Difficult Access for a CTO in the SFA

Alternative options for accessing and treating this challenging but common indication.

BY TONY S. DAS, MD, FACC

Chronic total occlusions (CTOs) make up a significant number of complex cases that present to the endovascular interventionist. Access to these lesions can be a daunting challenge when they include the entire extent of the superficial femoral artery (SFA) and popliteal artery. Presented in this article is a patient with chronic occlusion of the right SFA and distal reconstitution at the distal popliteal artery, precluding safe popliteal artery sheath placement. Direct peroneal artery access is described as an alternative approach to this lesion.

HISTORY

The patient was a 47-year-old woman with resting pain and a nonhealing ulcer of the right lateral fourth toe. Her medical history included type 2 diabetes, hypertension, coronary artery disease, and peripheral vascular disease. Her surgical history was pertinent due to right femoral-popliteal artery bypass using a reversed greater saphenous vein conduit in 2004; this graft closed in 2005. Her history also included repeat surgery using a polytetrafluoroethylene graft for a femoral occlusion in December 2005, which closed 6 months later. The patient recently presented with resting pain and a nonhealing ulcer. Noninvasive arterial doppler revealed resting ankle-brachial indices of 0.4 on the right and 0.7 on the left. She was referred for complex intervention of the occluded right SFA and popliteal artery.

ANGIOGRAPHY

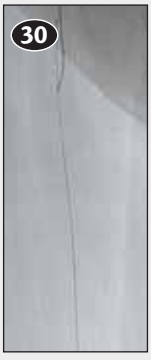
Digital subtraction angiography shows relatively normal aortoiliac bifurcation with ostial occlusion of the right SFA and distal reconstitution at the popliteal artery with only one-vessel runoff of the peroneal artery (Figures 1-5).

PROCEDURE

Initial options for access were reviewed. Antegrade access was ruled out by angiography and ultrasound, due to the short stump of the SFA. Retrograde popliteal access was not attempted due to the short popliteal segment patency and the likelihood that the entry sheath would already be in the lesion, precluding complete revascularization. Brachial access was not entertained due to the long distance of occlusion and the anticipation of a lack of sufficient length of balloon/stent catheters from the brachial access point. Therefore, contralateral access was attempted from the left femoral artery. Unfortunately, angled Glidewire (Terumo Interventional Systems, Somerset, NJ) attempts with the support of both straight and angled catheters continued to lead to the previous polytetrafluoroethylene graft and not the native artery (Figures 6-19).

Percutaneous transluminal angioplasty (PTA) was performed with a 4-mm X 12-cm PTA balloon, distally and proximally in the graft, with a final 5-mm balloon at the proximal anastamosis, which would not yield despite 20 atm of pressure. The small channel created was enough to alleviate the resting pain, but clearly was not enough to heal the ulcer. The next attempt at recanalization was from the direct peroneal artery puncture in a retrograde fashion using a micropuncture kit and only the 3-F dilator of the kit without sheath placement. The stick was made using

FIGURES 1-51



roadmapping technique from the anterior compartment with the patient in the usual supine position (Figures 20-23). Retrograde recanalization with a .018-inch angled Glidewire was successful to the proximal vessel, but a 15-mm snare was unable to grab the retrograde wire (Figures 24-32). The channel created by the retrograde dissection was patent enough to allow a contralateral .035-inch angled Glidewire passage into the distal popliteal artery (Figures 33 and 34). A 3-mm X 4-cm balloon was inflated for 5 minutes to seal the access site puncture from above, after exchanging the .035-inch Glidewire for a .018-inch wire. The retrograde wire from the peroneal artery access site was removed, and an angiogram confirmed a patent distal peroneal artery without perforation; a photo of the access site is shown (Figures 35-37). Finally, the procedure was completed with overlapping balloon angioplasty and stent therapy from the ostial SFA to the distal tibeoperoneal trunk, allowing recanalization of a complex SFA and proximal popliteal CTO (Figures 38-51).

FOLLOW-UP

The patient was observed for compartment syndrome problems overnight and had no pain, swelling, or bleeding at the access site in the shin. The patient returned for follow-up at 3 months with a healed ulcer, and a resting ankle-brachial index of 0.8 was recorded. Duplex ultrasound showed a patent SFA and popliteal artery stent.

DISCUSSION AND CONCLUSION

Critical limb ischemia typically presents with advanced occlusive disease. Access issues often need to be resolved before successful recanalization can be attempted. In this case, the contralateral access would only allow wire passage into the previous bypass grafts, which would have a low patency rate. The novel direct peroneal artery puncture was performed in lieu of the traditional popliteal artery retrograde approach due to the diffuse disease in the popliteal artery and the concern for sheath placement in the diffusely diseased segment. Balloon angioplasty sealing of the access site from the antegrade wire was successful and without bleeding complications in the anterior compartment of the lower extremity. Ultimately, complete reconstitution of straight-line flow allows ulcer healing and resolution of resting pain. ■

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An integral component of endovascular therapy for the treatment of lower-extremity ischemia certainly includes the implantation of self-expanding stents in the superficial femoral artery (SFA) for flow-limiting dissections and residual stenosis after angioplasty. This has been expanded to include the placement of nitinol stents from the origin of the SFA to the adductor canal (long-segment stenting). Unfortunately, there can be a significant arterial restenosis response to stent placement, resulting in reocclusion with intimal hyperplasia known as in-stent restenosis. The endovascular correction of these restenoses can be challenging due to the difficulty of recannulation through these regions of occlusion within the stented segment. The etiology of the difficulty with traversing through the regions of in-stent occlusion can be attributed to either stent fracture or the passage of the wire through the interstices of the stent rather than through the lumen. We present two cases of chronic total occlusion of the SFA due to in-stent restenosis. After failing to cross the occluded segment using an antegrade approach, retrograde access of the popliteal artery was performed, and the SFA was successfully recannalized.

CASE 1

A 56-year-old man with coronary artery disease and diabetes presented with a 2-year history of right calf claudication at 1 block. He had undergone a right lower-extremity angioplasty and stenting at an outside institution 4 years before for similar symptoms. On physical examination, the patient had a strong right femoral pulse with no palpable pulses distally. The ankle-brachial index on the affected side was .60, and duplex ultrasound showed a stented SFA with occlusion of the proximal and midportions.

Angiogram of the right lower extremity demonstrated total occlusion of the proximal SFA and stenosis of the proximal profunda femoral artery. The previously placed SFA stent was shown to extend proximally into the distal common femoral artery, jailing the profunda origin (Figure 1A). The stents extended into the below-knee popliteal, with reconstitution within the stents at the above-knee popliteal artery (Figure 1B) and three-vessel runoff distally (Figure 1C). A 7-F contralateral Balkin sheath (Cook Medical, Bloomington, IN) was placed, and the proximal half of the SFA was successfully recannalized. At this point, all further attempts resulted in the wire passing outside of the previous SFA stents due to multiple areas of fracture (Figure 2).

The left groin was then dressed sterilely, leaving the sheath in place, and the patient was placed in the prone position. The right popliteal region was then prepared, and a micropuncture needle was used to