

## Endovascular Rescue of a Narrowed Aorto-Aortic Bypass Graft in a Patient with Takayasu's Arteritis

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We report a case of successful endovascular treatment of a pseudoaneurysm and the obstruction of an aorto-aortic bypass graft, which had been performed to treat Takayasu's arteritis fifteen years prior, at the thoracic aorta. Along with the immediate relief of proximal hypertension that had caused severe heart failure, the successful exclusion of the pseudoaneurysm and the patency of the stem graft were maintained three years after the procedure.

Key words: 1. Aortic Aneurysm  
2. Stents  
3. Vascular disease

### CASE REPORT

A 59-year-old female visited an emergency room of Gachon University Gil Medical Center due to dyspnea that had lasted for five days. The initial blood pressure in her right arm was 220/100 mmHg, and her respiration rate was 40 breaths per minute. Chest radiography revealed cardiomegaly, a prominent aortic notch, and pulmonary edema, which explained her tachypnea and arterial hypoxemia (Fig. 1A). The laboratory data was as follows: creatine kinase-MB, 1.20 ng/mL; troponin I, 0.08 ng/mL; brain natriuretic peptide, 5,850 pg/mL; creatinine, 1.3 mg/dL; C-reactive protein, 12.30 mg/L; and an erythrocyte sedimentation rate of 1.1 mm/hr. An electrocardiogram showed sinus tachycardia with a Q wave on V1, ST segment elevation from V1 to V3, and T wave inversion on anterior precordial and inferior limb leads. Echocardiography showed akinesia of the anterior wall ante-

roseptum, and inferoseptum from the low middle left ventricle to the apex with thinning and a preserved ejection fraction of 50% with left ventricular hypertrophy. The medical history taken from the patient's family revealed that she had been diagnosed with hypertension, Takayasu's arteritis, and cerebral infarction at another hospital fifteen years ago. In addition, an aortic bypass graft procedure carried out to treat thoracic aortic stenosis 15 years ago. When the patient presented to an emergency room of Gachon University Gil Medical Center she had left hemiparesis as the sequel of her previous stroke.

Computed tomography revealed severe stenosis in the descending thoracic aorta and diffuse circumferential wall calcifications (Fig. 1B). Wall thickening was also observed in the distal portion of the aortic arch and in the left common carotid artery. Between the proximal descending thoracic aorta and supraceliac abdominal aorta, there was a bypass graft,

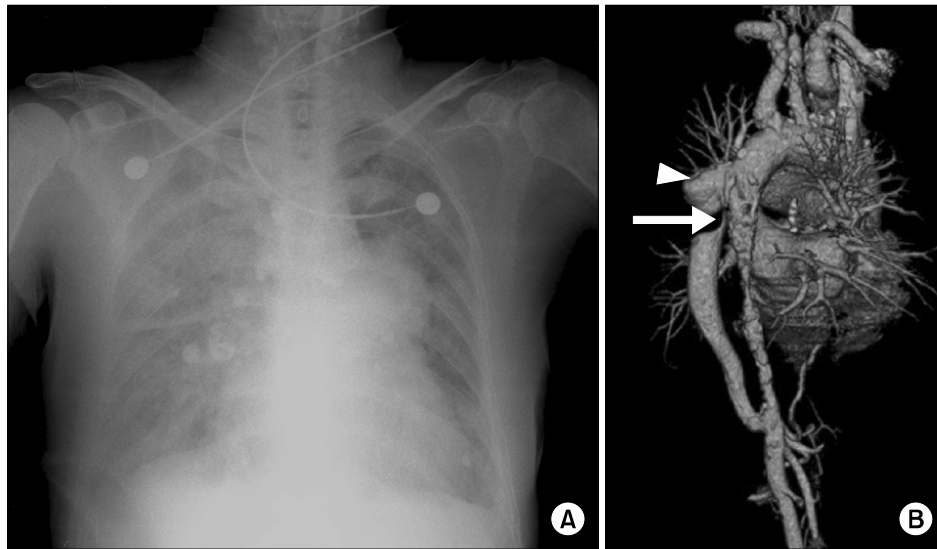
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Received: January 21, 2014, Revised: March 17, 2014, Accepted: March 18, 2014, Published online: December 5, 2014

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**Fig. 1.** Chest radiograph and computed tomography scan before the stent graft procedure. (A) Chest radiograph taken in the emergency room showing cardiomegaly and pulmonary edema. The aortic notch was prominent. (B) Computed tomography image showing severe stenosis in the descending thoracic aorta and diffuse circumferential wall calcification. Vascular wall thickening was observed in the distal portion of the aortic arch and in the left common carotid artery. The bypass graft was from the distal aortic arch to the abdominal aorta above the celiac trunk. There was a 3-cm pseudoaneurysm (arrowhead) and severe luminal stenosis in the proximal segment of the bypass graft (arrow).

which had a 3-cm pseudoaneurysm at the proximal anastomosis and severe luminal stenosis at its proximal segment.

