

# An Infected Nitinol Stent

In this case, an infected nitinol stent presented as an abrupt pseudoaneurysm in the femoral artery.

BY GARY M. ANSEL, MD; CHARLES F. BOTTI, JR, MD; MITCHELL J. SILVER, MD;  
AND PHILLIP BONGIORNO, MD

One of the benefits of an endovascular approach is the low complication rates associated with these procedures. Infection of a procedural site is a complication that is particularly rare in occurrence. If the complication that occurred in this case had occurred after a surgical bypass, the diagnosis would be quite obvious; however, after an endovascular procedure, it was clear only in retrospect.

## CASE REPORT

A 46-year-old man had a history of type I diabetes, coronary artery disease, tobacco use, peripheral vascular disease (after left below-the-knee amputation and right transmetatarsal amputation), and hypertension. Approximately 11 months prior to admission, the patient presented with a nonhealing right foot ulcer at the previous amputation site. Noninvasive evaluation showed an ankle/brachial index (ABI) of .45, with a monophasic waveform. Angiography was completed from the left groin and demonstrated an approximately 13-cm occlusion of the right superficial femoral artery. The patient underwent uneventful balloon angioplasty with adjunctive

nitinol stenting as an outpatient (Figure 1). The patient was treated with aspirin and clopidogrel. The pedal pulses were restored and the foot and heel ulcers healed after approximately 4 weeks of local therapy.

After approximately 6 symptom-free months, the

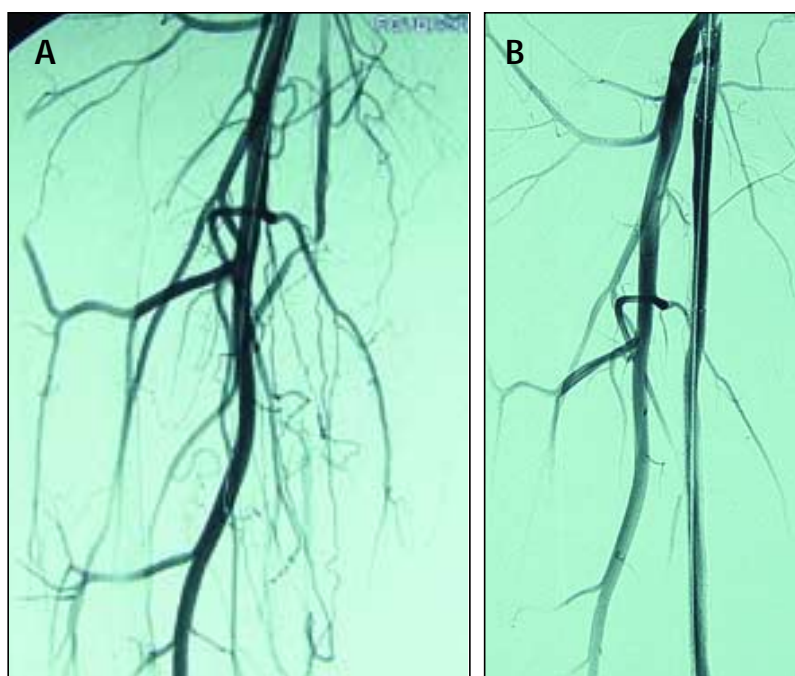


Figure 1. Pretreatment angiogram with proximal SFA occlusion (A). Postangioplasty and stenting angiogram (B).

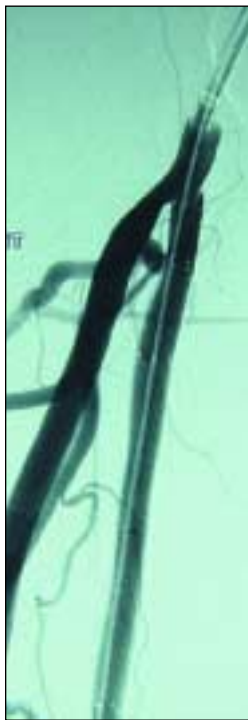


Figure 2. Angiogram obtained after repeat endovascular intervention of the superficial femoral artery.



Figure 3. Angiogram of the right femoral artery pseudoaneurysm. Note the medial migration of the femoral stents.

patient developed right calf claudication. Repeat noninvasive arterial studies revealed recurrent arterial obstruction. Angiography utilizing the left femoral artery for access revealed a total occlusion of the right femoral stent area. After simple guidewire passage through the occluded stents, the patient underwent mechanical thrombectomy followed by repeat balloon angioplasty of the right femoral stent area. This procedure was uncomplicated, and the final angiographic appearance was excellent (Figure 2). Examination at discharge again showed restoration of pulses and improvement of the ABI to .95.

