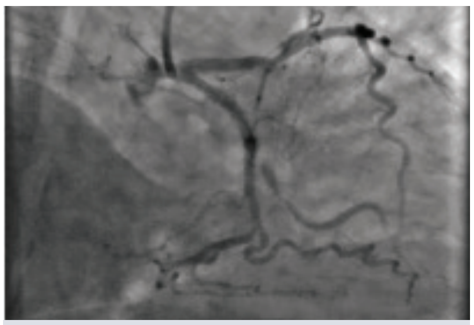
Cath Lab Digest

A product, news & clinical update for the cardiac catheterization laboratory specialist



CASE REPORT

Crossing a Difficult-to-Cross Coronary Lesion: The Utility of the Wire Surfing Technique

Khawaja Afzal Ammar, MD

Abstract

A difficult-to-cross coronary lesion, due to vessel tortuosity and almost complete occlusion, was crossed using the wire surfing technique. This case report captures the details of the case and presents it in the light of fluid hemodynamics, with focus on viscosity and resistance to flow.

Case Report

A 73-year-old female presented to the cardiac catheterization laboratory with chest pain, a half-millimeter ST-segment depression in inferior leads, and rising troponin over the previous 14 hours. Angiography revealed a completely occluded large first obtuse marginal artery (OM1) with an acute angle take-off from a dominant circumflex coronary artery.

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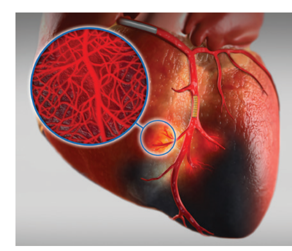
In This Issue

CUTTING-EDGE TECHNOLOGY

Baptist Health's Miami Cardiac & Vascular Institute Experience With SuperSaturated Oxygen (SSO_2) Therapy to Improve Outcomes in STEMI Patients

CLD talks with Marcus St John, MD, and Ramon Quesada, MD.



What have been your observations regarding ST-elevation myocardial infarction (STEMI) treatment outcomes over the past decade?

Marcus St John, MD: STEMI care and outcomes have definitely improved over the years. Much of that improvement has come from two things. One is the advent of percutaneous coronary intervention (PCI), which shepherded us from the thrombolytic era into the percutaneous era of mechanically getting the artery open, first with balloons and then with stents. The other major advent has been reducing door-to-balloon time, getting systems in place so that STEMI patients can get rapid treatment upon presentation.

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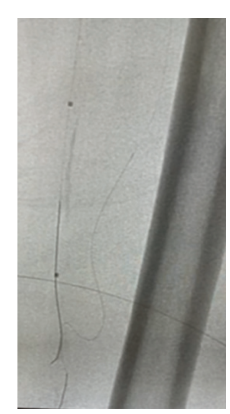
CASE REPORT

Transcollateral Access for SFA Chronic Total Occlusion Recanalization



Zaheed Tai, DO, FACC, FSCAI

Case Report

The patient is a 79-year-old male with a history of chronic atrial fibrillation, peripheral arterial disease with previous iliac stents, venous insufficiency, hypertension, and lifestyle-limiting claudication, with the left leg more symptomatic. He was able to walk 100-200 yards, depending on his activity.

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Transcollateral Access for SFA Chronic Total Occlusion Recanalization

Zaheed Tai, DO, FACC, FSCAI

Computed tomography angiography showed a normal aorta, high-grade stenosis of the right renal artery, patent bilateral common iliac stents, moderate stenosis in the right lower extremity, and occlusion of the left superficial femoral artery (SFA) with distal reconstitution. Patent 3-vessel runoff was noted bilaterally.

The right groin was accessed under ultrasound guidance. With a 5 French sheath, we crossed with a internal mammary artery (IMA) catheter and performed selective left lower extremity angiography. The SFA was occluded, although there appeared to be a possible beak (Figure 1). The vessels reconstituted distally just prior to adductors canal via profunda collaterals. Distally, there was visualization of the anterior tibial and peroneal arteries which appeared patent, with the posterior tibial filling last.

