

In situ total aortic arch replacement for infected distal aortic arch aneurysms with penetrating atherosclerotic ulcer

Kenji Okada, MD, PhD,^a Katsuhiko Yamanaka, MD,^a Toshihito Sakamoto, MD,^a Takeshi Inoue, MD,^a Masamichi Matsumori, MD, PhD,^a Fumi Kawakami, MD,^b and Yutaka Okita, MD, PhD^a

Background: We present a series of patients who underwent in situ total aortic arch replacement for infected distal aortic arch aneurysms.

Methods: Between 2002 and 2013, 9 patients with infected distal aortic arch aneurysms underwent total aortic arch replacement using antegrade selective cerebral perfusion. There were 4 male and 5 female patients with a mean age of 72.7 ± 9.0 years. All patients had penetrating atherosclerotic ulcer in the distal aortic arch, which formed saccular aneurysms. Four patients had preoperative hoarseness. Maximum preoperative white blood cell count was $10,211 \pm 4375/\mu\text{L}$, and mean serum C-reactive protein concentration was 12.7 ± 7.2 mg/dL. Causative microorganisms were identified by blood culture or aortic wall culture and were as follows: *Candida albicans*, *Pseudomonas aeruginosa*, *Edwardsiella tarda*, *Streptococcus dysgalactiae*, *Listeria monocytogenes*, *Staphylococcus aureus* (2 cases), and unknown (2 cases). Radical debridement with in situ total aortic arch replacement was performed in all patients, followed by the omental flap grafting in 7 patients. All surgery was performed on an urgent or emergency basis.

Results: Average cardiopulmonary bypass time and lower body circulatory arrest time were 199.7 ± 50.7 minutes and 66.6 ± 13.8 minutes, respectively. There was no in-hospital mortality, but 1 patient died of asphyxia 5 months after hospital discharge. Freedom from recurrence of infection was 100%.

Conclusions: Surgical treatment with the combination of radical debridement with in situ total aortic arch replacement using antegrade selective cerebral perfusion and omental flap grafting was a reliable procedure for the treatment of infected distal aortic arch aneurysms. (J Thorac Cardiovasc Surg 2014;148:2096-100)

Although treatments of aortic arch aneurysm have been improving during the past decade,^{1,2} infected aneurysms are one of the most intractable aortic pathologies, which complicate the surgical procedure and might cause recurrence of infection with high mortality. Controversy continues over the role of in situ reconstruction,³ extra-anatomic bypass,⁴ or thoracic endovascular aortic repair (TEVAR),⁵⁻⁷ and there are few studies that have focused on the reconstruction of infected aortic arch aneurysms. We describe a series of cases treated with radical debridement of infected aortic walls followed by in situ reconstruction combined with omental flap grafting and advanced antibiotic therapy based on sensitivity data.

MATERIALS AND METHODS

A retrospective review of the cardiovascular surgical database at Kobe University Graduate School of Medicine was performed for the period from January 2002 to August 2013. The medical records were reviewed for preoperative risk factors, operative records, intraoperative events, and postoperative course. This retrospective study was approved by the institutional review board at Kobe University (#1490). The need for individual consent was waived. During the period noted, consecutive 423 patients underwent total aortic arch replacement (TAR) using antegrade selective cerebral perfusion through a median sternotomy, and 9 (2.1%) of them with a mean age of 72.7 ± 9.0 years had infected aortic arch aneurysms. The diagnosis of infected aneurysms was made by a combination of clinical presentation, blood test, computed tomography (CT) imaging, positive bacterial growth on blood/aortic tissue culture, intraoperative Gram staining, and inflammatory change in the pathologic specimens. Transverse contrast-enhanced CT generally demonstrated an irregular multiloculated arterial wall, periaortic edema, a periaortic soft-tissue mass, or periaortic gas.⁸ Patients with aortic arch aneurysms-associated bronchial fistula or esophageal fistula were excluded in this study, because the former was difficult to diagnose as infectious aneurysms, and the latter was treated by a completely different surgical strategy. Patient profiles are shown in Table 1. Preoperative CT scan demonstrated that all patients had penetrating atherosclerotic ulcer (PAU) in the distal aortic arch, which formed saccular aneurysms (Figure 1). PAU was defined as a focal contrasted-filled outpouching of the aorta through intimal calcified plaque using CT scan. Four of 9 patients had preoperative hoarseness. All patients had ongoing fever before surgery. The duration from the infection onset was 36.6 ± 56.9 days (range, 0 day to 6 months). Preoperative blood culture was positive in 3 of 9 patients. Five of 9

