

## A complicated course for an infected endovascular stent graft

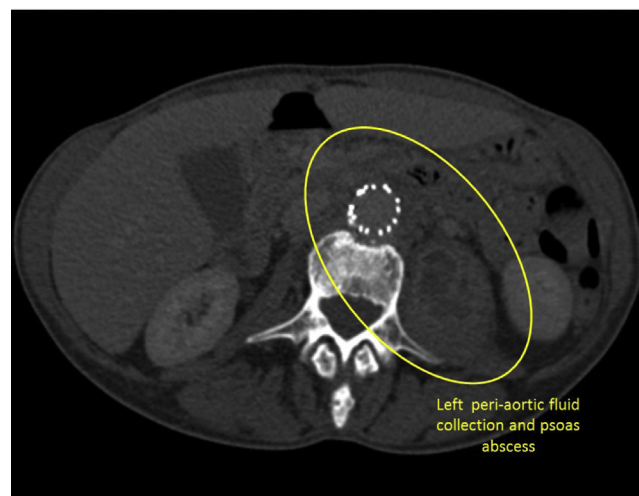
Matthew S. Jorgensen, BS,<sup>a</sup> Jonathan Obi, MD,<sup>a</sup> Samuel Nussbaum, BS,<sup>a</sup> Charles Ritchie, MD,<sup>b</sup> Albert G. Hakaim, MD,<sup>a</sup> and Houssam Farres, MD,<sup>a</sup> Jacksonville, Fla

### ABSTRACT

The management of an infected endovascular aortic stent graft can be complex and morbid. Therefore, caution should be exercised before an endovascular approach is considered in patients presenting with a saccular aneurysm who are younger than 65 years and without risk factors for this may indicate a mycotic aneurysm. An open approach with consideration of aneurysm excision should be entertained to prevent an endovascular implantation in the setting of an infected aorta. We report a case of endovascular aortic stent graft infection that led to complex surgical management and prolonged postoperative care. (J Vasc Surg Cases and Innovative Techniques 2020;6:690-3.)

**Keywords:** Infected graft; Complications; Reintervention

Although the overall incidence of stent graft infection is low (considered to be <1.0%), when infection does occur, it can result in catastrophic consequences.<sup>1-3</sup> For instance, perioperative 30-day morbidity and mortality of repairs involving stent graft infection are upward of 35% and 11%, respectively.<sup>1</sup> In addition, certain types of aortic infection are associated with poorer outcomes (eg, *Staphylococcus*, *Salmonella*, *Mycobacterium*).<sup>4</sup> Once an infected stent graft is diagnosed, some treatment strategies include prolonged antibiotic therapy, open surgical explantation with extra-anatomic bypass, and in situ aortic reconstruction.<sup>5,6</sup> In an emergent setting, in situ endovascular stent graft placement can be used temporarily as a bridge to future permanent solutions.<sup>5,6</sup> There is general consensus for treatment involving source control and removal of nonviable infected and foreign bodies followed by antibiotic therapy. Yet, there remains no single “gold standard” for the management of stent graft infections. We report a case of endovascular aortic stent graft infection that led to complex open and endovascular surgical management with prolonged postoperative care. The



**Fig 1.** Computed tomography angiography (CTA) image at presentation to our institution 3 years after initial endovascular aneurysm repair at an outside facility.

patient's consent for publication was obtained.

### CASE REPORT

The patient is a 59-year-old woman who underwent endovascular aneurysm repair of a 16-mm saccular infrarenal aortic aneurysm at an outside facility 3 years earlier. She presented to our facility for evaluation of epigastric pain, anorexia, and weight loss. Computed tomography angiography (CTA) demonstrated enhancing periaortic soft tissue and fluid collections that communicated with a left psoas abscess (Fig 1). Obtained psoas abscess tissue culture specimens were positive for *Salmonella*. Antimicrobial treatment (cefepime and vancomycin) was initiated. Management options (ie, sepsis control and re-establishment of flow in an extra-anatomic fashion) were discussed, and the patient opted to proceed with surgical

