

Acute infection of Viabahn stent graft in the popliteal artery

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ABSTRACT

Peripheral stents are increasingly used for treatment of peripheral arterial disease, yet all implanted devices are potentially at risk for infection. We describe a 51-year-old man who underwent stenting in the femoropopliteal artery and presented 3 days later with leg pain, fever, and evidence of peripheral stigmata of embolization. Blood cultures grew methicillin-resistant *Staphylococcus aureus* and remained persistently positive despite antibiotic therapy. At surgical exploration, the popliteal artery had essentially been disintegrated by the infection, with only visible stent graft maintaining arterial continuity. Acute stent graft infections are rare and must be managed promptly to reduce morbidity. (J Vasc Surg Cases and Innovative Techniques 2017;3:69-73.)

CASE REPORT

A 51-year-old man with history of smoking presented to the emergency department for evaluation of claudication in his right lower extremity. Symptoms occurred with walking of less than 50 feet and completely resolved with rest. The patient had normal femoral pulses bilaterally but diminished pulses in the dorsalis pedis and posterior tibial arteries bilaterally. There were no signs of limb ischemia, ulcerations, or wounds. He underwent arterial ultrasound and computed tomography angiography, and both studies documented bilateral popliteal artery short-segment occlusions with an estimated occlusion length of 4 cm (Fig 1). He was referred to the outpatient vascular clinic for evaluation. His medical therapy included aspirin, atorvastatin, and cilostazol for approximately 6 weeks, at which time he was seen in follow-up and had worsening right leg claudication. Revascularization options of endovascular treatment with angioplasty and stenting vs peripheral bypass with autogenous greater saphenous vein were discussed with the patient, including greater likelihood of future repeated interventions with an endovascular approach and the greater durability and freedom from repeated intervention with surgical bypass. The patient chose endovascular treatment, citing recovery time and need to return to work as the principal factor. The endovascular procedure was performed in the hospital angiographic suite, where interventional radiology procedures, cardiac device

implantations, and coronary interventions are usually performed. Right lower extremity angiography from left contralateral femoral access confirmed short-segment complete occlusion of the distal right femoropopliteal P2 segment (ie, proximal patella to center of knee joint space; Fig 2, A). The infrapopliteal arteries demonstrated a patent posterior tibial and peroneal artery and an occluded anterior tibial in the mid-portion, reconstituting distally through the peroneal. He underwent percutaneous transluminal balloon angioplasty of the lesion with suboptimal result (>75% residual diameter stenosis) despite prolonged inflation (Fig 2, B) and required stenting with placement of a 5- × 50-mm Viabahn endoprosthesis stent graft (W. L. Gore & Associates, Flagstaff, Ariz; Fig 2, C), with good result and re-established distal runoff. The procedural duration was 45 minutes from ultrasound-guided arterial access to vascular closure and included a sheath exchange from 5F to 6F. A support catheter and wire were used for lesion crossing, with a crossing time of <5 minutes. There was no obvious contamination of the sterile field during the procedure. The patient was discharged home after the procedure on the same day. Three days after the procedure, he presented to the emergency department with a 24-hour history of fever, leg pain, swelling, and new findings of atheromatous vs septic emboli of the right lower extremity (Fig 3, A). He was febrile with a body temperature of 38.7°C, and initial blood cultures were positive for gram-positive cocci within 10 hours and later speciated as methicillin-resistant *Staphylococcus aureus* (MRSA). His nasal swab on the day of presentation was also positive for MRSA. The patient was admitted and started on vancomycin and piperacillin-tazobactam and seen by infectious disease consultants, who also recommended treatment with rifampin at 450 mg orally twice daily to combat biofilm on the recently implanted stent. The initial treatment plan was aggressive antimicrobial therapy and to pursue surgical intervention for treatment failure. The patient underwent transesophageal echocardiography, which did not show evidence of infective endocarditis. Computed tomography angiography suggested partial intraluminal obstruction of the popliteal stent and surrounding edema with possible abscess formation. Multiple subsequent surveillance cultures continued to grow MRSA,

