WHAT WOULD YOU DO?

The Curse of the Long SFA Occlusion

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CASE PRESENTATION

A 45-year-old woman presents with severe claudication involving the left lower extremity (Rutherford class 3). She has an extensive medical history that includes lupus anticoagulant, coronary artery disease treated with percutaneous coronary intervention (PCI), renal artery disease treated with a drug-eluting stent (DES) in the right renal artery, cerebrovascular accident, dyslipidemia, type 2 diabetes mellitus, continued tobacco abuse, and a previous right femoropopliteal bypass graft complicated by thrombosis requiring urgent thrombectomy. She has not undergone previous intervention or surgery of her left lower extremity. Her medications include aspirin, clopidogrel, and a statin.

The patient reports discomfort of the left calf region with short-distance claudication (< 50 ft) that feels similar to symptoms that she had involving the right lower extremity, which ultimately prompted the femoropopliteal bypass. On examination, the left leg is warm with ulcerations, there is no edema, and capillary refill is delayed. Her bilateral femoral pulses are palpable. The left popliteal artery pulse is monophasic with a handheld Doppler ultrasound, but we are unable to detect pulses of the dorsalis pedis (DP) or posterior tibial (PT) artery.

What is/are the appropriate noninvasive test(s) to order? With this patient's complex history of peripheral artery disease (PAD), would you order functional testing or CTA, or would you proceed directly to angiography?

Dr. Sharma: If it is determined that the severe claudication in the left lower extremity is lifestyle limiting, anatomic imaging such as duplex ultrasound or CTA with runoff can certainly be considered. I still would perform an ankle-brachial index (ABI) because she is likely to undergo intervention, and this ABI would be used as a baseline when following the patient long term. In addition, because she has undergone a previous right lower extremity intervention, ABI of the left side has likely been previously obtained. If there is any concern of pseudoclaudication, getting an exercise ABI now would be helpful, as you would likely see a drop in the current ABI compared with a previous ABI in true claudication. If there is a concern for pseudoclaudication and there is no change in ABI after exercise compared with the previous ABI, then evaluating her for other causes such as spinal stenosis would be warranted.

Dr. Jolly: I like getting baseline functional testing (ABI, duplex) for several reasons. First, it provides objective clinical data that you can corroborate with the patient's symptoms and anatomy. Second, it serves as the basis from which success can be measured beyond clinical symptoms postprocedure. And finally, it is actually required as part of the Vascular Quality Initiative registry.

Dr. Madassery: For most patients who present with this clinical scenario, my practice is to perform noninvasive exams consisting of an ABI, with exercise if warranted, and segmental pressure evaluation. In diabetics and renal failure patients, I prefer to also get toe pressures and toe-brachial index (TBI). This provides information that can guide the next steps. Transcutaneous oxygen measurements can also be utilized. The segmental pressure evaluation provides important information as to the level of disease, which helps the approach for the case. For me, the ABI/TBI and toe pressures act as a preprocedure and follow-up comparison tool. I refrain from cross-sectional imaging unless there is concern on physical examination for common femoral artery (CFA)/aortoiliac disease or there is extensive vascular surgical history. For most patients in my practice with high calcific burden, CTA has limited value for evaluating distal extremity vasculature. I don't find many reasons to go directly to angiography without noninvasive exams.

CASE CONTINUED

ABIs at rest and with exercise are ordered. The patient exercises for 2 minutes but stops due to left leg pain.

The results of resting ABIs are 1.03 on the right and 0.66 on the left. Postexercise, ABIs are 0.74 and 0 (did not return to baseline) on the right and left, respectively.

What are next steps in the workup—angiogram versus CTA? Should vein mapping be performed? What else do you want to know about this patient's history?

Dr. Sharma: I would certainly get an arterial duplex ultrasound of the vessels from the abdominal aorta to the ankle arteries or CTA with runoff rather than an angiogram to define the anatomy first. This would identify whether surgery or endovascular therapy would be the best option.

