

# Very Late Aortic Endograft Infection With *Listeria monocytogenes* in an Elderly Man

Jorge A. Miranda, MD<sup>1</sup>; Ahmed Khouqeer, MD<sup>1</sup>; James J. Livesay, MD<sup>1,2</sup>; Miguel Montero-Baker, MD<sup>1</sup>

<sup>1</sup>Division of Vascular Surgery and Endovascular Surgery, Baylor College of Medicine, Baylor–St. Luke's Hospital, Houston, Texas

<sup>2</sup>Department of Cardiovascular Surgery, Texas Heart Institute, Houston, Texas

*Endograft infection with Listeria monocytogenes is a rare, potentially devastating complication of endovascular aortic aneurysm repair. To our knowledge, only 8 cases have been reported. We describe the case of a 72-year-old man who presented with L. monocytogenes endograft infection and a 19-cm degenerative aneurysm 9 years after having undergone endovascular repair of an abdominal aortic aneurysm. The infection was successfully treated with open surgical excision of the infected aortoiliac endograft and its replacement with a rifampin-soaked, bifurcated Dacron graft. (Tex Heart Inst J 2022;49(1):e207298)*

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## Corresponding author:

Jorge A. Miranda, MD, Baylor College of Medicine, One Baylor Plaza Houston, TX 77030

## E-mail:

jorge.miranda@bcm.edu

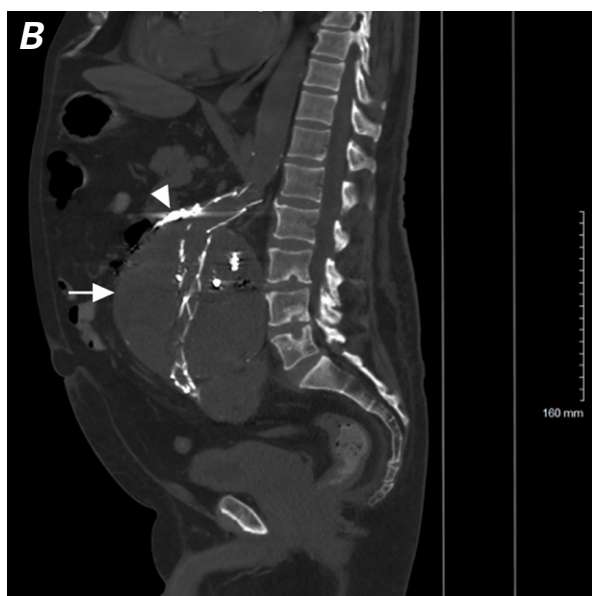
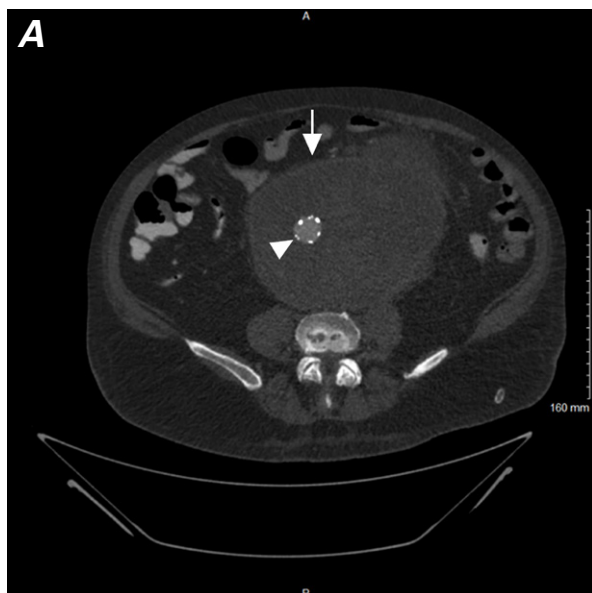
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**E**ndograft infection is a potentially devastating complication of endovascular aortic aneurysm repair. Associated mortality rates range from 3% to 50%.<sup>1-4</sup> Reoperation to explant infected grafts often requires more proximal clamping and is associated with major complication rates of up to 27%.<sup>5,6</sup> The current approach to managing endograft infections is based on experience gained from the open repair of degenerative aortas that have become infected. The pathogen most commonly responsible for aortic degeneration is the *Staphylococcus* species, particularly *S. aureus*.<sup>7</sup> Aortic endograft infections are infrequent, with a reported incidence of approximately 2%.<sup>2</sup> *Listeria monocytogenes* infections of endografts are particularly rare. To our knowledge, only 8 cases have been reported, and in 2 patients the infection was treated by early surgical removal of the endograft.<sup>8-10</sup> We report a case of endograft infection with *L. monocytogenes* in an elderly man 9 years after he had undergone endograft implantation.

