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Case report - Vascular thoracic
Distal repair using the frozen elephant trunk technique to treat an extended mycotic aneurysm of the aortic arch

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Abstract

We reported successful distal repair using the frozen elephant trunk technique to treat a mycotic aneurysm extending from the ascending aorta to the descending aorta. An infected blood culture sample was positive for Escherichia coli, and total arch replacement with a rifampicin-bonded graft covered the omental pedicle flap.

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1. Introduction

Mycotic aneurysms of the aortic arch are life-threatening but rare and exhibit high mortality rates [1]. We reported a distal repair method using the frozen elephant trunk technique to treat a mycotic aneurysm extending from the ascending aorta to the descending aorta.

2. Case

An 82-year-old male was admitted to our hospital with persistent pyrexia and dyspnea after an operation for right shoulder arthritis. A chest radiography revealed left pulmonary effusion. Laboratory data showed a C-reactive protein level of 15.4 mg/dl (normal, <0.5 mg/dl) and progressive leukocytosis of 11,200/mm$^2$ (normal range, 4000–8000). A blood culture sample was positive for Escherichia coli. Computed tomography (CT)-scan showed two aneurysmal formations on the ascending aorta and the aortic arch with DeBakey-type IIIb dissection (Fig. 1). After intravenous treatment using antibiotics sensitive for E. coli, the patient was free of pyrexia. However, he experienced persistent pain during antibiotic treatment, and we performed an urgent operation five days after admission.

Median sternotomy was performed after cardiopulmonary bypass was established by arterial perfusion from graft anastomosis on the right axillary artery to prevent aortic injury. During moderate hypothermia at a rectal temperature of 28 °C, selective cerebral perfusion was established under the monitor by regional cerebral oxygen saturation (rSO$_2$) and bilateral radial arterial pressure, and the aortic arch was transected. After complete debridement of the infected tissue on two aneurysmal formations on the ascending aorta and the aortic arch, copious saline irrigation was performed. Although the downstream descending aorta was dissected with mycotic pseudoaneurysm, intraoperative tissue sample of the dissection site was negative. Therefore, we performed the frozen elephant trunk technique using a stent graft for distal repair after debridement and irrigation. In situ total arch replacement with a rifampicin-bonded gelatin-sealed Dacron was performed after distal stent grafting. An intraoperative tissue sample revealed the presence of Gram-negative bacilli. After cardiopulmonary bypass was stopped, the omental pedicle graft was harvested and covered around the grafts. Surgical, cardiopulmonary, and selective cerebral perfusion times were 340 min, 210 min and 80 min, respectively. The postoperative course was considerably good, and the patient was discharged 25 days after the operation without complication. He received oral antibiotics for three months. Postoperative CT-scan showed that the aortic aneurysm had completely disappeared three months after the operation (Fig. 2). He was alive and had no recurrence 29 months after operation.

3. Discussion

Mycotic aneurysms of the aorta are life-threatening but rare, with high mortality rates reportedly ranging from 11.8% to 38.0% [1, 2]. Surgical treatments for mycotic aneurysms remain challenging and controversial. We reported surgical experience of distal repair using the frozen elephant trunk technique with total arch replacement to treat...
Mycotic aneurysms require wide resection and debridement of the infected aorta followed by revascularization via in situ grafting [2,3]. However, the mycotic aneurysm in this patient consisted of two pseudoaneurysms of the ascending aorta and the distal arch, specifically a mycotic aneurysm on the distal arch complicated by DeBakey-type IIIb aortic dissection. We performed total arch replacement by rifampicin-bonded graft after complete resection of two aneurysms with combination of distal repair using the frozen elephant trunk technique for distal aortic dissection where intraoperative tissue sample was negative.

The frozen elephant trunk technique is advantageous because it is less invasive requiring distal anastomosis rather than conventional replacement [4]. Stent grafting as a treatment for mycotic aneurysm avoids the extensive excision and debridement of the infected field. The potential benefit of the stent grafting approach is thus diminished by the risk of infection recurrence. Only a few series of patients with mycotic aneurysms have been reported to exhibit positive results from the stent grafting approach [5,6]. A rifampicin-bonded gelatin-sealed Dacron graft that is immediately available for surgery has been reported to be effective [7]. The antimicrobial effect of rifampicin is primarily directed against Gram-positive staphylococci. The effect of rifampicin-bonded grafts against Gram-negative bacilli is controversial; however, a high local concentration of rifampicin may protect the implanted prostheses from Gram-negative bacilli infection. In addition, the implanted graft was covered with an omental pedicle graft as reported previously, and a satisfactory surgical outcome was obtained [8].

In conclusion, stent graft repair using the frozen elephant trunk technique might be an alternative method of treating mycotic aneurysm extending over the thoracic aorta.

References