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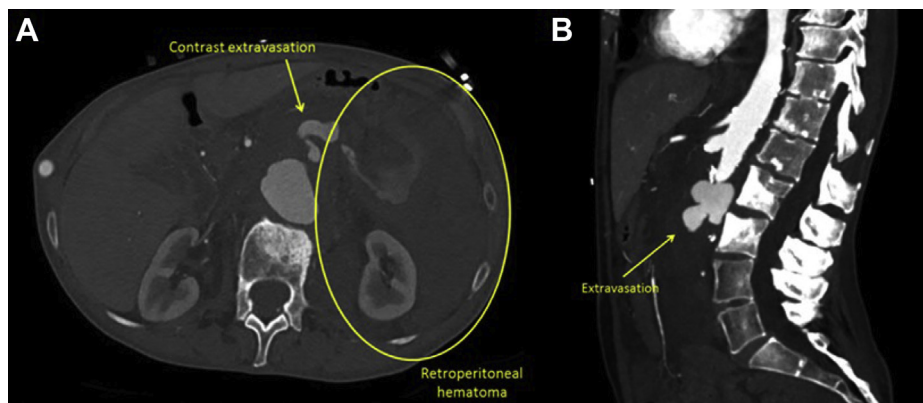
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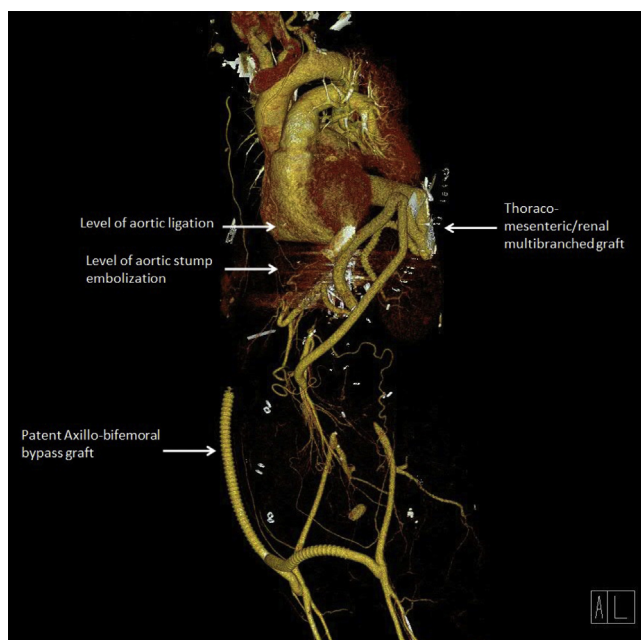
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**Fig 2.** Computed tomography angiography (CTA) showing aortic stump rupture.