## Case Report

A 72-year-old man presented at another hospital with recurrent fever of unknown origin. Blood cultures and inflammatory marker tests revealed no identifiable source of fever-inducing infection. Nine years before this presentation, the patient had undergone endovascular repair of a 12-cm abdominal aortic aneurysm (AAA) with an AFX endograft (Endologix), followed 2 years later by thrombectomy for treatment of right iliac limb occlusion and by coil embolization of the inferior mesenteric and left hypogastric arteries for treatment of type II endoleak. At the current presentation, computed tomographic (CT) angiograms of his abdomen and pelvis revealed a stable aneurysmal sac and an intact endograft. The patient was admitted to the hospital for observation. Two weeks later, his fever persisted, so meropenem, vancomycin, and gentamicin were prescribed. Repeat CT angiograms revealed an increase in the diameter of the infrarenal aneurysmal sac to 19 cm and radiographic signs of a contained rupture (Fig. 1). These findings prompted the patient's transfer to our institution.

Upon arrival at our institution, the patient was hemodynamically stable, but he had vague abdominal symptoms and persistent fever despite negative inflammatory marker tests. The symptoms raised concern for endograft infection and contained rupture of the AAA. Therefore, we prescribed ertapenem and vancomycin. We also



**Fig. 1** Computed tomographic angiograms show the abdominal aortic aneurysm (arrows) with **A**) the original endograft (arrow-head) (axial view) and **B**) the inferior mesenteric artery coils (arrowhead) that had been placed 7 years previously.

decided to perform exploratory laparotomy through a traditional midline abdominal incision, excise the aortoiliac stent-graft, and replace it with a rifampin-soaked Dacron graft.

An intraoperative transesophageal echocardiogram ruled out endocarditis and valvular vegetations. Abdominal exploration revealed a large retroperitoneal aneurysm, but no evidence of rupture or hematoma. Proximal control of the supraceliac artery and distal control of the iliac artery were achieved. The aneurysm wall was incised longitudinally along its anterior aspect, and the aneurysm thrombus was removed. The aortoiliac



**Fig. 2** Photograph shows the infected aortoiliac endograft after excision.

stent-graft was excised and sent, along with a sample of the aneurysm thrombus, for culture (Fig. 2). The aorta was sized, and an 18-mm × 9-mm rifampin-soaked, bifurcated Gelweave Dacron graft (Terumo) was placed.

The proximal anastomosis of the graft to the aorta was created with a running 3-0 Prolene suture. The bifurcated graft limbs were tunneled retroperitoneally through the left iliac aneurysm to the left external iliac artery and through the right iliac aneurysm to the right external iliac artery. The ureter was preserved. Distal anastomoses to the external iliac arteries were then created with end-to-side 4-0 Prolene sutures. Next, the graft and retroperitoneum were irrigated with copious amounts of amoxicillin and gentamicin. The redundant aneurysm wall was reapproximated over the graft with a running 0 Vicryl suture (Ethicon Inc., a Johnson & Johnson company). The peritoneal defects over the iliac arteries were closed with a 0 Vicryl suture, after which the bowel was returned to its normal anatomic position. The abdominal wall and its fascia were closed with a running #1 polydioxanone suture. The surgical wound was then profusely irrigated with saline solution. The subcutaneous tissue was reapproximated with a 2-0 Vicryl suture. Finally, the skin was closed with a running 3-0 Monocryl subcuticular suture (Ethicon), and a sterile dressing was applied to the incision site. Palpable pulses were detected in the bilateral dorsalis pedis arteries before the patient was transferred to the recovery room.

