Case Report

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A simple method for removal of an infected aortic stent graft: A case report

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ABSTRACT

Endovascular aortic stent graft infection is a severe complication of endovascular aneurysm repair (EVAR). Due to the increase in the number of EVAR cases in recent years, the prevalence of graft infection has been on a rise. Treatment of endovascular aortic stent graft infection is difficult and conservative methods such as aspiration of the sac and lifelong antibiotic therapy are defined. Although non-surgical methods are described, removal of the endograft and revascularization is a more satisfying method in the long-term. Herein, we present a technique involving the use of a cut edge of 20 mL syringe for removal of the infected endovascular aortic stent graft, followed by revascularization and long-term antibiotic therapy.

Keywords: Aortic stent graft, endovascular aortic repair, stent graft infection.

Endovascular aortic stent graft infection after endovascular aneurysm repair (EVAR) of abdominal aortic aneurysms (AAAs) is a rare complication. The incidence of graft infection is expected to increase in the coming years due to the increasing number of EVAR used.[1] Although non-surgical management of patients with endograft infections has been described in the literature, removal of the endograft is usually required to control the infection.[1] Herein, we report successful surgical management of EVAR infection with endograft removal in which we used a 20-mL syringe and extra-anatomic bypass.

CASE REPORT

A 77-year-old man who underwent elective EVAR five months ago for an AAA was admitted with high fever, nausea, and vomiting and hospitalized. Laboratory tests revealed increased C-reactive protein (CRP) (105 mg/L) and white blood cells (WBC) (14,000 K/uL). Blood culture revealed negative microorganism reproduction, but air-fluid level was demonstrated around the endograft on computed tomography (CT) (Figure 1a). The patient was diagnosed with endovascular aortic stent graft infection and tazobactam/piperacillin (3×4.5 g) was started. However, as there was no significant improvement in the clinic and laboratory findings, surgical removal of the endograft with revascularization was decided. A written informed consent was obtained from the patient.

The implanted endograft was a suprarenal fixation stent graft (Ankura™; Lifetech Scientific Co., Ltd., Shenzhen, China) (Figure 1b). The patient was operated on Day 17 of hospitalization. Midline laparotomy was performed under general anesthesia. The abdominal aorta and iliac arteries were exposed. The common iliac arteries and infrarenal neck of aortic aneurysm were mobilized for clamping. After administration of heparin, the infrarenal aorta and common iliac arteries were clamped. The infrarenal aneurysm sac was opened. The infected material in the aneurysmal sac was evacuated and the samples

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were sent to culture. The iliac extensions of the endograft were retrieved and separated from the main body (Figure 1c). A polyester tape was tied to the distal end of the endograft. The other end of the tape was advanced through the syringe, the tape was held tight, and the syringe was advanced forward over the endograft, as previously described by Usatii et al.[1] (Figure 1d). Using this technique, the barb hooks were disengaged from the aortic wall and the main body of the endograft was removed without trauma. The infrarenal abdominal aorta and iliac arteries were primarily closed with polypropylene sutures. The abdomen was closed after establishing bleeding control. The patient was, then, prepped and draped again for extra-anatomic (axillofemoral and femorofemoral) bypass. In this operation, 8-mm polytetrafluoroethylene grafts were used. The operation was completed successfully. Postoperatively, intravenous tazobactam/piperacillin (3×4.5 g) was administered for 33 days. Intravenous linezolid 600 mg b.i.d. was added to the medical treatment upon the identification of methicillin-resistant coagulase-negative staphylococci in the surgical culture material and was administered for 10 days.

Postoperatively, the patient did well. There was no reproduction in blood cultures. Laboratory test results were within normal limits and physical examination findings were normal without any sign of systemic infection. The patient was uneventfully discharged on postoperative Day 15. The CRP value was 4 and 5 mg/L, the WBC count was 7,900 and 9,100 K/uL, and the procalcitonin level was 0.1 and 0.1 ng/mL at one and three months, respectively.

