

# Complex Chronic Total Occlusion Treatment Using a Re-Entry Catheter

A creative approach utilizing retrograde re-entry from the popliteal artery to the proximal SFA.

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A 60-year-old man with a long history of coronary artery disease, hypertension, hyperlipidemia, and diabetes presented for evaluation of severe lifestyle-limiting claudication (Rutherford category 3) in his right leg, and to a lesser degree, his left. He reported bilateral lower-extremity calf pain after walking one half block, and he had no resting pain and no nonhealing ulcers. The patient had undergone previous CABG in 1990, as well as a distant gallbladder surgery and appendectomy.

## WORK-UP

Physical examination revealed an absent pulse in the left femoral, popliteal, dorsalis pedis, and posterior tibial arteries; the right femoral artery had a 1+ pulse, and pulses were absent in the right dorsalis pedis and posterior tibial. No ulcers were observed. The patient's resting ankle-brachial indices (ABIs) were 0.6 on the left and 0.7 on the right. His cardiovascular workup included an adenosine nuclear scan, which showed an ejection fraction of 54% and a mild inferior scar without ischemia. The patient's labs were normal, including a creatinine level of 1.2.

## ANGIOGRAPHY FINDINGS

Initial aortogram and runoff imaging (Figures 1-8)

revealed relatively normal aortoiliac vascular territory. However, his left external iliac artery and left common femoral artery showed a 100% occlusion with collaterals to a patent left profunda femoris artery. His right common, internal, and external iliac arteries were patent with mild plaques, and his right superficial femoral artery (SFA) was 100% occluded, with reconstitution via collaterals at the distal SFA near the adductor canal. His left SFA was also occluded, with collaterals reconstituting in the distal SFA at the above-the-knee popliteal artery with three-vessel runoff bilaterally.

## ACCESS DILEMMA

The patient has mildly greater right-side claudication. In light of the occluded left common femoral artery, the contralateral access option to treat the right SFA with endovascular techniques was limited. The brachial approach was not feasible due to the distance from the left or right brachial artery to the reconstitution of the distal SFA being > 120 cm (which is the shaft length of most peripheral stents). Therefore, the only approach was a retrograde right popliteal artery approach.

## PROCEDURAL TECHNIQUE

The patient was brought to the endovascular suite, and his right groin was prepped and draped. A 5-F

## STEP-BY-STEP PROCEDURAL ANGIOGRAPHY



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14



Figure 15



Figure 16



Figure 17



Figure 18



Figure 19



Figure 20



Figure 21

sheath was placed in the right common femoral artery for access, and proximal artery imaging was performed (Figure 9). Angiography of the SFA occlusion was performed in the anterior-posterior and lateral views to identify the short stump of the SFA. The femoral sheath was attached to two consecutive 30-inch extension tubings and kept sterile to inject from above. The patient was repositioned into a prone position, and the right popliteal fossa was prepped and draped.

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The popliteal artery was entered using a 4-F micro-puncture kit, which was exchanged for a 6-F sheath placed in the popliteal artery (Figure 10). A .035-inch Zipwire (Boston Scientific Corporation, Natick, MA) and a 5-F, straight Glidacatheter (Terumo Medical Corporation, Somerset, NJ) were used to traverse the chronically occluded SFA using the subintimal technique (Figure 11). Once the wire was in proximity to the nub of the proximal SFA, it would not enter into the true lumen (Figure 12). Concern for further propagation of the subintimal channel led to using the Outback Re-entry catheter (Cordis Corporation, a Johnson & Johnson company, Miami, FL). A Pioneer catheter (Medtronic Vascular, Santa Rosa, CA) was considered, but the safety of using the existing 6-F sheath rather than upsizing the popliteal sheath to the 7-F sheath that is required for the Pioneer was taken into account. The .035-inch wire was exchanged for a supportive .014-inch Spartacore wire (Abbott Vascular, Abbott Park, IL) (Figure 13).

The concern was to safely re-enter the SFA without jeopardizing the ostium of the profunda femoris. The orientation mechanism of the Outback catheter was positioned so the “L” marker was pointing medially toward the SFA in the 45° LAO view (Figure 14). The “T” marker orientation was achieved in the 45° RAO view (Figure 15). Once centered, the nitinol needle was deployed, and a .014-inch Whisper wire (Abbott Vascular) was gently advanced into the common femoral and external iliac artery (Figure 16). This wire was exchanged over an .018-inch-compatible QuickCross Catheter (Spectranetics Corporation, Colorado Springs, CO). The wire was exchanged for an

.018-inch wire to allow passage of the angioplasty balloons. A 5-mm X 10-cm balloon was expanded from the ostium to the reconstituted SFA (Figure 17). Persistent recoil and an expected suboptimal SFA angioplasty result led to stenting. Two overlapping (150-cm), nitinol, self-expanding stents were used to cover the lesion completely, and a good final angiographic result was achieved (Figure 18-21).

## FOLLOW-UP

The patient had an uneventful postprocedure overnight hospital stay. He was ambulatory and discharged the next morning. The follow-up right-side resting ABI is now 0.94. The patient is scheduled to undergo left common femoral endarterectomy and future left SFA recanalization.

## CONCLUSION

Complex peripheral chronic total occlusions require persistent innovation regarding access, options, and equipment. Understanding the available techniques of subintimal angioplasty along with familiarity with re-entry devices such as the Outback catheter allow safe and successful recanalization of SFA occlusions. Retrograde re-entry with an Outback catheter from the popliteal artery to the proximal SFA has not been described or published before to my knowledge. This approach was both necessary (due to the contralateral femoral occlusion) and successful. Safety issues of avoiding the profunda femoris upon re-entering and avoiding a larger sheath were achieved using the Outback Re-entry catheter. ■

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