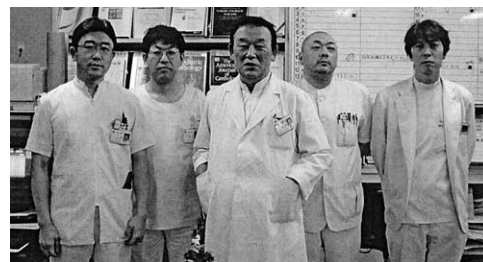


A safe strategy for surgical repair of coarctation of the aorta in an adult

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In adults, coarctation of the aorta is usually accompanied by dilatation of the aorta at a site distal to the coarctation, and graft replacement of the aorta is therefore usually performed. Pathological study of coarctation has revealed that median necrosis of the aorta and aortic injury may occur as a result of crossclamping a portion of the aorta to the site of coarctation. Herein, we report a successful surgical repair of coarctation of the aorta by graft replacement using open anastomosis technique under the condition of deep-hypothermic circulatory arrest and a central cannulation technique. These techniques appear to be safe, and we recommend that they be used as a standard procedure for surgical repair of coarctation of the aorta in adults.

Clinical Summary

A 57-year-old woman had been followed up for coarctation of the aorta (postductal type) and descending aortic aneurysm for 9 years. The size of the aortic aneurysm had increased to 55 mm, and pressure gradient between the arms and legs was 46 mm Hg at rest. Three-dimensional computed tomography confirmed the presence of a coarctation of the aorta just distal to the left subclavian artery, and the presence of a descending aortic aneurysm (Figure 1). Magnetic resonance imaging revealed the left Th11 intercostal artery to be an Adamkiewicz artery. A graft interposition of the coarctation and aneurysm of descending aorta was planned.

Surgical Procedure

The patient was placed in a left thoracotomy position, with the hips swiveled for femoral cannulation. The incision was performed through the fourth intercostal space. Tape was passed around the ascending aorta to assist cannulation. After exposure of the aortic



Figure 1. Three-dimensional computed tomography demonstrated extreme coarctation of the aorta (postductal type) near the junction of the aortic arch and the descending aorta, as well as an aneurysm of the descending aorta.

aneurysmal segment, tape was also passed around the descending aorta at the level of Th9, then cardiopulmonary bypass (CPB) was initiated between a double-staged venous cannula inserted through the right femoral vein and an ascending aorta cannula, and core cooling was commenced. An arterial cannula was also inserted through the right femoral artery. After ventricular fibrillation of the heart, a venting tube was inserted through the left atrial appendage and the ascending aorta was crossclamped, and cold cardioplegia was performed to obtain a state of cardiac arrest. Circulatory arrest was achieved at a rectal temperature of 21.5°C. The descending aorta was opened, and the portions of the coarctation and aneurysm were resected. Then, a 22-mm woven double-velour Dacron graft (Hemashield Gold; Boston Scientific Corp, Natick, Mass) was anastomosed to the proximal aorta with 3-0 polypropylene by an open proximal technique. The incision of the proximal aorta was extended toward the left subclavian artery to adjust the size of aortic orifice to the graft. The distal descending aorta was cross-clamped during this process. After completion of proximal anastomosis, the head and body were reperfused with a vascular clamp through the ascending aortic and right femoral arterial cannulas, respectively. Distal aortic anastomosis was performed with 3-0 polypropylene at the Th9 level during rewarming. Weaning from CPB was easy and the postoperative course was uneventful. There

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was no arterial pressure gradient between the arms and legs after the operation.

Discussion

Surgical repair of aortic coarctation has expanded to include resection with end-to-end anastomosis,¹ prosthetic patch aortoplasty,² subclavian flap aortoplasty,³ and aortic resection with graft replacement. Because further aortic growth is not a problem in adult patients, graft replacement or bypass is often used and produces the best results.^{4,5} As the aortic wall in the portion of coarctation was thought to be fragile in our case because of the median necrosis, we used an open proximal anastomosis technique to avoid possible aortic injury caused by crossclamping.

The central cannulation technique⁶ is preferred for correction of postductal coarctation of the aorta to secure sufficient cerebral perfusion. In our case, this technique also had the advantage of preventing scattering of debris by the blood jet in an aortic aneurysm to cerebral blood flow. We prefer insertion of a venous cannula into the right atrium through the right femoral vein rather than insertion into the main pulmonary artery, as originally reported by Westaby and colleagues,⁶ because we have sometimes found that the wall of the main pulmonary artery is very fragile and thus susceptible to injury. We routinely insert a double-staged

venous cannula through the right femoral vein in operations for descending aortic aneurysms and have experienced no technical problems.

In conclusion, our "modified" central cannulation technique and open proximal anastomosis technique seem to be safe. This is an appropriate approach for surgical correction, and we recommend it as the standard approach for the coarctation of the aorta in adults.

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Severe pulmonary stenosis and aortopulmonary fistula caused by a dissecting aneurysm in the ascending aorta

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A 35-year-old man was referred to our hospital because of persistent fever lasting for 1 month, mild dyspnea, and continuous heart murmur. Oral and intravenous antibiotics had been administered at another hospital. The leukocyte count was 12,000/ μ L, and the serum C-reactive protein level was 3 mg/dL. The patient had never had severe pain

in the chest or in the back, but he had a 1-year history of multiple systemic abscesses that spontaneously developed and healed. Several imaging studies revealed a dissecting aneurysm in the ascending aorta that compressed the pulmonary artery (PA), causing severe pulmonary stenosis (pressure gradient, 75 mm Hg on echocardiography), and that was accompanied by a fistula into the PA (Figure 1). Proximally, the aneurysm reached the level of the aortic valve annulus. A moderate amount of right pleural effusion and marked liver congestion were also noted. On that day, he was admitted to our hospital. However, severe PA stenosis precluded successful right-heart catheterization. Antibiotic therapy was discontinued, but blood culture failed to disclose causative organisms. The clinical condition of the patient remained almost stable for 5 days, but then he suddenly fell into a state of cardiogenic shock and multiple organ failure on the sixth day and underwent emergency surgical intervention. The right ventricle was severely distended and had poor contractility. Intraoperative blood sampling revealed that the Qp/Qs ratio was 4.0. The aneurysm in front of the PA was 5 cm in diameter, and hematoma was absent. The almost round intimal tear in the ascending aorta, 8 mm in diameter, appeared to be a chronic change. The PA wall was gray and very floppy, and there was an irregularly shaped orifice of the fistula, 4

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