Endovascular repair was performed to treat the pseudoaneurysm and graft stenosis simultaneously. Under general anesthesia, the descending aorta was accessed via a right common femoral artery puncture. After the narrowed proximal portion of the graft was dilated with a 12×4 cm balloon catheter (Ultrathin; Boston Scientific, Natick, MA, USA), a tapered stent graft (proximal diameter 32 mm, distal diameter 24 mm, length 10 cm; Seal, S&G Biotech Co., Seongnam, Korea) was implanted from the proximal descending aorta into the bypass graft. The bare stent portion of the stent graft was deployed proximally to the left subclavian artery. To relieve the stenosis at the middle portion of the graft, a bare metal stent 28 mm in diameter and 8 cm in length (Hercules; S&G Biotech Co.) was implanted. The absence of a pressure gradient between the stent graft and the distal native aorta was confirmed before the catheter and sheath were removed.

The patient was extubated three days after the endovascular stent graft procedure. Postoperative computed tomography showed good stent graft patency in the descending thoracic

aorta and that the pseudoaneurysm was thrombosed (Fig. 2B).

The patient was discharged uneventfully with no pressure difference between the right arm and the legs. She showed no complications for three years after the stent graft procedure, and a follow-up computed tomography scan showed that the graft was patent and that the size of the pseudoaneurysm remained unchanged.

## DISCUSSION

Atypical aortic coarctation has been reported to occur anywhere along the length of the aorta, except in the ascending aorta [1]. Atypical aortic coarctation is a rare condition that is associated with Takayasu's arteritis, fibromuscular dysplasia, congenital hypoplasia, and atherosclerosis [1-3]. Extra-anatomical bypass, aortic patch plasty, anatomic graft interposition, and stent-graft insertion have been reported as surgical treatments for atypical aortic coarctation [4]. Although the medical records of our patient's first operation had been lost, we speculate that she underwent extra-anatomical aortic bypass grafting because of the coarctation-like features of her



**Fig. 2.** Angiography and computed tomography after stent grafting. (A) The narrowed portion of the proximal graft was dilated with a 12 mm×4 cm balloon catheter (Ultrathin, Boston Scientific) and a 32 mm (proximal diameter)×24 mm (distal diameter)×10 cm (length) aortic stent graft (Seal, S&G) and a 28 mm×8 cm vascular stent (Hercules, S&G) were implanted. (B) Computed tomography image taken ten days after stent placement showing a patent aortic stent graft in the descending thoracic aorta and the thrombosed aortic pseudoaneurysm.

descending aorta.

Taketani et al. [3] reviewed outcomes of the surgical treatment of atypical aortic coarctation complicating Takayasu's arteritis in 33 consecutive patients over 44 years, and reported 10 anastomotic aneurysms, one case of anastomotic stenosis, and two cases of graft deterioration. In another review of 106 Takayasu's arteritis patients who underwent various arterial reconstruction procedures, 31 anastomotic aneurysms occurred in 19 patients [5]. The overall primary 10-year cumulative patency rates of carotid, subclavian, aorto-aortic, renal, and mesenteric arterial reconstructions were 88%, 64%, 100%, 68%, and 67%, respectively [5]. Although this review demonstrated excellent patency rates for aorto-aortic bypasses [5], our patient displayed symptoms of heart failure because of the stenosis of her graft. After a computed tomography exam, we determined that the bypass graft obstruction caused increased afterload and impeded myocardial function. Uwabe et al. [6] reported on a patient with an occluded hypoplastic descending thoracic aorta that required re-operation because of graft failure between the descending thoracic aorta and the infrarenal abdominal aorta. This patient also had a history of Takayasu's arteritis. Although performing an axillobifemoral

bypass was a surgical option, they chose to perform an ascending-descending aortic bypass because doing so was expected to result in improved long-term patency and to more effectively reduce left ventricle afterload [6].

In conclusion, we believe that endovascular repair, if feasible, is safer than other options for treating complications of aorto-aortic bypasses, which occur frequently when they are performed to treat Takayasu's arteritis. Based on our literature search on PubMed, this report is the first of its kind.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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