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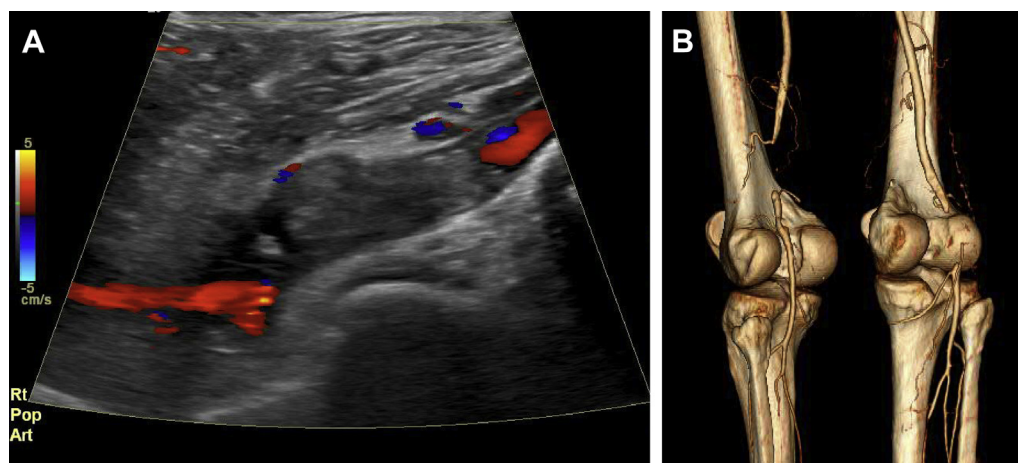


Fig 1. A, Arterial ultrasound of right popliteal artery demonstrating complete short-segment occlusion and absence of flow. **B,** Computed tomography angiography reconstruction demonstrating bilateral short-segment occlusions of the popliteal artery.

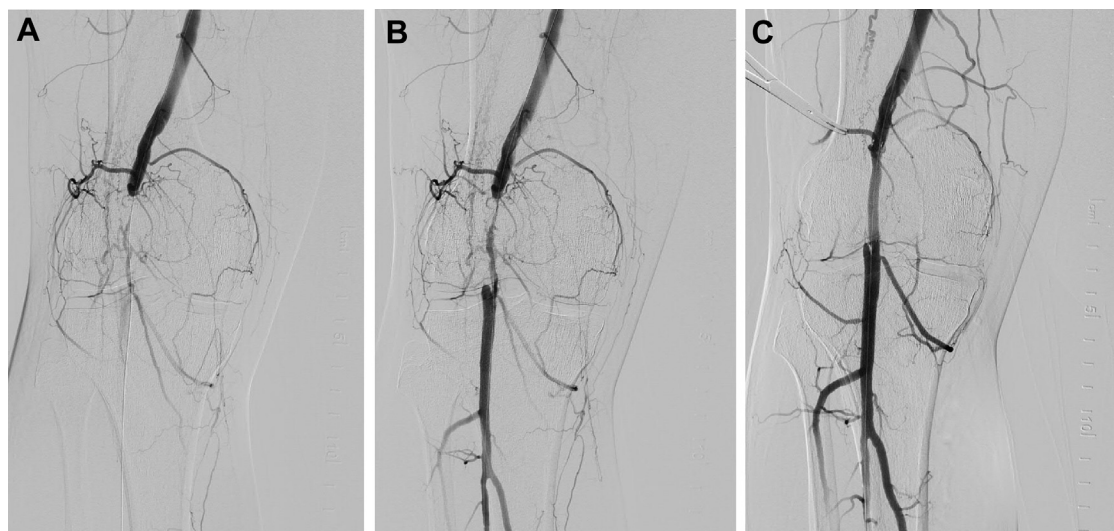


Fig 2. A, Digital subtraction angiography demonstrates complete occlusion of the right popliteal artery. **B,** Acute angioplasty failure (residual diameter stenosis >75%) despite repeated, prolonged balloon inflations. **C,** Treatment with a 5- x 50-mm Viabahn stent graft with good angiographic result.

suggestive of an intravascular source of infection, with the recently placed stent implicated. The decision was made to remove the recently implanted stent graft, which occurred 10 days after his presentation (13 days after his initial endovascular procedure). The patient was placed prone, and general anesthesia was administered. On surgical exploration of the popliteal fossa, there was a large amount of purulent drainage. When the popliteal vein was retracted, the popliteal artery was identified; however, the popliteal artery itself was almost completely destroyed by the infection, with visible stent graft and no surrounding arterial tissue (Fig 3, B, arrow). The stent was removed, and approximately 1-cm débridement of the P3 (distal) popliteal artery was performed. Arterial reconstruction was performed using a segment of greater saphenous vein graft that had been mapped and marked preoperatively and harvested from

the ipsilateral leg. The patient's immediate postoperative course was unremarkable; he was discharged on day 14 and completed a 6-week course of vancomycin. The patient developed gangrene of the distal right toes from septic emboli (Fig 4, A) and ultimately required amputation of the toes on the right foot, with subsequent healing of the surgical site (Fig 4, B). The patient consented to publication of this report.