Three weeks later, the patient developed a sudden popping sensation accompanied by swelling and tenderness of the right (nonaccess) groin area. The patient reported no claudication, fever, or chills. Noninvasive study revealed the ABI to be .96. Physical examination showed the patient to be afebrile, normotensive, and nontachycardic. Detailed examination of the groins revealed the left to be well healed. The right groin examination revealed a pulsatile, mildly tender mass. A harsh bruit was auscultated and no erythema was present. The pedal pulses were normal, and motor and neurological examinations yielded normal findings. The patient's white

blood cell count was not elevated at 6,300 cells/ $\mu$ L. The patient was taken back to the angiography suite where repeat angiography was completed from the left groin (Figure 3). A duplex scan revealed a large pseudoaneurysm, however, the precise location and mechanism of the pseudoaneurysm could not be adequately assessed. The patient was referred for surgical therapy. He underwent open surgical treatment under general anesthesia. The pseudoaneurysm was exposed after gaining proximal control at the level of the external iliac artery. Due to brackish fluid being seen around the pseudoaneurysm, infection was strongly considered and cultures were obtained. The proximal superficial femoral and profunda femoral arteries underwent oversewing. A 6-mm ringed prosthetic bypass was tunneled away from the infected area and passed down to the proximal popliteal artery. The cultures of the common femoral artery subsequently grew *staphylococcus aureus*. The patient was placed on intra-

venous antibiotics for 6 weeks and was asymptomatic at 9-month follow-up.

## DISCUSSION

The etiology of this pseudoaneurysm was at first believed to be vascular disruption due to tension of the stent applied against the ostium of the superficial femoral artery. However, we have not seen this reported in the literature, and we have commonly stented up to the ostium of this artery numerous times without complication. This case is an example of a very uncommon but serious complication—stent infection. Overall, the rate of significant complications for endovascular procedures is low (1.5%-5.6%).<sup>1,2</sup> Endovascular complications most commonly occur at the vascular access site and usually present as hematoma or false aneurysm. However, most nonaccess-related endovascular complications are frequently related to dissection of the vessel by the guidewire, perforation of the vessel by the balloon, or embolization of debris. These complications are even less frequent with a primary stenting approach.<sup>1</sup> When percutaneous therapy is applied, it is often successful in treating most complications.<sup>3</sup> Wound infection is quite frequent after open infrainguinal surgical

bypass and seen in 10% to 30% of patients.<sup>4,5</sup> However, the rate of graft infection ranges from approximately 1.4% for vein conduit to 3.6% for prosthetic material.<sup>6</sup> Infection of a stent is an uncommon occurrence and has rarely been reported. Most infections of endovascular devices appear to be related to the addition of material to the stent, as in stent grafts. However, there have been isolated reports of bare-metal stent infections in the femoral and even carotid circulations.<sup>7-9</sup>

### SUMMARY

Complications after endovascular therapies are less common than from open surgical bypass. Infection of a stent is a rare event with few case reports in the literature. Infection of a bare-metal stent is a rare event but should be considered when rupture of stented vascular structure occurs. ■

*Gary M. Ansel, MD, is from MidOhio Cardiology and Vascular Consultants, Midwest Cardiology Research Foundation, Riverside Methodist Hospital, Columbus, Ohio. Dr. Ansel may be reached at (614) 262-6772; gansel@mocvc.com.*

*Charles F. Botti, Jr, MD, is from MidOhio Cardiology and Vascular Consultants, Midwest Cardiology Research Foundation, Riverside Methodist Hospital, Columbus, Ohio. Dr. Botti may be reached at (614) 262-6772; cbotti@mocvc.com.*

*Mitchell J. Silver, MD, is from MidOhio Cardiology and Vascular Consultants, Midwest Cardiology Research Foundation, Riverside Methodist Hospital, Columbus, Ohio. Dr. Silver may be reached at (614) 262-6772; msilver@mocvc.com.*

*Phillip Bongiorno, MD, is from Cardiothoracic and Vascular Surgical Specialists, Riverside Methodist Hospital, Columbus, Ohio. Dr. Bongiorno may be reached at (614) 261-8377.*

1. Ansel GM, Botti CF Jr, George BS. Clinical results for the training-phase roll-in patients in the Intracoil femoropopliteal stent trial. *Catheter Cardiovasc Intern*. 2002;56:443-449.

2. Becker GJ, Kalzen BT, Dake MD. Noncoronary angioplasty. *Radiology*. 1989;170:921-940.

3. Malsi PJ, Manninen HI. Complications of lower-limb percutaneous transluminal angioplasty: a prospective analysis of 410 procedures on 295 consecutive patients. *Cardiovasc Int Radiol*. 1998;21:361-366.

4. Robison JG, Ross JP, Brothers TE, et al. Distal wound complications following pedal bypass: analysis of risk factors. *Ann Vasc Surg*. 1995;9:53-59.

5. Schwartz ME, Harrington EB, Schanzer H. Wound complications after in situ bypass. *J Vasc Surg*. 1988;7:802-807.

6. Feinberg RL, Winter RP, Wheeler JR, et al. The use of composite grafts in femorocrural bypasses performed for limb salvage: a review of 108 consecutive cases and comparison with 57 in situ saphenous vein bypasses. *J Vasc Surg*. 1990;12:257-263.

7. Fiorani P, Speziale F, Calisti A, et al. Endovascular graft infection: preliminary results of an international inquiry. *J Endovasc Ther*. 2003;10:919-927.

8. Walton KB, Hudenko K, D'Ayala M, et al. Aneurysmal degeneration of the superficial femoral artery following stenting: an uncommon infectious complication. *Ann Vasc Surg*. 2003;17:445-448.

9. Maleux G, Benaerts P, Thijs V, et al. Extracranial carotid artery stenting in surgically high-risk patients using the Carotid Wallstent endoprosthesis: midterm clinical and ultrasound follow-up results. *Cardiovasc Intervent Radiol*. 2003;26:340-346.