The patient's postoperative course and recovery were uneventful. Cultures obtained from specimens of the excised endograft and aneurysm thrombus grew *L. monocytogenes*, so the patient continued receiving ampicillin and gentamicin parenterally until discharge from

the hospital on POD 5, and then for another 3 weeks as immunosuppressive therapy against graft infection. After that, he began taking oral amoxicillin indefinitely. At his 6-month follow-up visit, a CT angiogram revealed an intact graft, uninterrupted aortic flow, and no signs of infection. The patient continued taking amoxicillin and resumed activities of daily living.

## Discussion

Early surgical management of rare endograft infection with *L. monocytogenes* is crucial. Treatment in this case included complete excision of the infected aortoiliac stent-graft and replacement with a rifampin-soaked, bifurcated Dacron graft.

*Listeria monocytogenes*, a gram-positive, intracellular bacterium, can cause serious illness such as Listeriosis and has been associated with multiple foodborne disease outbreaks linked to contaminated poultry, meat, cheese, and seafood.<sup>11</sup> Although the bacterium's intracellular nature makes it difficult to treat, penicillin or ampicillin are effective against it.<sup>12</sup> Our patient was prescribed parenteral ampicillin and gentamicin for 3 weeks after hospital discharge and amoxicillin indefinitely after that, because prosthetic material had been placed in the previous area of infection. As Bandyk and colleagues<sup>13</sup> showed, in situ reconstruction is a safe and durable treatment option for less virulent aortic graft infections.

At increased risk for an invasive *L. monocytogenes* infection are neonates, pregnant women, individuals with impaired cellular immunity, and individuals older than 60 years.<sup>8</sup> The only risk factor for our patient was his age. Although his original endograft had been in place for 9 years, reoperation at 2 years to treat right iliac limb occlusion and type II endoleak suggests that reintervention may be another risk factor. Nonspecific symptoms such as intermittent fevers and negative blood cultures at presentation are typical of *L. monocytogenes* infection.<sup>10</sup> In addition, an increase in AAA sac size may point not only to an endograft infection, but also to an atypical infectious organism.<sup>9</sup>

Graft infections are typically treated by removing the infectious source along with the graft, débriding the surrounding tissue, and reestablishing blood flow. The techniques used depend on the virulence of the causative organism and overall fitness of the patient. Although graft explantation and direct anatomic aortobiiliac repair are effective in patients with less virulent infections, they are also associated with prolonged hospital stays.<sup>14</sup> Other effective techniques are axillobifemoral bypass<sup>15</sup> and the neoaortoiliac system procedure.<sup>16</sup> However, axillofemoral bypass is associated with a patency rate of only 83% at 5 years, and the neoaortoiliac system procedure is long and demanding.<sup>17,18</sup> Reconstruction with cryopreserved arterial allografts is useful and effective, although such grafts are costly and not always readily available for emergency

use.<sup>19</sup> Rifampin-soaked grafts are not only effective, but also associated with low reinfection rates and overall reduction in graft colonization.<sup>20</sup> In this case, our patient was a good and successful candidate for direct surgical excision of his infected aortic endograft and replacement with a rifampin-soaked graft.