Dr. Madassery: Based on the clinical history, I would like to know about any previous endovascular interventions, any venous disease ablations, and if the right lower extremity bypass was native or prosthetic (ie, vein harvested). My assumption is that unless a cephalic vein option is present, the likelihood is that surgical options for this patient may be prosthetic. But if uncertain, I would obtain vein mapping.

Dr. Jolly: For me, the decision regarding CTA or a direct angiographic strategy is largely determined by my suspicion for aortoiliac disease. I find CTA very helpful in planning aortoiliac interventions but less useful for the infrainguinal segments. I personally do not find CTA for pure femoropopliteal disease to be cost-effective or necessary most of the time. Arterial duplex ultrasonography is typically satisfactory. Vein mapping may be considered, but in this particular patient, I would be very careful to devise a strategy that doesn't lead to the use of her left great saphenous vein. She is a 45-year-old woman who has already undergone PCI and will almost certainly encounter the need for coronary artery bypass grafting in her lifetime. It's not mentioned whether her right femoropopliteal bypass graft was synthetic or vein.

CASE CONTINUED

Additional history reveals that 3 years prior to presentation, five stents were placed in her right superficial femoral artery (SFA; four were DESs), but they occluded within 10 months, when she had her bypass. The patient subsequently undergoes diagnostic angiography, which reveals a patent distal abdominal aorta, with mild disease in the bilateral common iliac artery. There is a 40% stenosis in the left external iliac artery and CFA, with proximal stenosis of 50% in the deep femoral artery (Figure 1). The proximal left SFA is occluded with distal reconstitution, the popliteal artery is patent, and there is three-vessel runoff to the foot.