DISCUSSION

Peripheral stent infections in the arterial circulation are uncommon; however, as more endovascular procedures are currently performed with implanted stents, recognition of this complication is critical. A recent review on intravascular infections from metal stents demonstrated that urgent surgery to remove the infected stent is

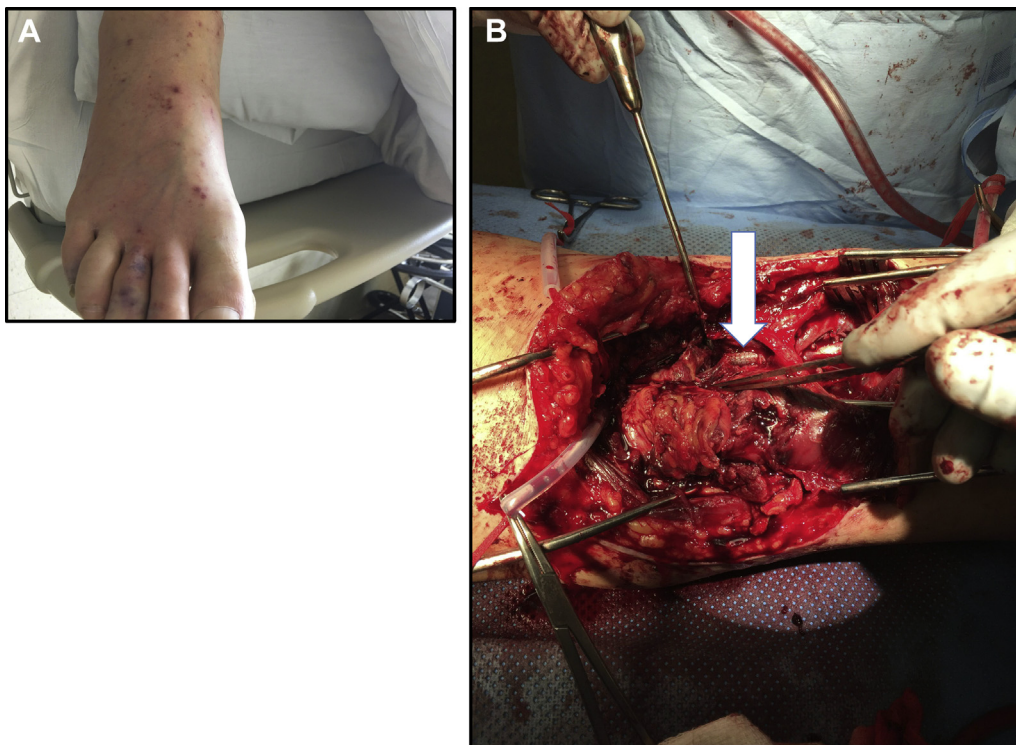


Fig 3. The patient returned to the emergency department 3 days later with fever, leg pain, swelling, and evidence of atheromatous vs septic emboli of the right lower extremity (A). Because of ongoing bacteremia despite vancomycin and rifampin, the patient underwent stent removal; it was noted that the popliteal artery had been destroyed by the infection (B), with the stent graft clearly visible at exploration (arrow).

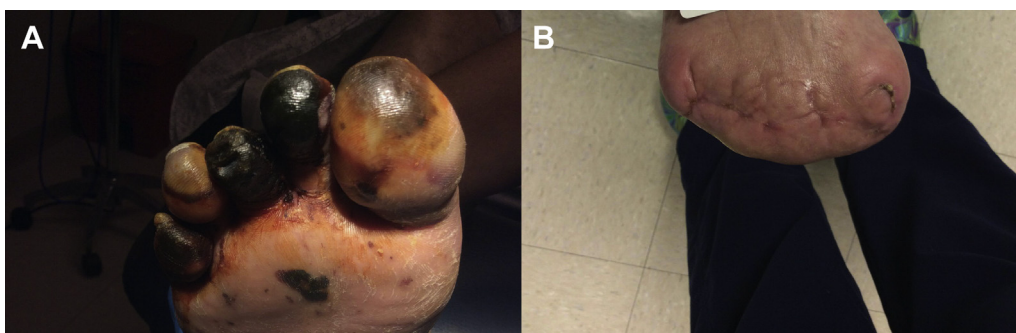


Fig 4. The patient developed gangrene of the distal right toes from septic emboli (A) and required amputation of the toes on the right foot with subsequent healing of the surgical site (B).

performed in >80% of cases, with 25% of cases leading to either amputation or intestinal surgery.¹ The mortality of these cases exceeded 30%. The high rates of morbidity and mortality are likely to be related to both patient-related factors and persistent bloodstream infections by virulent organisms.

