

Patient With Takayasu Arteritis Treated with the Ozaki Procedure and Ascending Aorta Replacement

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ABSTRACT

Due to the specific pathogenesis of Takayasu arteritis, complicated with aortic valve disease, surgical treatment always has been a difficult problem. We report a 26-year-old female patient with Takayasu arteritis who was treated with the Ozaki procedure for aortic valve disease and replacement of the ascending aorta with a straight synthetic graft. The surgery achieved satisfactory early results.

INTRODUCTION

Takayasu arteritis is a rare, chronic inflammatory disease of the large vessels that usually involves the aorta and its major branches. Aortic valve insufficiency is the most common complication of Takayasu arteritis with valvular disease, with an incidence rate of 7% to 34%, and is mostly secondary to ascending aortic dilatation or ascending aortic aneurysm. Some patients require surgical treatment, and aortic valve replacement and composite valved conduit surgery are the two most commonly selected surgical procedures [Matsuura 2005]. However, the optimal surgical approach remains unclear. The Ozaki procedure is aortic valve neocuspidization (AVNeo) procedure utilizing autologous pericardium. The mid-term outcomes of the Ozaki procedure were satisfactory in 850 patients with various aortic valve diseases [Ozaki 2018]. We report a patient with Takayasu arteritis who underwent the Ozaki procedure at the same time as ascending aortic replacement, and the surgery achieved good early results.

Ethical standards: The authors assert that all procedures contributing to this work complied with the ethical standards of the relevant national guidelines on human experimentation

(Fuwai Hospital Chinese Academy of Medical Sciences) and with the Helsinki Declaration of 1975, as revised in 2008, and were approved by the institutional ethics committee.

CASE REPORT

A 26-year-old female patient with a six-month history of Takayasu arteritis was asymptomatic. Her ultrasonography revealed ascending aortic dilatation, a thickened aortic valve with severe regurgitation (Figure 1A), an aortic valve annulus of 20 mm, and diffuse intima-media thickening of the bilateral common carotid arteries. (Figure 1) A chest computed tomography (CT) showed the diameter of the aorta at the level of the ascending aorta was approximately 50mm (Figures 1B and 1C), and the diameter of the aortic sinus was 32 mm. Oral corticosteroids were administered for 2 weeks before surgery.

Access to the heart was obtained through median sternotomy. A 70 × 80 mm piece of the autologous pericardium was harvested (Figure 2A), treated with 0.6% glutaraldehyde for 10 minutes, and then treated three times with saline solution for 6 minutes each time. (Figure 2) Cardiopulmonary bypass was established through the ascending aorta and the right atrium. The diseased aortic valve was resected. We determined the size of the cusps by the Ozaki AVNeo Sizer System and revealed a 27-mm size for each of the remodelled cusps. We cut out three identical cusps from the treated autologous pericardium (Figure 2B). The pericardial cusps were fixed to the aortic annulus using a continuous suture line with 4-0 Prolene, following the Ozaki procedure (Figure 2C). Suturing started from the right coronary cusp, and the first suture was passed from the cusp's midpoint to the annulus's midpoint. Suturing always is from upside to downside on the annulus and vice versa on the cusp, with a smooth surface of the cusp facing the left ventricle.

After dissection of the ascending aorta, ascending aorta replacement was performed using a straight Maquet 30-mm synthetic graft. The cardiopulmonary bypass time was 220 minutes, and the aortic cross-clamp time was 186 minutes.

Intraoperative transesophageal and postoperative transthoracic echocardiograms showed an aortic valve with trivial regurgitation. Postoperative aortic wall pathology showed changes in the aortitis healing period. The patient recovered well and spent 65 hours in the intensive care unit; she was

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Figure 1. Preoperative echocardiography and CT. A) Echocardiography showed severe aortic valve insufficiency and a vena contracta width of 8 mm (B, C). A chest CT scan with 3D reconstruction showed the ascending aorta at the level of the pulmonary artery trunk measuring 50 mm.