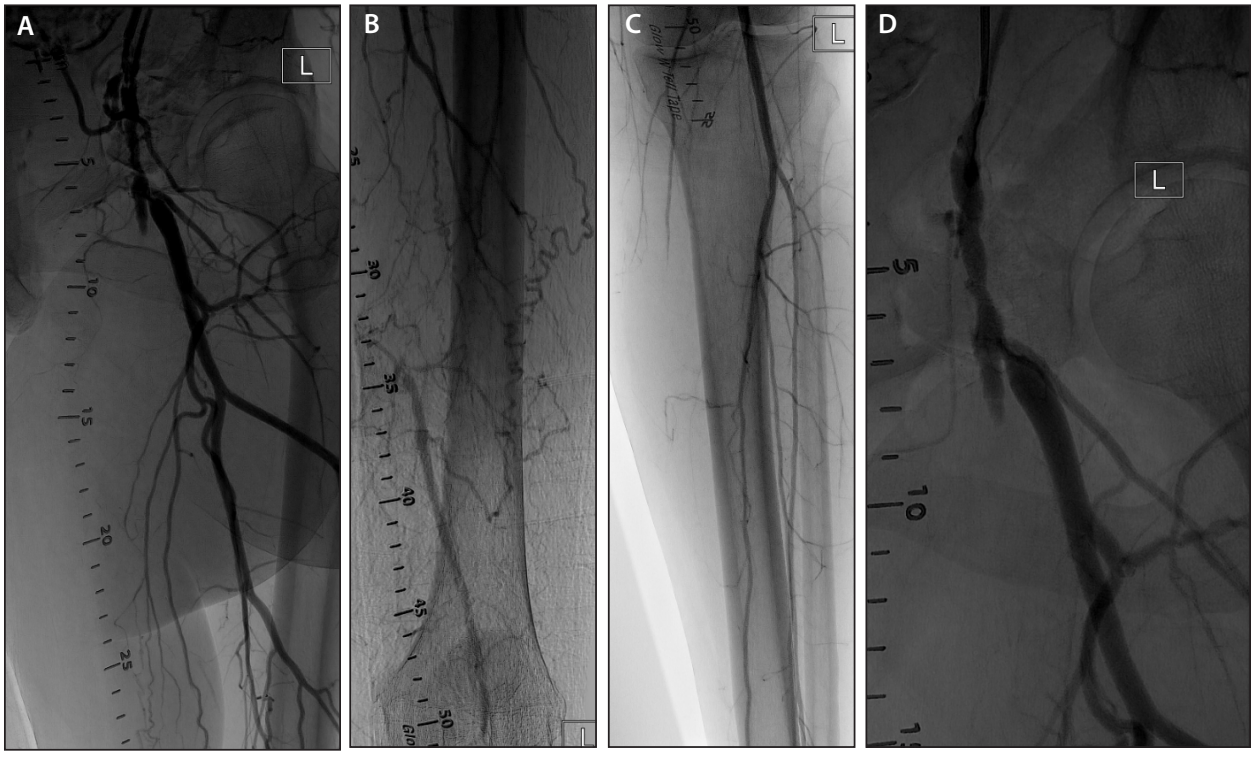

Figure 1. Angiograms highlighting the long SFA occlusion of almost 30 cm with distal reconstitution (A–C). Angiogram showing the proximal cap (D).

Given this patient's PAD history with failed intervention on the right side, what treatment plan would you offer her regarding the long chronic total occlusion (CTO) of the left SFA?

Dr. Jolly: This is a really tough decision because you cannot ignore the fact that she has very dramatically demonstrated early failure, even with excellent technology having been utilized. This may make me lean more toward atherectomy followed by use of a drug-coated balloon (DCB) and/or DES use provisionally, but a CTO of this length will almost certainly need some degree of scaffolding. Flow-limiting dissections, subintimal recanalization, and higher embolization risk are the norm for this kind of case. You are hopeful that you will find a long segment of hibernating lumen.

Dr. Sharma: It is essential to know why the stents occluded. Was it because of the type of stents used, persistent anatomic defects that make the stents unlikely to stay patent, noncompliance with antithrombotic therapy, and/or her ongoing smoking that puts her at risk for stent and graft thrombosis? If the concern for stent occlusion is due to her history of lupus anticoagulant and a perhaps higher propensity to thrombose, then that would be the same for grafts as well. I think a stenting-first approach is still acceptable provided it is believed that stent placement would be performed adequately and there would still be targets left for bypass in case it is needed in the future.

Dr. Madassery: In reviewing the imaging, I would want to first further clarify the degree of disease in the CFA with pressures or intravascular ultrasound. I get a sense that it's more than meets the eye; if so, I would entertain having my surgical colleague do an endarterectomy and patch, or if not, I would consider treating that area endovascularly because it may limit the patency of anything I do in the SFA. With already failed (ie, short-term patency) contralateral SFA endovascular recanalization and her age, I would evaluate the vein mapping result. If a native suitable vein is present, then a bypass should be discussed. If no veins are available or the patient is deemed an unsuitable candidate for bypass, then I would plan for revascularization with stenting. With her good runoff, I would consider using either self-expanding bare-metal stents or, potentially, covered stent grafts.

CASE CONTINUED

We elect to recanalize the left SFA CTO (Figure 2).

Please describe how you would approach this procedure, specifically your method of choice for CTO crossing, distal embolic protection, use of atherectomy, balloon angioplasty (with or without drug), and stent type (with or without drug).

Dr. Sharma: I would defer this to my interventional colleagues.

Figure 2. Angiograms showing successful revascularization (A), distal embolization in the PT artery (B, C), and successful removal of the embolization with spasm of the vessel (D).