From the Division of Cardiovascular Surgery,^a Departments of Surgery, and Diagnostic Pathology,^b Kobe University Graduate School of Medicine, Kobe, Japan.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Oct 14, 2013; revisions received Dec 22, 2013; accepted for publication Feb 3, 2014; available ahead of print March 4, 2014.

Address for reprints: Yutaka Okita, MD, PhD, Division of Cardiovascular Surgery, Department of Surgery, Kobe University Graduate School of Medicine, 7-5-2, Kusunoki-cho, Chuo-Ku, Kobe, Hyogo 650-0017, Japan (E-mail: yokita@med.kobe-u.ac.jp).

0022-5223/\$36.00

Copyright © 2014 Published by Elsevier Inc. on behalf of The American Association for Thoracic Surgery

<http://dx.doi.org/10.1016/j.jtcvs.2014.02.015>

Abbreviations and Acronyms

CRP	= C-reactive protein
CT	= computed tomography
PAU	= penetrating atherosclerotic ulcer
TAR	= total aortic arch replacement
TEVAR	= thoracic endovascular aortic repair

patients had undergone antibiotic therapy before surgery, and the duration ranged from 9 days to 6 months.

The standardized surgical procedure of TAR used at Kobe University Graduate School of Medicine has been reported.² Surgical indication and urgency were determined by the type of aneurysm (saccular) with clinical symptom (chest pain, back pain, and sudden development of hoarseness) and active infection (ongoing fever, increased white blood cell count, and C-reactive protein [CRP] level) despite the use of antibiotics. All patients underwent TAR on an urgent/emergency basis (1.8 ± 2.1 days after admission). After cardiopulmonary bypass was established, tympanic temperature had decreased to 20°C to 23°C, and rectal temperature was less than 30°C, the aortic arch was opened and antegrade selective cerebral perfusion was started. The distal aortic arch or the descending aorta was transected at the distal clear level of the infected aneurysms, followed by debridement of the infected tissue and aneurysmal wall, and copious saline irrigation. Intraoperative Gram staining was performed in 6 of 9 patients, and resected aneurysm walls were subjected to both tissue culture and pathologic examinations in all patients. Intraoperative Gram staining was positive in 3 of 6 patients, and culture of resected aortic wall was positive for bacterial growth in 7 of 9 patients. A gelatin-impregnated quadrifurcated Dacron graft (Gelweave, Vascutek Ltd, Terumo Corp, Scotland, UK, or J Graft Shield Neo, Japan Lifeline, Tokyo, Japan) was used. Rifampicin soaking of the gelatin-sealed Dacron graft was performed in 8 of 9 patients. After completion of the distal anastomosis of the prosthetic graft, lower body circulation was restarted through a branch graft, and the tympanic/rectal temperature was rewarmed early to 33°C. The proximal anastomosis of the graft was completed followed by coronary reperfusion. Finally, the aortic arch vessels were reconstructed. In 7 of 9 patients, the omental flap was prepared and installed around the prosthetic graft to separate the surrounding tissue after debridement.

