Expanding PAD Treatment Options in Office Interventional Suites Using Alternative Access Sites

Insights and tips on using retrograde tibiopedal and radial access in an office setting.

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Office-based endovascular labs offer advanced techniques for limb revascularization. Initially, when these labs opened, the primary purpose was to manage and improve the patency of dialysis access. Over the years, these labs have developed to take the lead in managing lower extremity ischemia, including claudication and critical limb ischemia. As favorable results of endovascular intervention in lower extremity arterial occlusive disease are published, patients are increasingly treated with these techniques. The rate of surgical bypass continues to fall. With the increasing focus on patient outcomes and safety, the traditional approaches to arterial access need to be reviewed. Two approaches that are gaining favor are the retrograde tibial/pedal approach and radial artery entry.

Improvements in devices have opened new doors. Traditionally, lower extremity revascularization is carried out by entering the common femoral artery from the contralateral limb or, occasionally, in an antegrade fashion from the ipsilateral limb. Both of these approaches carry inherent risks. The biggest risk is bleeding, resulting in significant complications that may require an operation or hospitalization or cause other sequelae. This is also the most common cause of death after the procedure. To minimize this complication, alternative vessel access points have been explored. Radial artery access is a potential answer to decreasing bleeding complications.

There are other clinical scenarios in which a different approach may be required, including hostile groin anatomy, a calcified femoral artery, the presence of an endovascular aortic device, a previous aortobifemoral operation, morbid obesity, and an inability to cross a lesion. For these reasons, endovascular specialists practice novel approaches, such as retrograde tibial/pedal or radial artery access to address these issues. Because these are relatively new techniques, most reports in the literature are case reports or small single-center experiences. Some operators have also used other access vessels, such as the popliteal artery, a branch of the superficial femoral artery (SFA), or the profunda femoris artery. These reports are anecdotal in nature.

RETROGRADE TIBIAL/PEDAL ACCESS

The retrograde approach is most commonly used when the interventionist is not able to cross the lesion in an antegrade manner. Iyer et al[1] reported two cases in which they accessed the posterior tibial arteries by cutdown. Subsequently, in 2003, Spinosa et al[2] reported on the percutaneous retrograde approach. It is believed and borne out by experience that the occlusive cap on top of the lesion is much harder than the distal cap at the end of the occlusion. This makes crossing the lesion in a retrograde manner easier. In addition, the distance between the entry point of the wire and the lesion is significantly shorter when the retrograde approach is used. This approach allows more control and maneuverability.

Various techniques have been used to enter the tibial artery. In heavily calcified arteries, the calcium itself may outline the artery walls. These arteries may also pose the biggest challenge for entry and could result in dissection. Road mapping of the arteries has been used to access

the vessel. In our experience, ultrasound guidance is very helpful and should be routinely used (we use a hockey stick probe, L14-5sp [Linear Array Zone Sonography Technology]). To gain access, we use the Micropuncture pedal access set (Cook Medical), which includes a 21-gauge needle, 0.018-inch wire, and a 4-F sheath (Figures 1 and 2). The artery should be entered in the calcium-free spot, if possible. After accessing the artery, a confirmation arteriogram should be obtained. Depending on the size of the vessel, the sheath can be upsized. Most of the intervention is carried out in an antegrade manner after the lesion is crossed and the crossing wire is snared from the top. There are few devices available that can be used in a retrograde manner, especially if the tibial vessels are being treated. If proximal vessels are being treated, however, an antegrade approach is required. The most common vessels used for access are the anterior and posterior tibial arteries. The peroneal artery is harder to access but can be used. Hemostasis after the procedure is achieved with manual compression.

One of the cardinal principles of vascular surgery is to protect the target vessel (the access vessel in the retrograde approach) because it may need to be used later for surgical bypass. With the retrograde approach, the operator can permanently occlude the tibial vessel and thereby take away the bypass option. In our experience and others', this has not happened. Surprisingly, the access vessel remains patent. This may be because of increased blood flow through the vessel and antiplatelet drugs used after the procedure. We have used this approach in more than 50 patients. Before using this approach, we would have abandoned the endovascular procedure due to an inability to cross the lesion and proceeded with surgical bypass. We have also used this approach to revascularize a limb with a previously failed bypass and when an autogenous conduit is not available.

TRANSRADIAL ACCESS

Although the retrograde approach is most commonly used to cross lesions that could not be crossed in an antegrade manner, the radial artery approach is used for most of the other reasons that have been previously outlined. Transfemoral arterial access is the standard approach for lower extremity revascularization and limb salvage procedures. Overall, the complication rate for transfemoral procedures is low. Postoperatively, patients need to lie flat with the affected limb straight for 2 to 6 hours. Closure devices do not reduce the risk of major bleeding but do shorten patient bed rest time. The transradial approach offers some advantages over the femoral approach.

Transradial access has become more popular over the past 20 years. The cardiology literature is scattered with

Figure 1. Ultrasound-guided access to the posterior tibial artery.

Figure 2. A sheath being inserted in the radial artery to perform radial access.

case studies, randomized studies, and position statements about transradial coronary interventions. The articles are generally positive and support the technique. The sheath sizes used in the various studies have varied from 4 to 8 F. Generally, limitations were related to anatomical problems and sheath size.

When it comes to transradial peripheral arterial revascularization, the literature is sparse. In combination with ultrasound guidance, initial access is quite easy for the patient and the doctor. Postoperatively, patients are free to ambulate immediately with nothing more than a pressure dressing around the wrist. Transradial access gives hope in reducing postoperative access site bleeding complications and may provide greater patient satisfaction. Because the radial artery is easily compressible, pseudoaneurysms and bleeding risks are almost eliminated. Invariably, we use the left radial artery after making sure that the Allen test results are normal. To access the vessel, we use a hockey stick ultrasound probe and a Glidesheath Slender 5-F kit (Terumo Interventional Systems), which has a 21-gauge needle, hydrophilic sheath (with an outer diameter of 4 F and inner diameter of 5 F), and a 0.021-inch wire.

Diagnostic arteriography can be routinely performed using the transradial technique, however, there are limitations when revascularization is required. The chief limitation to the technique comes from lack of therapeutic options due to device length and size of the patient's radial artery. Long (> 300 cm) wires, long (> 120 cm) catheters, and balloons are commercially available today and reliably allow for the treatment of iliac lesions. In certain patients, treatment of the proximal SFA is possible. As device manufacturers produce a greater variety of device lengths, the distal SFA and tibial vessels will become treatable. In the future, a patient will come to an outpatient access center, undergo revascularization through the wrist, and leave with nothing more than a bandage.

CONCLUSION

The retrograde tibial/pedal and radial approaches to managing lower extremity occlusive disease are evolving techniques that may increase the endovascular options for the patient and possibly diminish the long-term necessity for open procedures. Office-based labs will continue to work with manufacturers to come up with new devices that aim to optimize these approaches. Long-term data are needed, and we encourage all operators to document and publish their long-term results. ■

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