

➤ **Case Report** ◀

# Replacement of the Thoracoabdominal Aorta after Endovascular Abdominal Aneurysm Repair for Ruptured Infected Aneurysm: A Case Report

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A 73-year-old man underwent emergency endovascular abdominal aneurysm repair (EVAR) for a ruptured infected abdominal aortic aneurysm. Two years after EVAR, he was admitted with a spiking fever and left lower back pain. Computed tomography scan revealed not only recurrent graft infection with psoas abscess but also infection around the orifice of the superior mesenteric artery. Because conservative medical therapy with antibiotics could not control the infection, we performed complete removal of the infected stent graft, debridement of psoas abscess, and in situ replacement of the thoracoabdominal aorta using rifampicin-soaked prosthetic grafts, followed by the omental flap. He was discharged with no complications.

**Keywords:** endograft infection

## Introduction

With the development of endovascular treatment technology, endovascular abdominal aneurysm repair (EVAR) has been conventionally performed in many institutes for ruptured abdominal aortic aneurysm (AAA)<sup>1</sup> and for infected AAA.<sup>2</sup> Following EVAR, aortic stent-graft infection is a complication with high mortality rates. Despite the existence of conservative medical treatment for infected grafts followed by surgery, open conversion is required for recurrent infection after EVAR for infected AAA.<sup>2</sup> Here, we report a case of replacement of the thoracoabdominal aorta for recurrent infection after EVAR for ruptured, infected AAA refractory to conservative medical treatment with antibiotics.

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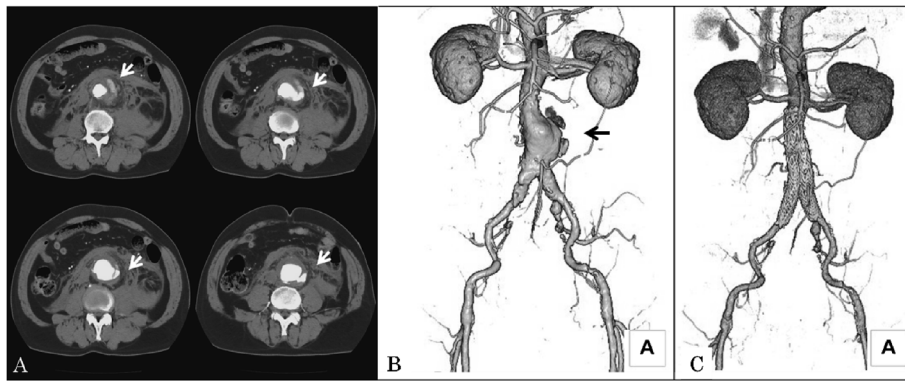
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## Case

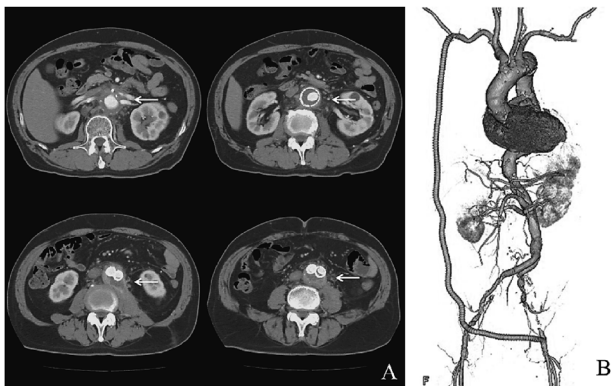
Previously, a 73-year-old man was emergently admitted to our hospital for treatment of a ruptured AAA. He had a history of hypertension and hyperlipidemia and a 40-year history of smoking. Physical examination revealed a blood pressure of 76/56 mmHg, a heart rate of 78 beats/min, a body temperature of 38.3°C, and an oxygen saturation of 96%. Laboratory test revealed leukocytosis (white blood cell (WBC) 16600 mg/dL). Computed tomography (CT) revealed a ruptured infrarenal AAA with lack of calcification, multiloculated aneurysms, and soft tissue inflammation. The maximum diameter of AAA was 46 mm; the proximal neck diameter and length were 25 mm and 44 mm, respectively (Figs. 1A and 1B). These findings indicated ruptured, infected AAA. Emergency EVAR was performed with two GORE EXCLUDER stent grafts (W.L. Gore & Associates, Inc., Delaware, USA) for the ruptured AAA (RLT281414 and PLC181000). Postoperative CT showed no endoleaks (Fig. 1C). The patient was discharged on the eight postoperative day with no abnormal findings.