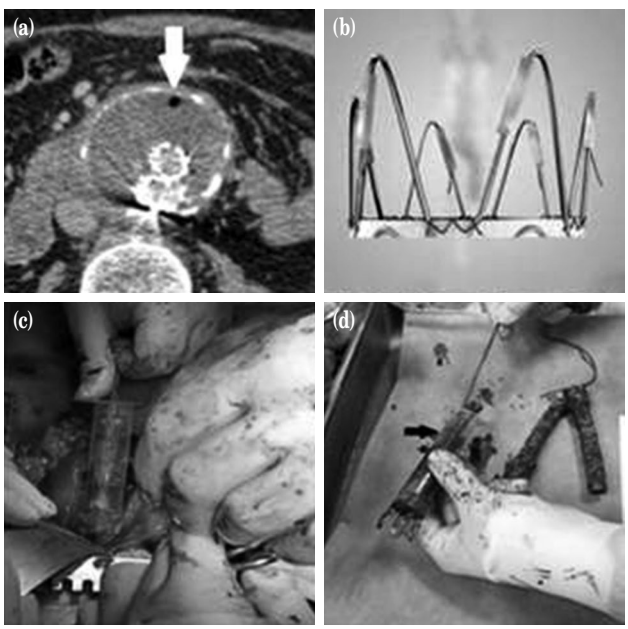

Figure 1. **(a)** A computed tomography image revealing infection around endovascular aortic stent graft (white arrow indicating intra-aortic air). **(b)** The Ankura™ endograft with suprarenal fixation barbs. **(c)** Main body of endograft after removal of iliac extensions. **(d)** Removal of endograft (black arrow indicating 20 mL syringe).

DISCUSSION

Prosthetic aortic graft infections after EVAR of AAAs have been reported previously in the literature.[2] The incidence of these rare complications ranges between 0.5 and 1.3% in single-center case series with high mortality rates.[2]

Treatment of prosthetic aortic graft infections is difficult, and conservative treatment options such as aspiration of the sac, translumbar CT-guided thrombin injection, and lifelong antibiotic use have been defined.[3] Favorable survival rates have been shown in some small series in selected patients; however, some authors have reported 100% mortality with conservative treatment.[2] In such cases, patient-related factors should not be overlooked. Percutaneous drainage of aneurysm sac abscess and long-term antibacterial therapy have been also used to bridge major surgery. There are studies revealing high mortality rates (35 to 75%) related to percutaneous drainage of aneurysm sac abscess and long-term antibacterial therapy alone.[4] Therefore, surgical removal of endovascular aortic stent graft with revascularization was planned in our patient. Although short-term morbidity and mortality rates are lower in non-surgical methods, these rates are higher in the long-term, compared to surgical options. Surgical removal of the infected graft and all infected tissues with revascularization is necessary for an effective treatment,[5] although 30-day mortality has been reported as high as 30%.[5] One of the major problems with graft removal is the damage of the graft's hooks to the aortic wall. In particular, in devices with suprarenal fixation, detachment of the fixator barbs is usually troublesome and complicated. As seen in the study of Usatii et al.[1] and in our case, the 20-mL syringe can be used to induce minimal trauma. The main reason for the use of 20 mL syringe in our case is its similarity to the suprarenal aortic diameter.

A disposable proctoscope is used as another method for removal of the infected endograft.[5] Possibility of the aortic wall damage with the cut edge of the syringe is higher than the disposable proctoscope.[5] However, it is well known that the cost of proctoscope is higher

than the syringe and 20 mL syringe is available in every operating room.

In case of endovascular aortic stent graft with suprarenal fixation as in our patient, supraceliac clamping may be required, and the bare suprarenal struts of the device may be cut and left *in situ* as an option.[6] After excision of the infected endovascular aortic stent graft and debridement of the devitalized tissue, *in situ* or by extra-anatomical routes, reconstruction can be performed. In case of *in situ* reconstruction, a cadaveric homograft tissue or antibiotic-impregnated or silver-coated polyester grafts are used in some centers.[6] Of note, homograft has a risk of degeneration, leading to complications such as calcification, dilatation, or even rupture and, therefore, caution should be exercised while planning *in situ* reconstruction in patients with an extensive infection or highly virulent Gram-negative organisms.[6] Extra-anatomic bypass is recommended, when there is a widespread purulent abdominal infection, as in our patient.[6]

In conclusion, prosthetic aortic graft infection after EVAR of AAAs is a rare, but highly fatal complication. The choice of treatment is dependent on the patient's characteristics and properties of the device. In our opinion, removal of the infected graft and all infected materials with revascularization is of paramount importance to achieve an effective treatment. Also, a 20-mL syringe can be used to minimize the damage to the aortic wall. Patient satisfaction and uncomplicated follow-up period encourage us to use this simple method in future cases.

Declaration of conflicting interests

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