Case report

Bilateral coronary ostial patch angioplasty with autologous pericardium in Takayasu arteritis: a case requiring replacement of the aortic valve and ascending aorta

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Received 7 April 2004; received in revised form 5 July 2004; accepted 12 July 2004; Available online 20 August 2004

Abstract

Since the lesions and stages of Takayasu arteritis vary with each patient, surgical treatment of this disease requires meticulous planning for the timing of operation, technique, material used, and postoperative medication. We report a rare complex lesion of Takayasu arteritis, which required simultaneous repairs for aortic regurgitation, a dilated ascending aorta and bilateral coronary ostial stenosis. Such multiple lesions have not been reported previously. A 47-year-old woman was referred to us because of heart failure and chest pain. The coronary ostial stenosis were enlarged with generously sized autologous pericardial patches, and separate aortic valve and ascending aortic replacements were performed since the diameter of the Valsalva sinus was 37 mm. The postoperative course was uneventful, but steroid therapy was commenced postoperatively because inflammatory reaction remained high.

Keywords: Takayasu arteritis; Aortic root; Aortic valve regurgitation; Coronary artery disease; Pericardium

1. Introduction

The incidence of coronary lesions has been reported to be about 10% in patients receiving a clinical diagnosis of Takayasu arteritis [1]. In the aorta and its main branches, not only stenotic but also dilated lesions are well recognized and the dilatation of the aortic root could be the main cause of aortic regurgitation. The present case required surgery for aortic regurgitation, a dilated aortic root and bilateral coronary ostial stenosis. We successfully performed simultaneous operation for these three lesions, which has not been reported previously.

2. Clinical summary

A 47-year-old woman was referred to our hospital because of heart failure. Her blood pressure was 104/38 mmHg, but no difference between the blood pressures of her arms was noted. Chest CT revealed a thickened and dilated ascending aorta, whereas no peripheral vascular lesion was noted in any arterial imaging study. On echocardiography, severe aortic regurgitation was noted with a dilated left ventricle. The diameters of the ascending aorta, sinotubular junction (STJ), Valsalva sinus and annulus were 53, 35, 37, and 22 mm, respectively. Coronary angiography revealed 75% stenosis of both left and right coronary ostia with normal peripheral coronary arteries. Blood examination showed a slightly increased inflammatory reaction with C-reactive protein (CRP) 2.2 g/dl. Analysis of the human leukocyte antigen gene revealed that it was B52 positive, which halotype is known in patients with Takayasu arteritis.

Cardiopulmonary bypass was established with an arterial line from the left femoral artery and venous lines from both venae cavae. Two pieces of autologous pericardium were harvested for patchplasty of both coronary ostia. The diffusely dilated aorta was completely transected above the STJ. The aortic wall showed severe fibrosis, 3–4 mm in thickness. Since complete exposure of the left main trunk (LMT) separating it from the pulmonary trunk was not possible because of dense adhesion, a 2 mm probe was
gently inserted from the left coronary ostium, which was narrowed by intimal thickening. An incision was extended to the orifice and continuing the LMT for a length of 8 mm, guided by the inserted probe. A rectangular patch with untreated autologous pericardium was sutured to the LMT and was continuously sutured up to the aortic wall. The orifice of the right coronary artery was also constructed as described above with another patch (Fig. 1).

After construction of the coronary artery ostia, the thickened aortic valve was removed and an mechanical prosthesis was implanted with an interrupted mattress since the aortic annulus was not dilated and its surrounding tissue was strong enough to suture. Then an artificial graft was sutured to the aortic ends.

Histological sections of the ascending aortic wall demonstrated marked intimal proliferation and fibrous degeneration of the elastic fibers of the media and adventitia, and some round cell infiltration of the adventitia, which were compatible with Takayasu arteritis. A segment of the aortic valve found to have myxoid degeneration. Postoperative coronary angiography 4 weeks after surgery showed that both coronary artery ostia were widely enlarged without aneurysmal formation (Fig. 2). Prednisolone (10 mg) was commenced three weeks after operation, since CRP remained high at 3–4 mg/dl.

3. Discussion

Although it is not frequently observed, the presence of coronary ostial stenosis is potentially lethal in Takayasu arteritis. Aortocoronary bypass grafting and transaortic endarterectomy for this serious complication have been reported previously. However, the late results of these procedures have been unsatisfactory because of the inflammatory process of the aorta and its branches. Considering the many advantages of ostioplasty, including physiologic perfusion of the coronary tree, obviating the need for retrograde flow, and subsequent percutaneous angioplasty, patch enlargement was desirable for the coronary ostial stenosis. In fact, this procedure was reported to be effective for atherosclerosis and other inflammatory diseases, although the patch material remains controversial. In cases with artherosclerosis, a piece of autologous pericardium [2], an vein graft [3], and an ITA [4] have been used as patches for coronary ostioplasty, while a superficial femoral artery [5], and bovine pericardium [6] have been used as patches in Takayasu arteritis. However, no report is available on long-term results, particularly in Takayasu arteritis. Since a generously sized patch is required [5] to obtain large coronary ostia and native coronary ostium may become occluded, we used autologous pericardium to obtain a large, easy trimmed patch.

Fig. 1. Operative procedure. (a) An oblique incision was begun at the transverse aortotomy from the right side of the orifice and continuing to the LMT orifice. (b) A rectangular pericardial patch was sutured in a manner that created a curtain fold that arched over the roof of the coronary artery. (c) An oblique incision was made from the left side of the orifice to the RCA orifice, and ostial angioplasty was completed in the same manner. (d) After replacement of the aortic valve, an artificial graft was sutured to the proximal aortic end, and U-shape mattress sutures were used at the transverse aortomy where construction of the coronary artery ostia was done. Ao: aorta, PA: pulmonary artery, LMT: left main trunk, RCA: right coronary artery.

Fig. 2. Postoperative coronary angiograms show enlarged coronary ostia with pericardial patches.
In addition, the patch was sutured in a manner that created a curtain fold that arched over the roof of the coronary artery, thus ensuring a sufficient orifice for the coronary ostium even though the native orifice was occluded due to progressive inflammation. We have used the same technique in another patient with Takayasu arteritis, and no aneurismal formation or stenosis was observed four years later.

Although dilatation of the STJ could be the main cause of aortic regurgitation, an aortic valve sparing operation is not suitable because of myxoid changes in the aortic cusp [7], as shown in the present case, resulting in a high rate of reoperation [8,9]. In any patient with a dilated aortic root (more than 5 cm) including Takayasu arteritis, aortic root replacement is required with a valved conduit or homograft [6]; however, it is not clear whether the aortic root should be replaced when its size is less than 5 cm in Takayasu arteritis. In the present case, the STJ and Valsalva sinus were preserved because their diameters were 35 and 37 mm, respectively. We have treated two patients with separate replacements of aortic valve and ascending aorta in Takayasu arteritis, but no further dilatation of the aortic root has been observed during 5 years of follow-up. Although the long-term results are clearly needed, we believe the treatment options for aortic root aneurysm in Takayasu arteritis are the same as for aneurysm due to atherosclerosis, and the control of inflammation is an important strategy in this disease. As emphasized in several reports, steroid therapy to suppress inflammation is considered crucial for a good long-term result. Certainly, long-term follow-up is mandatory to elucidate the fate of the pericardial patch and the rest of the aortic root where the native aortic wall remains.

References