Dr. Madassery: Assuming that the CFA situation has been addressed and cleared/rectified, I would plan for standard angled catheter and hydrophilic guidewire recanalization, usually starting with a 0.035-inch system. If there is difficulty, then I would switch to a 0.018-inch system. If unable to cross from above, I would perform a retrograde distal tibial stick and see if luminal recanalization is successful. If there is still difficulty, then I would consider reentry into the patent popliteal artery with an Outback reentry device (Cordis, a Cardinal Health company) from the subintimal SFA space. I do not detect much calcific burden on the provided images; therefore, if I chose atherectomy, it would be with directional atherectomy, and I prefer routine embolic protection use. Postrecanalization, I would perform scoring balloon angioplasty, and in the current highly controversial drug-based device period, considering the patient's age and disease stage, I would prefer to use a self-expanding, non-DES device such as Supera (Abbott Vascular), provided that predilation is optimal. Alternatively, because the outflow appears to be good, I would at times also consider use of a Viabahn endoprosthesis (Gore & Associates) after initial intervention.

Dr. Jolly: This is a standard SFA case from the contralateral groin. Fortunately, the ostium of the SFA is not ambiguous, so I typically start directly with a straight 0.035-inch hydrophilic guidewire with a support catheter and push. If I need directionality, I go between a straight and curved hydrophilic guidewire. The critical part is ensuring you do not propagate a subintimal tract beyond the natural reconstitution level. This "interventional creep" is a major mistake and should be avoided at all costs. You do not want to turn a potential above-the-knee femoropopliteal bypass into a below-the-knee one due to poor reentry technique (if required). For me, whether atherectomy is performed or not, I typically use embolic protection devices (EPDs) for all CTOs of this length. My confidence in luminal crossing versus subintimal crossing then determines my enthusiasm for atherectomy, but in this case, I would lean toward atherectomy, especially given the patient's early failure of stenting on the right leg. In this case, I would absolutely use a paclitaxel-based DES or DCB, as she has all the features of a patient with high restenotic risk (small vessels, aggressive disease, long CTO, tobacco abuse).

CASE CONTINUED

During the procedure, distal embolization to the PT artery occurs.

How would you treat this complication?

Dr. Jolly: The best way to treat this is to ideally prevent it from happening in the first place. However, that is easier said than done, and it is not always easy to work over the weak support of the 0.014-inch wire of an EPD with severely calcified SFAs. Additionally, EPDs aren't perfect and distal embolization can occur despite them (or sometimes because of them). Assuming there is adequate intraprocedural anticoagulation, embolization is typically of luminal debris (calcium or atheroma) and must be aspirated if possible.

Dr. Madassery: My initial approach for this distal embolization is to first fully heparinize the patient, then get a catheter positioned just above the occlusion and instill a small-volume cocktail of heparin and tissue plasminogen activator directly into the clot, followed by aspiration thrombectomy with the Indigo system (Penumbra, Inc.). Based on the results, if thrombus has cleared, I would see if any additional measures such as nitroglycerin or balloon angioplasty are needed.

Dr. Sharma: Again, I would defer this to my interventional colleagues to see if there is an endovascular option for this complication, including the use of lytic therapy. If not, then if the complication is symptomatic, and I would consider therapeutic anticoagulation for a short duration (1–3 months) rather than just antiplatelet therapy alone.

CASE CONTINUED

After the complication angiogram, the patient has palpable PT and DP pulses with an intact PT after thrombectomy. Her postprocedural ABI the next day is 0.83.

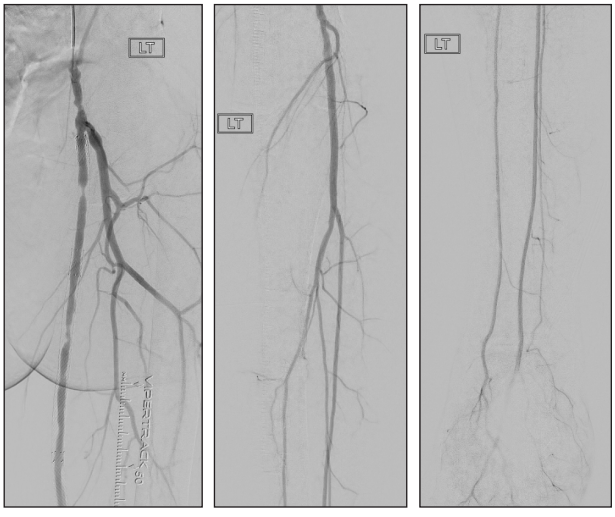

Figure 3. Focal restenosis of the SFA stents with three-vessel runoff to the foot.