Subsequently, the causative microorganisms were identified by blood culture or aortic wall culture and were as follows: *Candida albicans*, *Pseudomonas aeruginosa*, *Edwardsiella tarda*, *Streptococcus dysgalactiae*, *Listeria monocytogenes*, and *Staphylococcus aureus* (2 cases). Negative culture was obtained in 2 patients (numbers 5 and 6). Intravenous antibiotic therapy based on sensitivity data was continued for 6 weeks postoperatively, and prolonged antibiotic therapy was continued according to the clinical course (fever), blood test parameters (WBC and CRP levels), and CT imaging.

Statistical Analysis

Continuous variables were expressed as mean \pm standard deviation. Survival and freedom from recurrence of infection were assessed by the Kaplan–Meier method using SPSS software (SPSS Inc, Chicago, Ill).

RESULTS

Average operation time was 507.3 ± 163.9 minutes, cardiopulmonary bypass time was 199.7 ± 50.7 minutes, myocardial ischemic time was 92.0 ± 16.7 minutes, lower body circulatory arrest time was 66.7 ± 13.8 minutes, and antegrade selective cerebral perfusion time was 136.4 ± 29.6 minutes. Average minimum tympanic and

rectal temperatures were $21.6^\circ\text{C} \pm 1.3^\circ\text{C}$ and $26.3^\circ\text{C} \pm 1.4^\circ\text{C}$, respectively. The 30-day mortality and in-hospital mortality were 0%. Average duration of postoperative hospital stay was 47.0 ± 33.8 days. No newly developed neurologic deficits were observed. One patient had refractory methicillin-resistant *Staphylococcus aureus* pneumonia, followed by tracheostomy. Two patients (numbers 5 and 7) had iatrogenic hoarseness caused by radical debridement of infected aneurysmal walls, and 3 patients had atrial fibrillation. None of the patients experienced persistent bacteremia.

Follow-up was completed in all cases, and average duration of follow-up was 25.0 ± 23.6 months (range, 0.8–69.7 months). One late death (patient number 2) occurred 5 months after the operation and was caused by asphyxia. Freedom from recurrence of infection was 100% during the follow-up (Figure 2).

Representative findings of pathology of the resected aortic walls demonstrated infiltration of neutrophils, formation of abscess (Figure 3, A and B), and the presence of gram-positive cocci by Gram staining (Figure 3, C).

DISCUSSION

Infected aortic aneurysm is a rare but formidable medical condition associated with mortality ranging from 4.3% to 36%.^{3,9,10} Weis-Muller and associates¹¹ demonstrated that the mortality was highly dependent on the status of rupture at the time of surgery, but the ratio in patients with contained rupture was still as high as 30%. There are few sporadic reports that have specifically focused on the infected aneurysms located in the aortic arch, with a reported mortality ranging from 0% to 10%.^{3,10} There is no known reliable strategy for the treatment of infected distal aortic arch aneurysms. The current study provided information regarding the clinical presentation of this sample of patients and their profiles, as well as satisfactory outcomes, including survival and freedom from recurrent infection.

Presenting symptoms are often nonspecific. All patients had consistent fever, and the final diagnosis was obtained by CT scan. Four of 9 patients (numbers 1, 2, 4, and 6) (44.4%) had progressive hoarseness, and 7 patients had a history of chest and back pain. Tokmaji and colleagues¹² demonstrated that preoperative progressive hoarseness was a rare clinical presentation,¹² but in the patients in this study the incidence was as high as 44.4%.

With regard to aortic pathology, although a recent report by Nathan and associates¹³ demonstrated PAU location in the aortic arch in 7% and in the descending thoracic aorta in 62%, all patients in this study had PAU with severe calcification in the distal aortic arch. Stellmes and associates⁷ also showed that PAU was a cause of aortic pathology in the native aortic infection. However, whether PAU is likely to be associated with infection remains controversial.

Download English Version:

<https://daneshyari.com/en/article/5989551>

Download Persian Version:

<https://daneshyari.com/article/5989551>

[Daneshyari.com](https://daneshyari.com)