Introduction

An estimated 10 to 12 million people live with peripheral artery disease (PAD) in the United States, and over 1 million people live with critical limb ischemia (CLI).\textsuperscript{1,2} CLI is a severe form of PAD occurring as a consequence of severe atherosclerosis that may culminate in reduced blood supply to the legs, feet, and hands. CLI usually manifests as numbness in the feet and toes or as non-healing ulcers and/or dry gangrene. If left untreated, it may require amputation. In addition to atherosclerosis in association with hypertension, hypercholesterolemia, cigarette smoking, and diabetes, less frequent causes of chronic CLI include Berger’s disease, thromboangiitis obliterans, and some forms of arteritis.\textsuperscript{3,5}

Smoking is the most important, preventable risk factor for PAD. M. Daryll Baker, consultant vascular surgeon at the Royal Free Hospital in the UK, states that “about 80% of the patients whose legs or extremities I have to amputate are current smokers. If they are not current smokers, then they almost certainly used to smoke. If patients presenting with PAD have never smoked, I have cause to doubt whether they have the disease at all.” Smokers have a 10- to 16-times greater risk of developing PAD than people who have never smoked.\textsuperscript{6} In fact, the rarity of PAD among nonsmokers was noted as early as 1960 when a study of 520 non-diabetic patients with PAD aged younger than 60 years found that 97.5% of the patients were smokers.\textsuperscript{7}

Currently, there is no FDA-approved medical treatment for CLI. Treatment options for CLI involve revascularization or bypass surgery around the diseased vessel by a vein from patient or a synthetic graft.

Patient Background/Case Description

An 84-year-old woman presents with complications of a non-healing wound on the medial and posterior side of the left calf. Initially, the patient had an EpiFix\textsuperscript{®} graft placed on her wound 5 months ago, which had failed.

A previous computed tomography angiography (CTA) documented mild disease of the internal iliac arteries bilaterally and occlusions in the tibioperoneal trunk and proximal posterior tibial artery. The patient had then undergone angioplasty of the peroneal vessel a month ago, which was supplying collateral to the posterior tibial, as an attempt to treat the wound and avoid progression to need for amputation.

The patient had a totally occluded posterior tibial artery, which was being supplied by collateral from the peroneal vessel. However, the peroneal artery that was supplying the collaterals itself had 90% proximal disease. Therefore, the former angioplasty used the retrograde/foot access approach to gain access to the peroneal artery through the anterior tibial artery to relieve peroneal artery occlusion and improve blood flow through the collaterals to the posterior tibial artery (PTA). However, this approach failed to aid in the healing of the wound.

Thus, the patient presented to the hospital with concern about the non-healing wound, despite the angioplasty performed a month ago.

The patient has well-controlled hypertension. She is a former heavy smoker and has a sedentary lifestyle. The patient has known PAD, rheumatic arthritis, multiple sclerosis, anemia, and vitamin D deficiency. She has already undergone angioplasty of the left lower extremity involving placement of the stent to left superficial femoral artery (SFA) and PTA of the posterior tibial vessel and cholecystectomy. Rest of medical history is insignificant, and systemic review is unremarkable. The only important finding in physical examination is the presence of the non-healing wound, as described earlier.
Successful Sheathless Intervention of Flush Occluded Posterior Tibial Artery via Pedal Access for Non-healing Ischemic Leg Ulcer
Muhammad Akram Khan, MD, FACC, FSCAI; Kashif Waqee Ahmed, M.B., B.S.; Taliya Rizvi

Procedure Overview/Devices Used

The patient was taken to the cardiac catheterization lab, prepped, and draped in the usual sterile manner. Both the antegrade approach from above and the retrograde approach from the foot were used. The angiogram from above confirmed an intact SFA and popliteal vessel and anterior tibial vessels, but the posterior tibial vessel was completely occluded to an extent that even its origin could not be visualized (also called a flush occlusion).

The posterior tibial vessel was then accessed right at the foot with the ultrasound; a fairly good lumen of the posterior tibial vessel was visualized, despite the absence of blood flow (hybrid vessel). The wire was introduced and taken all the way up to distal SFA and proximal lesion.

Then multiple balloon dilatations were performed using a 2.0 balloon followed by 2.5 balloon, and complete revascularization of posterior tibial vessel was formed all the way up to the foot. This entire procedure using the 4-Fr sheath had no complications.

The patient was followed up after 2 weeks, and showed significant wound healing.

Discussion

With a significant rise in incidence of CLI, there appears to be a dire need for finding new, minimally invasive and efficient techniques for restititution of blood flow through the atherosclerosed vessels and ischemic limb to prevent the need for a more invasive bypass surgery of the lower limb or leg amputation. A combined antegrade and retrograde approach with ultrasound guidance can be considered a good option for treatment in such cases.

Key Takeaways

The combined antegrade and retrograde approach with ultrasound guidance for treatment of atherosclerosis of a flush occluded artery provides a viable option for revascularization of flush posterior tibial occlusions with only minimal invasion. This allows ischemia-induced, treatment-resistant ulcers of the lower limb to heal rapidly.

The technique described in this article allows for a larger number of patients with flush PTA occlusions to be treated primarily with endovascular techniques and helps avoid a conventional bypass surgery in the lower limb for the treatment of ischemia-induced ulcers that fail to get treated by other traditional means.

A pedal access angiogram will also help to identify the hybrid vessel, location and length of the target complex occlusion which helps to determine the appropriate intervention.
Successful Sheathless Intervention of Flush Occluded Posterior Tibial Artery via Pedal Access for Non-healing Ischemic Leg Ulcer
Muhammad Akram Khan, MD, FACC, FSCAI; Kashif Waqiee Ahmed, M.B., B.S.; Taliya Rizvi

References


Disclosures

The authors declare that they have no competing interests.

Acknowledgements

The authors thank Dr. Akram Khan for his valuable recommendations and the patient for cooperation and consent for publishing the data.