

Treating Complex SFA Occlusive Disease

Two case reports detailing the use of the Viabahn endoprosthesis with heparin bioactive surface.

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Endovascular intervention has become the standard of care for short-segment occlusive lesions of the superficial femoral artery (SFA). However, there remains a great deal of debate regarding the optimal treatment of longer, more complex lesions. Additionally, the ideal treatment of in-stent stenosis after angioplasty and stenting of the SFA remains ill defined. The Viabahn endoprosthesis with heparin bioactive surface (Gore & Associates, Flagstaff, AZ) offers an additional endovascular tool with which to approach these more complex situations. We present two cases using this device. First, we detail the recanalization of a long-segment SFA occlusion, and then we describe the treatment of a recurrent SFA occlusion after angioplasty and stenting.

CASE 1

The patient was a 70-year-old man with a history of hypertension, hyperlipidemia, and coronary artery disease, who presented with disabling claudication. He reported an inability to ambulate more than one block before onset of left-calf pain. He had previously undergone coronary artery bypass grafting and percutaneous coronary angioplasty and stenting. On the contralateral side, the patient had previously undergone a right common femoral to above-knee popliteal artery bypass with a prosthetic graft for similar complaints. On physical examination, the patient had a 2+ femoral pulse but no palpable pulse distally. His skin was intact without evidence of ulceration. Preprocedure noninvasive studies showed evidence of occlusion of the SFA with an ankle-brachial index (ABI)

of 0.65. His symptoms had improved minimally after several months of exercise therapy and risk factor modification. Given the patient's significant lifestyle-limiting symptoms, the decision was made to proceed with endovascular intervention.

The initial aortography revealed that the aorta and bilateral iliac arteries were patent without significant disease. Subsequently, the left common femoral artery was selectively catheterized with a 5-F catheter and a .035-inch Wholey wire (Covidien, Hazelwood, MO). Angiography performed at this level showed a complete occlusion of the SFA with distal reconstitution and two-vessel runoff (Figure 1). To facilitate intervention, a 7-F Ansel sheath (Cook Medical, Bloomington, IN) was then placed over the aortic bifurcation.

A straight .035-inch Glidewire (Terumo Interventional Systems, Somerset, NJ) was then directed into the proximal nub of this occluded SFA using a Beacon tip torcon NB advantage vertebral catheter (Cook Medical). The wire was successfully advanced through this occluded

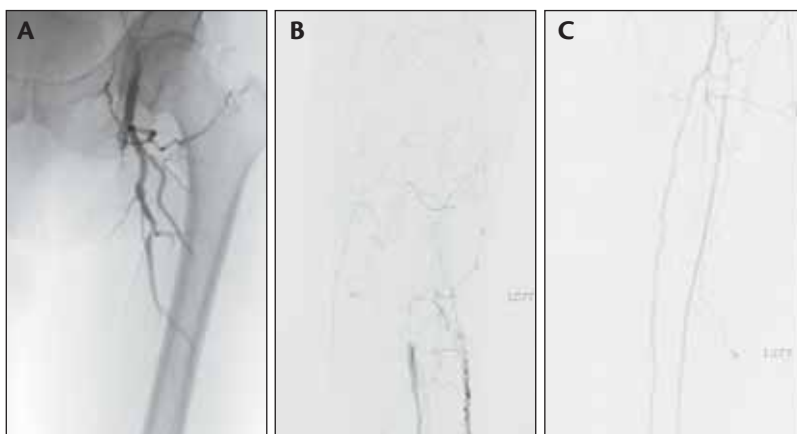


Figure 1. The initial angiogram showing complete occlusion of the SFA just distal to its origin (A), reconstitution of the popliteal artery at the level of the knee (B), and two-vessel infrapopliteal runoff (C).

vessel with the use of a Quick-Cross catheter (Spectranetics Corporation, Colorado Springs, CO). After reentry into the true lumen of the popliteal artery, the .035-inch Glidewire was exchanged for a .014-inch Spartacore (Abbott Vascular, Santa Clara, CA) wire to allow for predilatation. The entire occluded segment was then dilated with a 3-mm balloon. Once this was complete, a 5-mm X 15-cm Viabahn endoprosthesis with heparin bioactive surface was deployed beginning at the native popliteal artery distally (Figure 2). Subsequently, two additional 6-mm X 15-cm Viabahn endoprostheses were deployed extending proximally to the origin of the previously occluded SFA with a minimum of 1 cm of overlap between devices. These endoprostheses were minimally oversized for the native vessel, which measured 4.4 mm distally and 5.5 mm proximally. After deployment, the devices were then postdilated using a 5-mm balloon for the distal portion of the now-recanalized vessel and a 6-mm balloon for the proximal portion. Completion angiography showed excellent flow through the recanalized vessel into the native artery and into the previously noted two-vessel infrapopliteal vessels (Figure 3). The patient tolerated the procedure well and was noted to have a palpable dorsalis pedis pulse at completion. He was discharged the same day on his preprocedure dose of clopidogrel 75 mg daily.