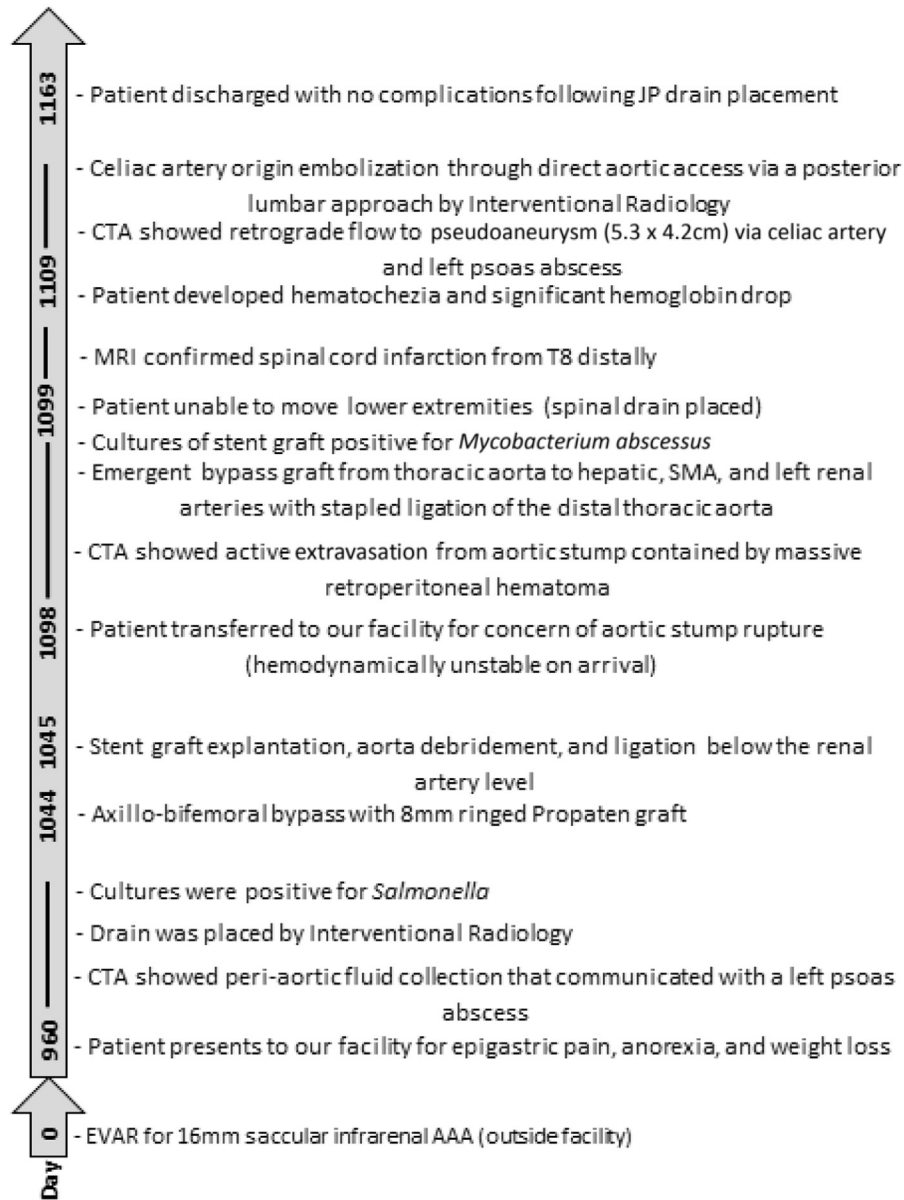


**Fig 3.** Three-dimensional reconstruction of computed tomography angiography (CTA) image showing axillobifemoral bypass, stent graft explantation and aortic ligation, multibranched graft after aortic stump rupture, and celiac artery origin embolization.

intervention. Therefore, she underwent staged axillobifemoral bypass graft (8-mm ringed Propaten [W. L. Gore & Associates, Flagstaff, Ariz]) and stent graft explantation 10 weeks after first presentation. The stent graft, including a suprarenal bare-metal stent, was explanted, and the aorta was débrided and oversewn just below the level of the renal arteries. There were no immediate complications postoperatively, and the patient was discharged on postoperative day 10. Cultures of the stent graft were also positive for *Mycobacterium abscessus*. She was prescribed 6 weeks of peripherally inserted central catheter antibiotics.

Five weeks later, she was transferred to our facility for concern of aortic stump rupture. She was hemodynamically unstable, encephalopathic, and hypoxemic on arrival. She was resuscitated adequately and a permissive hypotension protocol was initiated. CTA showed active extravasation from the aortic stump that appeared to be contained by a massive retroperitoneal hematoma (Fig 2). Given the level of aortic stump rupture, risks of emergent surgery, including spinal ischemia, were discussed with the patient and her husband. She underwent emergent extra-anatomic bypass graft (from thoracic aorta to hepatic, superior mesenteric, and left renal arteries) with stapled ligation of the distal thoracic aorta through a left thoracoabdominal approach (Fig 3). A Gelweave graft (Terumo Aortic, Inchinnan, Scotland, United Kingdom) was used to create the bypass. The right renal artery was not bypassed because it was contained by the massive retroperitoneal hematoma and an attempt was considered unsafe for the patient. The aortic stump was closed in two layers in a vertical mattress fashion. In addition, polytetrafluoroethylene felt strip was used for buttressing. An omental flap was created. Postoperatively, she was unable to move her lower extremities. Therefore, a spinal drain was placed, and strict blood pressure management (mean pressure >90 mm Hg) was initiated. Magnetic resonance imaging confirmed spinal cord infarction at and distal to T8. Two weeks later, she developed hemochezia and significant hemoglobin drop. CTA demonstrated reconstitution of the abdominal aortic stump and terminated in a contained rupture. The aortic stump was refilling in a retrograde fashion through the celiac artery origin and right renal artery. Recurrent left psoas abscess was also noted. She then underwent plug embolization of the celiac origin through direct aortic access by a posterior lumbar approach. The left psoas abscess was drained, and a percutaneous JP drain was left in place.