Following the diagnostic angiogram, we initially upsized to a 6 French 45 cm sheath (Cook Medical) and an .035-inch 260 cm Zip wire (Boston Scientific) did take the initial channel of the SFA. An .035-inch Rubicon microcatheter (Boston Scientific) was advanced and the wire was switched out to a Gladius .018-inch (Asahi Intecc). The knuckle was advanced distally, but did not re-enter at the reconstitution point. There was some diffuse disease distal to the reconstitution point and the goal was to not extend the dissection plane. Initial attempts were made to redirect with an .014-inch Halberd (Asahi Intecc) and penetrate the cap that way; however, it deflected off the distal cap. Pedal access was considered, but had an initial difficult access secondary to poor imaging and patient cooperation. After reviewing the films, it appeared there was path from a collateral off the profunda. The Halberd .014-inch wire was left in place as a marker wire. A Sion Black (Asahi Intecc) and a secondary microcatheter were advanced through the profunda and into the collateral. The wire was advanced through and came in right at the distal cap. Although we could not get enough purchase retrograde to advance a retrograde knuckle, the retrograde wire was able to manipulate the distal cap and caused some plaque modification (Figure 2). At that point, the antegrade Halberd wire was able to be redirected, entered the vessel at the reconstitution point, and wired distally. The .035-inch Rubicon microcatheter was advanced and switched out for a Sion Black. A 2.0 Auryon laser (AngioDynamics) with aspiration was used to performed laser atherectomy with <50 mL of aspirate (Figure 3). Total lesion length was approximately 220 mm. After about 2 minutes of treatment at 50 mmJ^2, intravascular ultrasound (IVUS) (Boston Scientific) was performed, demonstrating a dissection distally at the cap. On pullback, there was diffuse plaque in the vessel but it was luminal (the proximal one-third of the vessel). Therefore, the plan was to treat the distal part of the lesion with a stent (to seal the dissection) and perform percutaneous transluminal angioplasty (after the laser) of the proximal vessel. After IVUS, we took a 5.0 mm x 200 mm Charger balloon (Boston Scientific), and inflated distally at 6 atmospheres and then to 10 atmospheres, and we came in proximal

Figure 1. Pre angiogram.

Figure 2. The retrograde wire was able to manipulate the distal cap and caused some plaque modification.

Figure 3. **Aspiration material.**

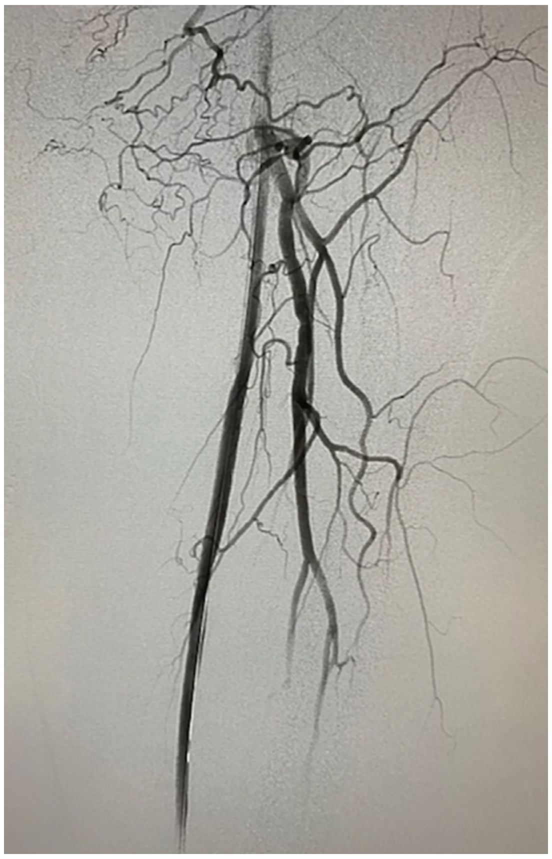

Figure 4. **Post Auryon laser (AngioDynamics), percutaneous transluminal angioplasty, and stent.**

in the SFA. There was now reconstituted flow. The lesion distal to the reconstitution point was touched up with low-pressure balloon inflation, and then, based on the dissection plane, a 6 mm x 150 mm stent was placed. We did some post dilatation, and brisk flow to the SFA and no evidence of distal embolization were seen following angiography (Figure 4). The patient tolerated the procedure well. The wire was removed and repeat angiography demonstrated the same status: no dissection, perforation, or embolization.

Discussion

Chronic total occlusion (CTO) of the superficial femoral artery (SFA) occurs in approximately 40% of patients with symptomatic peripheral arterial disease (PAD).[1] Recanalization of these lesions may prove to be challenging, with true lumen crossing occurring 40%-60% of the time and failure to cross in approximately 25% of cases.[2] In addition, procedure times can be lengthy and the patient may be subject to increased dye load.[3] The advent of multiple crossing devices has allowed for a decrease in crossing time, as well as facilitating distal reentry. Alternative approaches include subintimal angioplasty or a retrograde approach utilizing either popliteal or transpedal access. Transcollateral access has also been described for below-the-knee occlusive disease, with limited reports for the SFA.[4-7]