The patient was seen at 2 months after the intervention and no longer complained of any claudication



Figure 2. The angiogram after angioplasty and deployment of the initial 5-mm X 15-cm Viabahn endoprosthesis with heparin bioactive surface.

symptoms. Noninvasive studies demonstrated an ABI on his left side of 1 and a patent lined SFA. He will continue to be monitored with an office visit and noninvasive studies at 2-month intervals for 6 months, after which he will be seen every 6 months.

CASE 2

The patient was a 63-year-old man with a history of coronary artery disease, asthma, cirrhosis, and significant tobacco use, who originally presented with left lower extremity pain. He reported intermittent rest pain, particularly at night, and the inability to ambulate more than 25 feet before the onset of severe calf claudication. Physical examination revealed a palpable femoral pulse and no palpable pulses distally. Noninvasive studies revealed an ABI of 0.51 and evidence of an SFA occlusion. Given his severe symptoms, we elected to proceed with endovascular intervention.

Angiography confirmed left SFA occlusion with reconstitution at the level of the adductor canal and three-vessel runoff. This was successfully treated with subintimal angioplasty and stenting using two 6-mm X 100-mm Protégé EverFlex stents (ev3 Inc., Plymouth, MN) (Figure 4). After this procedure, he had near-complete resolution of his symptoms, and his ABI improved to 1.

The patient presented for routine follow-up 3 months after the procedure. Unfortunately, at this time, he com-



Figure 3. Completion angiogram showing excellent flow throughout the recanalized SFA (A through C) and patent two-vessel infrapopliteal runoff (D).



Figure 4. The angiogram at initial procedure showing complete, long-segment SFA occlusion (A), the SFA after angioplasty and stenting (B), and intact three-vessel infrapopliteal runoff after successful angioplasty and stenting (C).

plained of recurrence of his initial symptoms. Non-invasive testing confirmed stent occlusion with an ABI of 0.5. Of note, the patient had discontinued all of his medications, including clopidogrel, which had been initiated at the time of his angioplasty and stenting. He was taken back to the angiography suite, and initial angiography confirmed occlusion of the SFA at the level of the previously placed stents (Figure 5A, B). This occlusion was traversed with a .035-inch Glidewire and a Quick-Cross catheter (Spectranetics Corporation, Colorado Springs, CO). The AngioJet mechanical thrombectomy device (Possis Medical, Inc., Minneapolis, MN) was subsequently used to perform

pulse irrigation throughout the area of thrombosis, followed by pulse spray infusion of 6 mg of tissue plasminogen activator. This segment was then pulse irrigated again following a 15-minute wait time. Angiography revealed multiple areas of significant in-stent stenosis, which were angioplastied with a 5-mm X 80-mm UTSD balloon (Boston Scientific Corporation, Natick, MA) (Figure 5C through F). Again, after this intervention, he had significant improvement in his symptoms with a postprocedural ABI of 0.92.

Two months after this second procedure, the patient presented again with left lower extremity rest pain. Noninvasive studies demonstrated occlusion of his stented SFA segment with an ABI of 0.44. The patient was taken back to the angiography suite, and angiography again confirmed recurrent occlusion of the SFA. A 7-F Ansel sheath was positioned in over-the-top fashion into the left common femoral artery. The area of the SFA occlusion was then crossed with a stiff-angled Glidewire. The AngioJet device was utilized in combination with tissue plasminogen activator administration to perform mechanical thrombectomy of the occluded segment. Subsequent angiography revealed minimal clot debris remaining in the left SFA with multiple areas of significant in-stent stenosis. Despite subsequent angioplasty of these lesions, there remained significant residual stenosis in the range of 40% to 60% (Figure 6A). Given these findings and the patient's recurrent occlusions, the decision was made to proceed with stent graft placement utilizing the Viabahn endoprosthesis with heparin bioactive surface. Two 6-mm X 100-mm and one 6-mm X 50-mm Viabahn endoprostheses were deployed extending the length of the previously stented segment of the SFA with approximately 1 cm of overlap