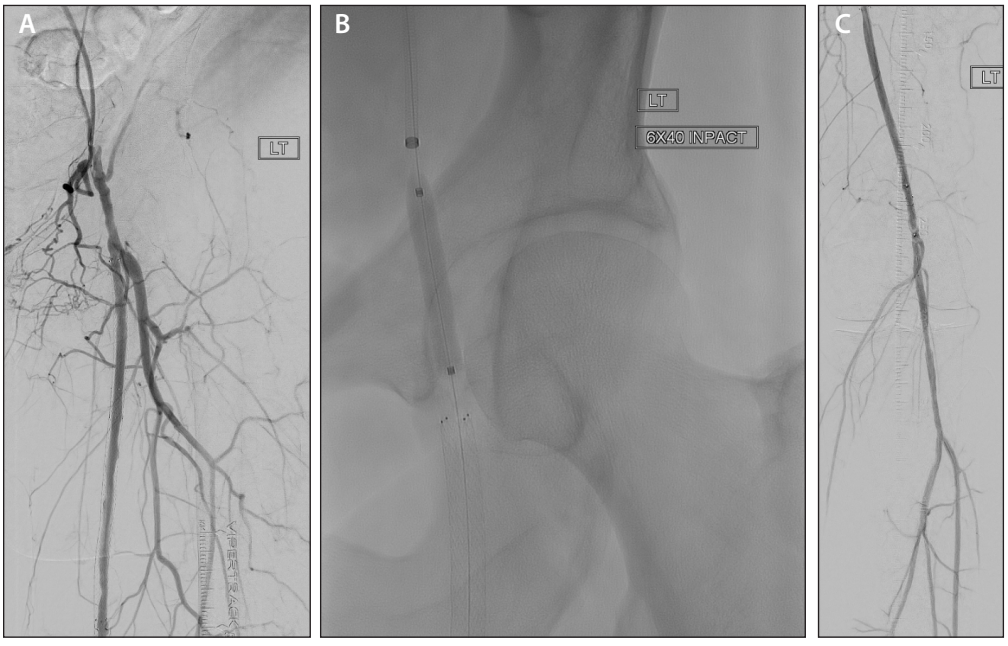

Figure 4. Angiograms showing successful intervention to the areas of restenosis in the SFA after laser and DCB angioplasty (A) as well as DCB angioplasty to the CFA (B). Panel C shows the patent distal vessels.

What combination of antiplatelet medications would you prescribe for this patient upon discharge? Would you consider using an anticoagulant, and if so, which one? How often should noninvasive testing be ordered for surveillance after the intervention?

Dr. Sharma: As previously mentioned, an anticoagulant would be considered if the distal embolization is symptomatic or causes extensive thrombosis of the PT. Also, if there is a concern for thrombosis due to the history of lupus anticoagulant, then anticoagulation is recommended. Direct oral anticoagulants are reasonable to use unless the patient has triple-positive antiphospholipid antibody syndrome or other contraindications to the use of direct oral anticoagulants. Otherwise, I would treat with dual antiplatelet therapy for 6 months, and based on the COMPASS trial, I would switch antithrombotic therapy after 6 months to aspirin daily plus rivaroxaban 2.5 mg twice daily. Follow-up would consist of clinical evaluation and imaging at 4 weeks, 3 months, 6 months, and then yearly. Imaging would include ABI and duplex ultrasonography of the stent.