At the time of discharge, renal function remained normal; however, there was no improvement in sensory or motor function of the lower extremities. Therefore, she was discharged to a rehabilitation facility and prescribed indefinite antibiotic treatment. The patient's hospital stay was



**Fig 4.** Timeline of the patient's course involving the infected stent graft. AAA, Abdominal aortic aneurysm; CTA, computed tomography angiography; EVAR, endovascular aneurysm repair; MRI, magnetic resonance imaging; SMA, superior mesenteric artery.

44 days. CTA 1.5 years postoperatively revealed that all bypasses were patent with a stable ligation of the distal thoracic and abdominal aorta.

## DISCUSSION

The management of infected stent grafts usually involves various inherent complications that may lead to poor outcomes.<sup>6-8</sup> Ultimately, these complications can result in both high short-term and long-term death rates.<sup>6</sup> In addition, within 1 year of surgery, graft-related complications and reinfection rates are upward of 10% and 5%, respectively. Therefore, the removal of the source of infection as well as taking measures to prevent further

infection is warranted. The majority of reported stent graft infections are *Staphylococcus* species, yet *Salmonella* infections are associated with the worst outcomes.<sup>2,4,6-8</sup> In our case, blood and stent graft cultures were initially positive for *Salmonella* at the time of stent graft explantation. There was a subsequent *M. abscessus* infection after the initial stent graft explantation. Potentially, the secondary infection of *M. abscessus* after the stent graft explantation may have contributed to the aortic stump rupture.

The surgical and medical management of an infected endograft is often complex because of both the rarity of the presentation and the complexities associated

with each case.<sup>7</sup> The concept of source control with distal revascularization is a uniformly accepted standard management strategy. A study by Smeds et al<sup>1</sup> evaluated the morbidity and mortality of patients with infected stent grafts to determine an optimal treatment strategy and found autogenous reconstruction or, if autogenous reconstruction is not a viable option, reconstruction with antibiotic-coated prosthetic graft to be the best option for treatment of an infected stent graft. Another study by Chaufour et al<sup>7</sup> found that in the setting of aortic endograft infection, the most reliable management that can potentially result in full resolution and therefore has the lowest need for reintervention is graft explantation. In this case, we were able to successfully explant the infected endovascular stent previously placed and to maintain flow in an extra-anatomic fashion with no immediate complications.

However, our case involved various complications, as outlined in Fig 4, after the first operation performed at our institution (axillobifemoral bypass and stent graft explantation). These included aortic stump rupture after subsequent *M. abscessus* infection during the initial intervention, which was repaired with emergent ligation and multibranched bypass; spinal cord ischemia at and distal to T8; hematochezia; psoas abscess, which was drained; and aortic pseudoaneurysm formation due to retrograde flow through the celiac artery, which was repaired with celiac artery origin embolization. This postoperative course filled with adverse events after presentation with an infected stent graft is unique and exemplifies the risks associated with the surgical management of infected stent grafts.

## CONCLUSIONS

Overall, patients presenting with a saccular aneurysm who are younger than 65 years and without risk factors

may suggest a possible mycotic aneurysm. Therefore, appropriate diagnostic steps (ie, obtaining tissue culture specimens) and consideration of an open approach with potential mycotic aneurysm excision should be exercised to prevent an endovascular implantation in the setting of an infected aorta, for as shown in this case, it may lead to a series of complications.

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