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## References

1. Capoccia L, Speziale F, Menna D, Esposito A, Sirignano P, Rizzo AR, et al. Preliminary results from a national enquiry of infection in abdominal aortic endovascular repair (Registry of Infection in EVAR--R.I.EVAR). *Ann Vasc Surg* 2016;30:198-204.
2. Heyer KS, Modi P, Morasch MD, Matsumura JS, Kibbe MR, Pearce WH, et al. Secondary infections of thoracic and abdominal aortic endografts. *J Vasc Interv Radiol* 2009;20(2):173-9.
3. Cernohorsky P, Reijnen MMPJ, Tielliu IFJ, van Sterkenburg SMM, van den Dungen JJAM, Zeebregts CJ. The relevance of aortic endograft prosthetic infection. *J Vasc Surg* 2011;54(2):327-33.
4. Smeds MR, Duncan AA, Harlander-Locke MP, Lawrence PF, Lyden S, Fatima J, et al. Treatment and outcomes of aortic endograft infection. *J Vasc Surg* 2016;63(2):332-40.
5. Arnaoutakis DJ, Sharma G, Blackwood S, Shah SK, Menard M, Ozaki K, Belkin M. Strategies and outcomes for aortic endograft explantation. *J Vasc Surg* 2019;69(1):80-5.
6. Turney EJ, Steenberge SP, Lyden SP, Eagleton MJ, Srivastava SD, Sarac TP, et al. Late graft explants in endovascular aneurysm repair. *J Vasc Surg* 2014;59(4):886-93.
7. FitzGerald SF, Kelly C, Humphreys H. Diagnosis and treatment of prosthetic aortic graft infections: confusion and inconsistency in the absence of evidence or consensus. *J Antimicrob Chemother* 2005;56(6):996-9.
8. Tanner-Steinmann B, Boggian K. Vascular endograft infection with *Listeria monocytogenes* reated [sic] with surgical debridement but without graft removal. *Case Rep Med* 2011;2011:482815.
9. Yamamoto T, Oka K, Kanda K, Sakai O, Watanabe T, Yaku H. In situ graft replacement for a ruptured abdominal aortic aneurysm infected with *Listeria monocytogenes* after endovascular aneurysm repair. *Ann Vasc Dis* 2018;11(3):346-9.
10. Foulex A, Coen M, Cherkaoui A, Lazarevic V, Gaia N, Leo S, et al. *Listeria monocytogenes* infectious periaortitis: a case report from the infectious disease standpoint. *BMC Infect Dis* 2019;19(1):326.
11. Farber JM, Peterkin PI. *Listeria monocytogenes*, a food-borne pathogen [published erratum appears in *Microbiol Rev* 1991;55(4):752]. *Microbiol Rev* 1991;55(3):476-511.
12. Temple ME, Nahata MC. Treatment of listeriosis. *Ann Pharmacother* 2000;34(5):656-61.
13. Bandyk DF, Novotney ML, Back MR, Johnson BL, Schmach DC. Expanded application of in situ replacement for prosthetic graft infection. *J Vasc Surg* 2001;34(3):411-20.
14. Terramani TT, Chaikof EL, Rayan SS, Lin PH, Najibi S, Bush RL, et al. Secondary conversion due to failed endovascular abdominal aortic aneurysm repair. *J Vasc Surg* 2003;38(3):473-8.
15. Li HL, Chan YC, Cheng SW. Current evidence on management of aortic stent-graft infection: a systematic review and meta-analysis. *Ann Vasc Surg* 2018;51:306-13.

16. Klonaris C, Patelis N, Katsargyris A, Athanasiadis D, Alexandrou A, Liakakos T. Neoaortoiliac system procedure to treat infected aortic grafts. *Ann Vasc Surg* 2017;44:419.e19-25.
17. Samson RH, Showalter DP, Lepore MR Jr, Nair DG, Dorsay DA, Morales RE. Improved patency after axillofemoral bypass for aortoiliac occlusive disease. *J Vasc Surg* 2018;68(5):1430-7.
18. Chung J, Clagett GP. Neoaortoiliac system (NAIS) procedure for the treatment of the infected aortic graft. *Semin Vasc Surg* 2011;24(4):220-6.
19. Chiesa R, Astore D, Piccolo G, Melissano G, Jannello A, Frigerio D, et al. Fresh and cryopreserved arterial homografts in the treatment of prosthetic graft infections: experience of the Italian Collaborative Vascular Homograft Group. *Ann Vasc Surg* 1998;12(5):457-62.
20. Oderich GS, Bower TC, Hofer J, Kalra M, Duncan AA, Wilson JW, et al. In situ rifampin-soaked grafts with omental coverage and antibiotic suppression are durable with low reinfection rates in patients with aortic graft enteric erosion or fistula. *J Vasc Surg* 2011;53(1):99-107, 107.e1-7.