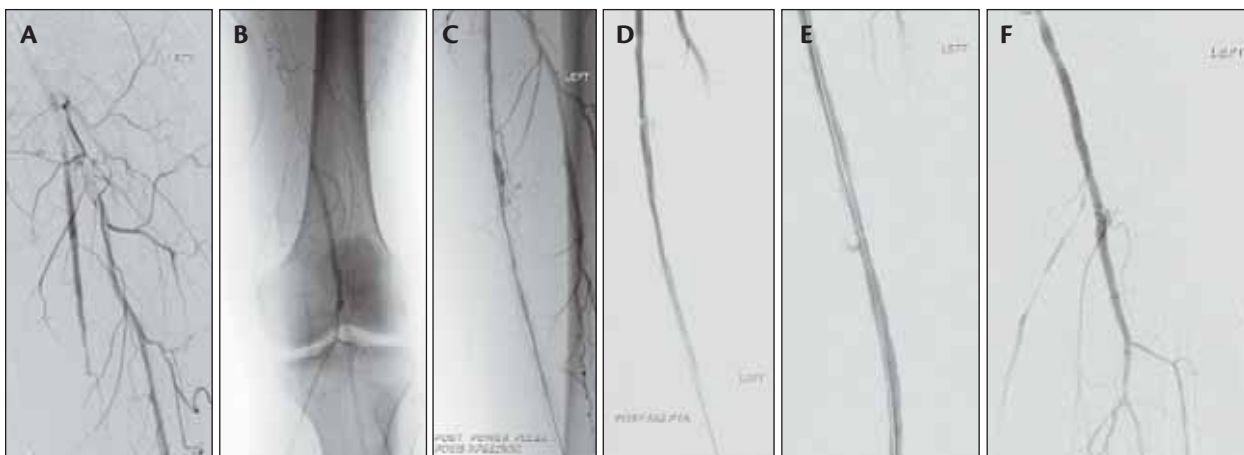


Figure 5. The angiogram at the second procedure showing complete occlusion of the stented segment of the SFA (A, B), the SFA after mechanical thrombectomy (C), and the patent SFA and runoff vessels after tissue-plasminogen activator administration, thrombectomy, and angioplasty (D through F).

between devices. After deployment, the devices were postdilated with a 6-mm balloon. Completion angiography demonstrated excellent flow through these devices and maintained three-vessel infrapopliteal runoff (Figure 6B through D). The patient was maintained on clopidogrel and discharged home 1 day after his procedure.

He was seen in follow-up 1 month after this last procedure and noted significant improvement in his symptoms, although he continued to have mild claudication. Noninvasive testing demonstrated a widely patent endoprosthesis with an ABI of 0.69. As with the patient presented in case 1, he will continue to be aggressively followed with clinical examination and noninvasive testing, including duplex ultrasound examinations in 3-month intervals.

DISCUSSION

Treatment for occlusive disease of the SFA is evolving along with new devices with which to approach these lesions. The original Viabahn endoprosthesis has been shown to be associated with secondary 1-year patency rates of up to 93%.¹⁻² Furthermore, in a single, randomized trial, this device had comparable results to above-knee prosthetic femoral-popliteal bypass.³ The Viabahn endoprosthesis with heparin bioactive surface was developed to provide greater thromboresistance. Despite this advance, as with other devices deployed in the SFA, fracture and restenosis remain potential risks, particularly for longer, more complex lesions.⁴⁻⁶ For this reason, despite our initial technical success, these patients will require strict periodic follow-up with duplex examinations to help maintain patency. Larger, longer-term studies will need to be undertaken to further determine the efficacy of this device; however, these cases demonstrate short-term success using the Viabahn endoprosthesis with heparin bioactive surface for the treatment of complex lesions of the SFA. ■

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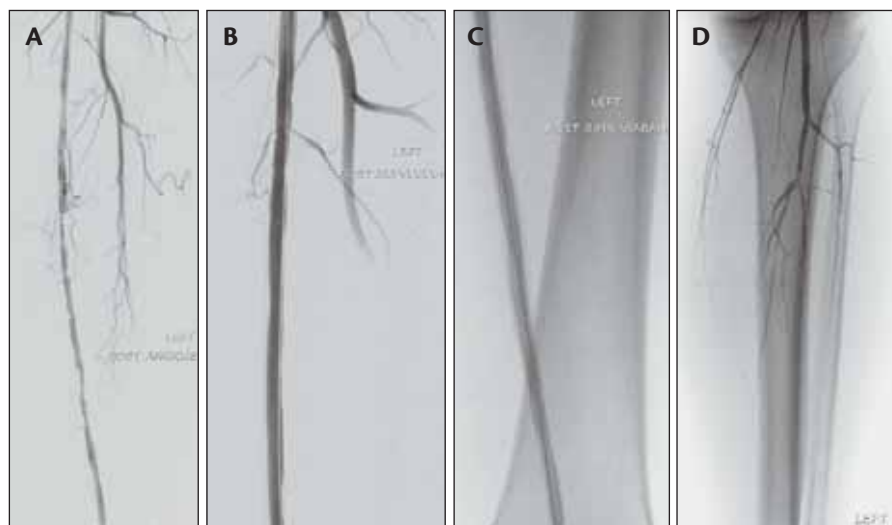


Figure 6. The angiogram at the third procedure showing the SFA after mechanical thrombectomy (A), the SFA after deployment of the Viabahn endoprosthesis with heparin bioactive surface (B, C), and the patent popliteal artery and runoff vessels after endoprosthesis deployment (D).

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