradient and could possibly result in heart failure.[2] Given the anatomic features in our patient, which included a well-functioning prosthesis with a low gradient, we chose a less arduous but appropriate procedure to avoid major sequelae such as anastomotic bleeding, mobilization of the coronary button and reattachment, and paravalvular leaks. Durability of longer than 3 decades has been reported[3,4] for the Starr-Edwards prosthesis; the longest-functioning Starr-Edwards valve ever documented in the aortic position has lasted 51.7 years.[5] In contrast with the current case, all previously reported devices were explanted during the repeat operations. After careful preoperative evaluation of the patient—in regard to such factors as age, projected durability of the prosthesis, and specific anatomic qualities of the aortic root—the physician should be able to advise that patient on the wisdom of retaining or explanting the old prosthesis. The merit of the conservative option chosen for our patient needs to be further evaluated by long-term monitoring.

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