Aortic regurgitation with associated significant dilation of the ascending aorta is relatively uncommon in patients with Takayasu’s arteritis. Both the choice of surgical procedure and the selection of the grafts for patients with these complications have been controversial. We report a patient with Takayasu’s arteritis who underwent successful replacement of the aortic root and the entire ascending aorta with a homograft valve and conduit.

Case Report

A 36-year-old woman with severe long-standing Takayasu’s arteritis was noted to have a cardiac murmur consistent with aortic incompetence. Echocardiography confirmed the presence of aortic regurgitation and revealed a dilated left ventricle. Magnetic resonance imaging (MRI) demonstrated a narrowed descending aorta and a fusiform aneurysm involving the entire ascending aorta (Fig 1). The aortic root measured 2.4 cm at the level of the valve ring whereas the ascending aorta at 3.5 cm above the valve was dilated to 6.5 cm in diameter. Cardiac catheterization showed a mean wedge pressure of 13 mmHg, pulmonary artery pressure of 24/12 mmHg and an aortic pressure of 174/38 mmHg, with no evidence of a pressure gradient across the aortic valve. Her arteritis, which had been worsening with a C-reactive protein level of 6.0 mg/dl, improved with the introduction of cyclosporine therapy. Preoperatively she was also taking 20 mg of prednisolone daily and her C-reactive protein level was within normal range.

Surgery was performed in July 1996 using a standard cardiopulmonary bypass with selective cerebral perfusion. An arterial cannula was inserted into the femoral artery and a 2-stage venous cannula was inserted into the right atrium. Balloon cannulae (MD-25412; Sumitomo, Tokyo, Japan) were inserted into the right subclavian artery, left carotid artery, and left subclavian artery, respectively. The subclavian arteries were approached through an infracavicular incision. The ascending aorta was inflated and adherent to the surrounding tissue. After balloon occlusion at the level of the proximal aortic arch, the aorta was transected and the coronary ostia buttons were excised from the aortic wall. A cryopreserved aortic allograft valve and conduit (CryoLife, Inc, Kennesaw, GA, USA), procured from a 32-year-old male, was used. The ABO blood type of the donor and recipient was incompatible. The size of the homograft valve was 2.2 cm and conduit length was 8.8 cm. Plegeted 3-0 prolene mattress sutures (Ethicon Inc, Somerville, NJ, USA) were placed in the host aortic annulus and passed through the muscle cuff of the allograft. The sutures were then reinforced with a strip of autologous pericardium. The coronary button anastomoses were carried out with continuous 4-0 prolene sutures buttressed with autologous pericardium. The distal aortic anastomosis was carried out just proximal to the origin of the brachiocephalic artery. The suture line was again strengthened with autologous pericardium (Fig 2).

Key Words: Aortic root replacement; Cryopreserved homograft; Takayasu’s arteritis
The resected aortic wall was examined microscopically and there was evidence of adventitial thickening and infiltration with inflammatory cells, predominantly lymphocytes. The medial elastic lamellae were found to be destroyed. The intima was thickened with evidence of thrombosis in the injured aortic segment. Steroid and cyclosporine therapy was initiated immediately after surgery for the arteritis. The patient's postoperative course was uneventful and more than 2.5 years after the operation echocardiography demonstrated no evidence of aortic regurgitation and MRI demonstrated no signs of graft enlargement (Fig 3).

Discussion

Takayasu's arteritis causes progressive stenosis of the aorta and its main branches, and arterial aneurysm formation. Dilatation of the sinotubular junction is thought to be the primary cause of aortic regurgitation. Surgical treatment of ascending aortic aneurysm in the setting of aortic regurgitation in patients with Takayasu's arteritis can be complicated, because of the fragile aortic annulus and aortic wall. As a result, postoperative perivalvular leaks and graft detachment have been commonly reported with the use of composite grafts bearing mechanical prosthetic valves. Yamauchi et al reported that among 69 patients with arteritis who underwent aortic valve operation for aortic regurgitation, valve or graft detachment developed in 6 patients. The translocated modified Bentall's procedure was used for patients at high risk for valve detachment to reduce the mechanical stress on the aortic annulus. However, there are some cases showing recurrent valve or graft detachment after modified Bentall's procedure. In the present patient, we used a cryopreserved homograft valve and conduit for the replacement of the aortic root and ascending aorta in order to avoid using any other prosthetic materials. Such homografts are characterized by their pliability and are thus appropriately compliant. The tissue properties of the homograft yield physiologic hemodynamics and thereby decrease the stress placed on the aortic annulus and distal suture line. Aortic root enlargement is a major concern; we therefore buttressed the proximal suture line with autologous pericardium to prevent future aortic annulus dilation. Echocardiographic study affirmed the competence of this procedure. Furthermore, because cerebral events are an important cause of mortality and morbidity in patients with Takayasu's arteritis, avoidance of anticoagulation therapy is desirable. The unusual complications of a pseudoaneurysm and dissection of a homograft ascending aorta have been reported. Despite these unusual complications, we believe that homograft valve and conduit replacement is an appropriate procedure for patients with Takayasu's arteritis, especially if they are receiving steroid therapy. The long-term results of this procedure need further study.

References