At 2 years after EVAR, the patient was readmitted to our hospital because of intermittent lower back pain and spiking fever. Laboratory findings revealed mild leukocytosis (WBC, 12800 mg/dL). Despite four negative blood culture results, the enhanced CT showed stent graft infection and psoas abscess. In addition, the infection had spread around superior mesenteric artery (SMA), and the stent graft had migrated (Fig. 2A). Open definitive surgery was chosen because of uncontrollable infections refractory to intravenous antibiotic treatments. To begin, a right axillobifemoral bypass using a prosthetic graft was performed for severe stenosis of bilateral external iliac arteries. Graft replacement of the thoracoabdominal aorta was performed the following day under general anesthesia in a right lateral decubitus position. The thoracoabdominal aorta and psoas abscess were exposed via Stoney's incision and the eighth intercostal space. Extracorporeal circulation was established via the left femoral artery and right





**Fig. 1** (A) and (B): Preoperative CT shows ruptured abdominal aorta aneurysm and leaked contrast medium. CT reveals AAA with lack of calcification, multiloculated aneurysms, and soft tissue inflammation. (C): The 3DCT after EVAR shows no endoleak. CT: computed tomography; AAA: abdominal aortic aneurysm; DCT: dimensional computed tomography; EVAR: endovascular abdominal aortic repair



**Fig. 2** (A): CT shows recurrence of infection, left iliopsoas abscess, and spread of infection to the superior mesenteric artery at 2 years postoperatively. (B): Postoperative 3DCT shows patent graft and no recurrent infection. CT: computed tomography; DCT: dimensional computed tomography

femoral vein. After the complete removal of the stent graft, wide debridement of the surrounding tissues, including psoas abscess, was performed. Next, the thoracoabdominal aorta was reconstructed using a rifampicin-soaked graft (20-mm Gelweave Coselli Thoracoabdominal Graft and 18-mm Gelsoft Plus Bifurcate; Terumo Medical Corporation, Tokyo, Japan). Finally, the omental flap, as a pedicle fashion fed by the gastroduodenal artery, was wrapped around the new graft.

Intravenous antibiotic administration of tazobactam/piperacillin was used for 6 weeks because bacterial culture of the abscess showed methicillin-sensitive *Staphylococcus Aureus* (MSSA). The postoperative CT also revealed no recurrent signs of infection (Fig. 2B). The patient was discharged on the 34th postoperative day.

## Discussion

In the recent years, because of the development of endovascular medical technology, EVAR has been conventionally performed for those with ruptured, infected AAA.<sup>1,2)</sup> Kan et al. reported that the 30-day and 2-year survival rates after EVAR for infected AAA were 89.6% and 82.2%, respectively.<sup>2)</sup> However, recurrent infection is one of the most important complications after EVAR for infected AAA. Typical symptoms of graft infection include fever and abdominal and back pain. Fiorani et al. reported that *Staphylococcus Aureus* was the causative agent in more than 50% of the cases, as shown in this case.<sup>3)</sup>

Because the long-term outcomes of EVAR for infected aneurysms remain unclear, EVAR should be performed as a bridge to open conversion.<sup>2)</sup> Veraldi et al. reported that the mortality rate was 27.9% for stent graft infection, 38.8% for conservative therapy, and 12.9% for surgical treatment based on antibiotic treatment.<sup>4)</sup> Fiorani et al. reported that the mortality rate related to anatomical reconstruction after explant of the infected stent graft and as much debridement as possible was 5.9%. In contrast, the mortality rate related to extra-anatomical reconstruction was as high as 32.0%.<sup>3)</sup> These reports suggest that under the diagnosis of stent graft infection, open definitive surgery based on antimicrobial therapy is better than only conservative medical treatment. Furthermore, the mortality rate of anatomical reconstruction was lower than that for extra-anatomical reconstruction.<sup>2-5)</sup> In our case, replacement of both the infrarenal abdominal aorta and thoracoabdominal aorta with the use of a rifampicin-soaked graft followed by the omental flap was required after complete removal of the stent graft. This was necessary because the infected lesions had spread around the orifice of SMA. Many reports have been published regarding in situ rifampicin-soaked graft replacement of the

infrarenal abdominal aorta with omental flap for infected grafts.<sup>2-5)</sup>

In this case, we had no choice but to clamp the aorta above the celiac artery because the infection had spread around SMA and the proximal position of the stent graft was located just below the orifice of the renal arteries. If the proximal end of the stent graft had been located below the level of the renal artery, in situ infrarenal abdominal aorta reconstruction could have been performed. Therefore, in treating infected AAA using the EVAR technique, the proximal end of the prosthesis should be placed as low as possible on the condition that the length of the proximal aortic neck is long enough ( $\geq 2$  cm). Furthermore, the explant of the stent graft followed by Y-graft replacement with the use of antibiotic-soaked prosthesis, as is required in the event of persistent aneurysmal infection, must be taken into consideration.

## Conclusion

We report a case of thoracoabdominal aorta replacement long after emergency EVAR for ruptured, infected AAA. In treating infected AAA with the use of a stent graft as a bridge to open definitive surgery, the proximal end of the endoprosthesis should be placed well below the level of the bilateral renal arteries. This should be done in preparation for the second stage of open definitive surgery for the

prevention of persistent aneurysmal infection.

## Disclosure Statement

The authors have no particular disclosures to make.

## Author Contributions

Writing: NK

Critical review and revision: all authors

Final approval of the article: all authors

Accountability for all aspects of the work: all authors

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