When antegrade methods fail or in the presence of certain clinical characteristics, a retrograde approach is preferred, which typically involves infrapopliteal or popliteal access.[8] Some potential imitations to this approach include repositioning of the patient, increased risk of access complications from popliteal access, small distal vessels, single- vessel runoff or difficulty with access secondary to heavy calcification of the infrapopliteal vessels. Transcollateral access may be an alternative route. This approach is minimally invasive, there is no need for repositioning of the patient, and additional access is not necessary.[7,9] The retrograde cap is often soft in nature and therefore, may offer a greater likelihood of wire crossing. In the literature, SFA revascularization has been successfully performed using collateral vessels in a small number of cases without complications.[6,7,9,10]

Transcollateral peripheral access incorporates many of the tools utilized in retrograde coronary revascularization. Microcatheters, such as the Turnpike LP (Teleflex), Corsair XS (Asahi Intecc) or Caravel (Asahi Intecc) will facilitate retrograde crossing and provide wire support. Some microcatheters are designed for rotational advancement and the tortuosity of the collateral may determine which catheter is used. Furthermore, advancements in coronary guidewire technology (.014-inch wires) have facilitated the use of the transcollateral approach and reduced the risk of vessel compromise. The Suoh3 or Scion Black (both Asahi Intecc) guidewires are examples. There are not many .018-inch peripheral wires with characteristics designed for this approach. Once retrograde crossing has been achieved, the retrograde wire can then be left in place as "marker wire" for antegrade wiring (particularly in an ambiguous proximal cap), escalated to a higher tip load wire for retrograde wiring, exchanged for a retrograde "knuckle" wire, or utilized for controlled antegrade and retrograde subintimal tracking (CART) technique or reverse CART to facilitate completion of the procedure. The operator should also be facile with snaring, wire externalization, and recognition and management of transcollateral complications (gear entrapement, perforation, etc) when undertaking this approach. ■

References

1. Boguszewski A, Torey J, Pai R, et al. Intraluminal recanalization of SFA CTOs. *Endovascular Today*. 2010; 9: 33-38.
2. Scheinert D, Laird JR, Schröder M, et al. Excimer laser-assisted recanalization of long, chronic superficial femoral artery occlusions. *J Endovasc Ther*. 2001; 8(2):156-166.
3. Bolia A, Miles KA, Brennan J, et al. Percutaneous transluminal angioplasty of occlusions of the femoral and popliteal arteries by subintimal dissection. *Cardiovasc Intervent Radiol*. 1990;13(6):357-363.
4. Urasawa K, Sato K, Koshida R, Honma Y. Trans-collateral angioplasty for the treatment of long chronic total occlusions of superficial femoral arteries: a novel wiring technique. *J Cardiovasc Surg (Torino)*. 2014 Jun; 55(3): 395-400.
5. Zander T, Gonzalez G, De Alba L, et al. Transcollateral approach for percutaneous revascularization of complex superficial femoral artery and tibioperoneal trunk occlusions. *J Vasc Interv Radiol*. 2012; 23(5): 691-695.
6. Memon S, George JC, Kalra S, et al. Transcollateral intra-arterial retrograde ostial superficial femoral artery chronic total occlusion recanalization for critical limb ischemia. *J Crit Limb Ischem*. 2021;1(2):E73-E78. Accessed March 18, 2022. https://www.clijournal.com/article/transcollateral-intra-arterial-retrograde-ostial-superficial-femoral-artery-chronic-total
7. Tai Z. Transcollateral approach for percutaneous revascularization of complex superficial femoral artery chronic total occlusion. *J Invasive Cardiol.* 2013; 25: E96-E100.
8. Banerjee S, Shishehbor MH, Mustapha JA, et al. A percutaneous crossing algorithm for femoropopliteal and tibial artery chronic total occlusions (PCTO algorithm). *J Invasive Cardiol.* 2019; 31: 111-119.
9. Fusaro M, Agostoni P, Biondi-Zoccai G. "Trans-collateral" angioplasty for a challenging chronic total occlusion of the tibial vessels: a novel approach to percutaneous revascularization in critical lower limb ischemia. *Catheter Cardiovasc Interv*. 2008;71:268-272.
10. Nakamura Y, Komatsu N, Masuda A, et al. Successful endovascular treatment of chronic total occlusion of superficial femoral artery using retrograde approach from deep femoral artery. *Fukushima J Med Sci.* 2014;60:43-46.

Zaheed Tai, DO, FACC, FSCAI
Winter Haven Hospital, Winter Haven, Florida

Disclosure: Dr. Tai reports he is a consultant for AngioDynamics.

The authors can be contacted via Dr. Zaheed Tai at zaheedtai@gmail.com