Dr. Jolly: I still favor aspirin and clopidogrel for most patients, especially patients like this who have concomitant coronary artery disease. Historically, I would not favor anticoagulation in the absence of using stent grafts. However, in the post-COMPASS trial era, the use of low-dose rivaroxaban and aspirin has been shown to reduce both major adverse cardiovascular and limb events and should be strongly considered in high-risk patients, as in this case. I would also consider very frequent surveillance for this patient, possibly every 3 months for the first year given her history.

Dr. Madassery: For this patient, I would discharge her on clopidogrel, with a loading dose after the procedure followed by standard daily dose, as well as daily aspirin. This would be continued for 3 to 6 months. The patient would be seen in the clinic within 2 to 3 weeks, with follow-up vascular duplex study and ABI examination.

CASE CONTINUED

The patient does well for a year but presents again with similar symptoms involving the left lower extremity. Rest and exercise ABIs are again performed, which are 0.92 on the left at rest and 0.09 postexercise. Arterial duplex ultrasound shows 50% to 99% stenosis in the left CFA and a velocity of 484 cm/s in the mid-SFA within the stented region. Angiography is performed and shows that the degree of stenosis in the left CFA has worsened (> 70%, as confirmed with intravascular ultrasound) and there are three areas of > 50% stenosis within the stented segments (Figure 3).

Is it time for a femoropopliteal bypass? If not, how would you treat these new lesions?

Dr. Madassery: Because the patient has been intervened on already and the current issue is stenoses rather than complete occlusion, my choice would be to consider laser atherectomy and balloon angioplasty. I would consider using a DCB if I thought that the patient could have a thorough understanding of the

current concerns. The other possibility is to follow-up laser atherectomy with Viabahn stenting. Bypass consideration is always on the table because the sites of interest for bypass will still be present in most instances. If this intervention fails down the road, then I would send her to my colleagues for bypass.

Dr. Sharma: I would speak with my interventional colleagues to see if the in-stent restenosis can be treated endovascularly first. Also, after treatment, I would add cilostazol to her medical regimen. Cilostazol has been shown to reduce the occurrence of in-stent restenosis.

Dr. Jolly: This patient has actually done quite well, all things considered. Focal restenosis of her DES is the typical pattern and is easily treated. The left CFA is more troublesome, but there is clearly growing evidence that an endovascular strategy with a DCB is effective and not nearly as taboo as once thought. I still agree with foregoing bypass at this time, assuming her ulcers are healing or have healed.

CASE CONTINUED

Laser atherectomy and DCB angioplasty in the CFA are performed, as well as laser atherectomy and DCB angioplasty to the regions of in-stent restenosis after placing distal embolic protection (Figure 4). There are no complications, and the patient is discharged on dual antiplatelet therapy and warfarin for 1 month, then clopidogrel and warfarin thereafter.

Was adding warfarin appropriate in this case?

Dr. Sharma: This doesn't appear to be stent thrombosis, which is likely to occur sooner, so I would choose cilostazol over warfarin. Stent thrombosis occurring soon after the procedure is where I would consider anticoagulants such as warfarin.

Dr. Jolly: I think the short answer here is that nobody truly knows. I use short-duration anticoagulation when there is clearly demonstrated thrombus but not typically for atherosclerotic disease. We are rapidly moving away from "triple therapy" in the cardiac world for most patients due to the elevated bleeding risk, but this patient likely carries a favorable risk profile due to her young age.

Dr. Madassery: Due to the restenosis within 1 year, I think that adding warfarin is not unreasonable. Many of these patients need modifications of their medication regimens in the course of their care. In some of these cases, I elicit consultation with my hematology colleagues as well.

CASE CONCLUSION

The patient undergoes noninvasive testing: her resting ABI is 0.77 on the right and 0.93 on the left. At the patient's most recent office visit, she is free from claudication in the left leg; however, claudication has developed in the right leg—but that is for next time! ■

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