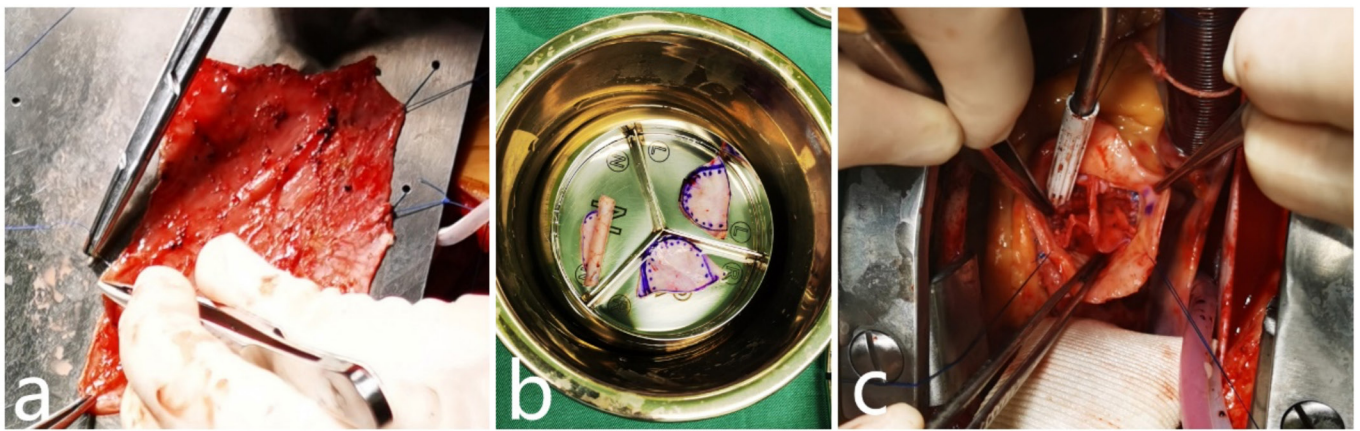


Figure 2. Surgical procedure. A) A 70 × 80 mm piece of the autologous pericardium was harvested. B) Three remodeled cusps, each of which was 27 mm in size, were obtained from the pericardium. C) Surgical view of the neo-tailored tricuspid aortic valve.

discharged on the 10th postoperative day. After 11 months of follow up, the patient recovered well without any symptoms and was able to take care of herself in daily life.

DISCUSSION

Most patients with Takayasu arteritis are women of child-bearing age, and most of them have an onset before the age of 30 years [Li 2017]. We report a case of an ascending aortic aneurysm and severe aortic valve insufficiency, due to Takayasu arteritis. The indications for surgery were clear, and the aortic valve and ascending aorta needed to be treated at the same time. However, the patient was a 26-year-old female with reproductive needs, and therefore, the use of mechanical valves that require long-term anticoagulation therapy or the replacement of biological valves with a prosthetic with a short service life was not suitable. Prosthetic valves have a higher risk of valve shedding in patients with Takayasu arteritis, especially in the active period of inflammation [Matsuura 2005]. In addition, because the aortic valve in patients with Takayasu arteritis may have pervasive inflammation, aortic root replacement with valve preservation is not a good choice [Matsuura 2005].

Therefore, the Ozaki procedure and ascending aorta replacement are the best options in our opinion. First, the material used in this operation is autologous pericardium, which can completely avoid the use of artificial valves and angioplasty rings, avoiding long-term postoperative anticoagulation. Relevant reports also indicate that the medium-term risk after the Ozaki procedure is equivalent to that of biological valves [Umberto 2021]. Second, these procedures maximize the effective valve area and maintain the natural motion of the aortic annulus. The reconstructed aortic valve has significantly lower pressure gradients than conventional aortic valve replacements, which is particularly important for patients with a small aortic valve annulus. The aortic valve annulus of the patient was only 20 mm, and a larger bioprosthetic valve could not be implanted. Third, this method has a wide range of applications and can be applied to almost all aortic valve lesions. Ozaki et al. reported midterm results of 850 aortic valve reconstructions published in 2018, which included all types of aortic disease (aortic stenosis, aortic valve insufficiency, mixed disease) and all types of anatomies (tricuspid, bicuspid, unicuspid, and quadricuspid aortic valves). The mean follow-up period in that study was 53.7±28.2 months, the longest follow up was 118 months, and satisfactory results were obtained [Ozaki 2018].

CONCLUSION

In summary, concurrently performing the Ozaki procedure with ascending aortic replacement is a very good surgical option for patients with Takayasu arteritis. However, further evidence from long-term studies and randomized clinical trials is required to draw a more reliable conclusion.

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