Surgery for coincidental infected distal arch and abdominal aortic aneurysms

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Abstract
A 63-year old man was admitted to hospital for the treatment of coincidental infected distal arch and abdominal aortic aneurysms. His haemodynamic state was unstable and uncontrollable because of septic shock. Group A beta-haemolytic Streptococcus pyogenes was the responsible microorganism. An emergent extra-anatomical bypass and complete aneurysm excisions were performed without extracorporeal circulation.

Keywords: Infected aortic aneurysm • Septic shock • Extra-anatomical bypass • Extracorporeal circulation

INTRODUCTION

The term ‘mycotic aneurysm’ was originally described by Osler [1] as malignant endocarditis, which occurred in association with bacterial endocarditis. An infected aortic aneurysm is a rare life-threatening condition [2]. In situ reconstruction carries a risk of graft infection, and the extracorporeal circulation is associated with increasing surgical damage and may enhance systemic inflammation and bleeding complications [3, 4].

CASE REPORT

A 63-year old man was admitted to an affiliate hospital with a spiking fever and severe lower back pain. Laboratory data revealed a leucocytes (39,200 /µl) and an elevated C-reactive protein (42.84 mg/dl). Enhanced abdominal computed tomography (CT) showed a 30-mm diameter infrarenal abdominal aortic aneurysm. Blood cultures were found to be positive for Group A beta-haemolytic Streptococcus pyogenes. He was diagnosed with an infected aortitis and received intravenous antibiotic therapy (ampicillin 12 g/day) for 9 days. Clindamycin (1.8 g/day) was also administered for the next 6 days. Anaemia progressed from a blood haemoglobin level of 13.0–7.5 mg/dl. Enhanced CT on the 15th day after admission revealed an enormous 80-mm diameter distal arch aneurysm (Fig. 1A), which had not been visible in the chest X-ray on admission, and a rapidly enlarged 50-mm diameter abdominal aortic aneurysm (Fig. 1B).

The patient was transferred and admitted to the intensive care unit. Enhanced CT revealed periaortic soft tissue infiltration, which indicated an impending aneurysmal rupture or inflammatory change. Considering the strong toxicity of Group A beta-haemolytic S. pyogenes, in situ graft replacement carried the risk of graft infection. An extra-anatomical bypass and aneurysm excisions were performed without extracorporeal circulation.

Initially, 8-mm grafts (Gelweave, Vascutek Ltd., Glasgow, UK) were anastomosed to the bilateral axillary arteries after heparinization, and a median sternotomy was performed. The proximal aortic arch was edematous and inflamed. A composite graft was constructed by the following technique. A 10-mm graft was anastomosed side-to-side to a primary 18-mm graft. Two 8-mm grafts were anastomosed end-to-side to the 10-mm graft (Fig. 2A). The composite graft was soaked with rifampin solution (1 mg/ml). The 18-mm graft was anastomosed end-to-side to the aortic root by applying a side-bite clamp. The inferior caudal end of the 10-mm graft was anastomosed to the 8-mm graft on the right axillary artery to establish a temporary bypass to the brachiocephalic artery to prevent cerebral ischaemia. Next, the brachiocephalic artery was clamped and transected proximally. The remaining end of the 10-mm graft was anastomosed to this transected distal end of the brachiocephalic artery, and the temporary perfusion was terminated. The 8-mm graft of the left axillary artery was introduced into the mediasternum and anastomosed to the 8-mm graft of the composite graft. The left subclavian artery was divided from the aorta. The left common carotid artery was clamped and transected, and anastomosed to the other 8-mm graft of the composite graft. All three proximal ends of the arch vessels were oversewn. Concurrently, a left antero-lateral thoracotomy was performed in the fifth intercostal space. The distal end of the 18-mm graft was passed through a pericardiotomy into the left thoracic cavity, and anastomosed to the descending aorta just...
above the diaphragm, by applying a side-bite clamp. The ascending aorta, just above the anastomosis, was transected with a stapler (endo-GIA II, ETHICON, Somerville, NJ, USA) and reinforced with a 3-0 prolene over-and-over suture under the aorta clamping. The descending aorta just above the anastomosis was transected using the same technique. The isolated distal arch aneurysm was completely excised (Fig. 2A). The aneurysm was found to be fenestrated to the left lung. A wide debridement of infected tissue and copious saline irrigation were applied. However, an extended amount of time was required to control the bleeding of the intercostal arteries because of the weakened aortic wall and a bleeding tendency. Surgery for the abdominal aortic aneurysm was postponed due to the patient’s unstable haemodynamic state.

An extra-anatomical bypass to the right femoral artery was made with a 10-mm ringed graft (Gelsoft, Vascutek Ltd.) from the inferior 10-mm limb of the composite graft.

The second operation was performed 7 days later. Initially, an 8-mm ringed graft was anastomosed from the previously implanted right femoral 10-mm ringed graft to the left femoral artery. The periaortic tissue was oedematous, and swelling of the lymph nodes was identified. The aneurysm was completely excised, and the proximal aortic stump closed with two-layered 3-0 prolene over-and-over sutures. The aneurysm was found to be fenestrated to the peritoneal tissue.

Ventilatory support was weaned over 17 days. Intravenous antibiotics therapy continued for 5 weeks after the operations, followed by oral antibiotics for 2 weeks. Postoperative three-dimensional CT (3D-CT) angiography revealed a good patency of the extra-anatomical bypass (Fig. 2B). There were no signs of infection or ischaemia at 18 months after the patient’s discharge from the hospital.

**DISCUSSION**

Despite the improvements in surgical treatment and antibiotics therapy, the hospital mortality of an infected aortic aneurysm ranges from 16 to 44% [2]. Some investigators reported that in situ graft replacement of an infected aortic aneurysm provided a good

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**Figure 1:** (A) An irregularly shaped, enormous distal arch and a shape of aneurysm (arrow). (B) A rapidly enlarged abdominal aortic aneurysm and a shape of aneurysm (arrow). An.: aneurysm.

**Figure 2:** (A) Temporary brachiocephalic artery perfusion was established by A-to-B anastomosis. In addition, the B was anastomosed to the right femoral artery. (B) Postoperative 3D-CT angiography.
outcome [2, 4]. Hsu and Lin stated that the hospital mortality rate was 10% for 10 patients with infected aortic arch aneurysms [5].

In this patient, the morbidity was exacerbated by septic shock. Extra-anatomical reconstruction minimizes the risk of prosthetic graft infection. Avoiding the use of extracorporeal circulation reduces surgical damage and may minimize the risk of infectious dissemination or haemorrhage complications. For infected aortic aneurysms, conventional in situ graft replacement is the best and most reasonable procedure after infection control with administration of antibiotics, but extra-anatomical bypass should be available for septic shock cases.

Conflict of interest: none declared.

REFERENCES