The use of covered stents for both short- and long-segment disease in the superficial femoral artery and femoropopliteal segment has shown promise compared with self-expanding bare-metal stents, particularly with regard to restenosis, although rare acute thrombotic events have occurred.² The Viabahn endoprosthesis is a heparin-bonded expanded polytetrafluoroethylene

(ePTFE)-covered stent that reduces neointimal proliferation and has been shown to have similar patency rates to surgical bypass prosthetic grafts³ and bare-metal stents^{2,4} at long-term follow-up. Although it may seem plausible that the microporous ePTFE lining may be more prone to development of stent infection than bare-metal stents, none of the Viabahn trials²⁻⁴ reported stent infections, and reports in the literature of infected peripheral stent grafts are rare. Schneider et al⁵ reported MRSA infection of a Viabahn stent graft in the superficial femoral artery in a patient with critical limb ischemia. The stent required excision and removal with evidence of autolysis of the vessel, similar to our case; however,

the stent was likely to have been chronically infected as the removal did not occur until >6 months after initial implantation. Brodmann et al⁶ published the case of stent graft infection in the superficial femoral artery with the Hemobahn endograft (precursor to Viabahn) diagnosed 2 weeks after implantation; however, the patient was a poor surgical candidate and was treated with oral antibiotics with temporary improvement, although the patient subsequently presented 4 months later with acute limb ischemia due to occluded stent graft and perigraft abscess, diskitis, and psoas abscess and underwent urgent surgical bypass and abscess drainage. There has also been report of late (ie, 1 year) stent graft infection with *Listeria monocytogenes* requiring graft excision and arterial reconstruction. These three reports⁵⁻⁷ encompass the existing literature regarding PTFE stent graft infections in the lower extremity.

Our report describes acute infection of a popliteal stent graft treated by excision and arterial reconstruction. We defined the acute period on the basis of symptoms of infection and emboli in the limb occurring 48 hours after the procedure, using the proposed cutoff of 72 hours after the procedure without an adverse event as the definition for acute procedural success.⁸ The level of destruction of the popliteal artery by MRSA was impressive, with no surrounding healthy arterial tissue. In our case, we hypothesize that the patient was chronically colonized by MRSA (documented by nasal swab) and that the infection was introduced at the time of the procedure through the needle track and caused resultant contamination of the guidewires and procedural sheath. There were no high-risk variables, such as repeated intervention, repeated punctures, prolonged indwelling arterial sheath, or prolonged procedure. Although microorganisms are often present in peripheral atherosclerotic plaques, their role in the pathogenesis of peripheral arterial disease is unknown. Importantly, these organisms are usually periodontal or gut microbiota, not virulent organisms like *S. aureus*, which often cause serious and acute infectious disease. It has previously been shown that MRSA colonization, compared with noncolonization, has a ninefold increased odds for development of subsequent surgical site infection.⁹ However, some reports have not found an independent association between MRSA colonization and risk of surgical site infection after gastrointestinal surgery.¹⁰ Others have suggested administering prophylactic antibiotics before percutaneous peripheral vascular procedures owing to risk of introducing skin pathogens through the needle track or infection risk with balloon dilation and endothelial disruption.^{6,11} Decolonization of *S. aureus* with mupirocin to the nares and skin antiseptic solution of either chlorhexidine or diluted bleach has been recommended to combat skin and soft tissue infections due to MRSA, with reductions of surgical site infections shown in the

surgical literature.¹²⁻¹⁵ In light of our experience with this case, we now check for MRSA colonization before endovascular procedures, similar to how our hospital checks for MRSA colonization of every inpatient admission using a nasal swab. If the result is positive, we recommend mupirocin to the nares and skin antiseptic solution of chlorhexidine. Whether decolonization that has been shown to be effective in reducing surgical site infections also applies to reducing risk of infections before peripheral endovascular procedures remains unknown. We do not necessarily have a working algorithm for rare and low-risk events (ie, endovascular infection) such as described in this report, although we are increasingly mindful of potential infectious complications in a patient with (1) prior MRSA infection, (2) breach in sterile field during procedure, multiple catheter exchanges, or prolonged placement of a vascular sheath, and (3) MRSA or methicillin-sensitive *S. aureus* colonization. Despite the lack of robust scientific evidence, we would offer patients primary prophylaxis with either cefazolin or vancomycin (if penicillin allergic) before placement of peripheral endografts and consider primary prophylaxis with a perioperative β -lactam antibiotic before any endovascular device placement.¹⁶ Despite the absence of reported peripheral stent graft infections from trials,²⁻⁴ our enthusiasm for using stent grafts has been tempered by this case. Primary patency rates in the femoropopliteal artery have also been favorable with different noncovered stent platforms.^{17,18}

CONCLUSIONS

Our report adds to the existing literature on peripheral stent graft infections, demonstrating that acute infections after the procedure can occur, and virulent organisms can quickly destroy healthy arterial tissue and lead to devastating consequences. Although long-term suppressive antimicrobial therapy for infected endovascular stents has been used, patients with persistent bacteremia or complications from the infected stent (pseudoaneurysm/bleeding, recurrent emboli, sepsis) may require stent explantation and arterial reconstruction if it is technically feasible.

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