How I Do It: Ultrasound-Guided Access

A simple update to access technique could lead to substantial improvements in outcomes.

BY JAMES D. JOYE, DO, FACC

Vascular access complications are among the most common complications that occur in the course of an endovascular procedure. In our haste to reach the patient's target lesion, as well as our eagerness to play with the latest device, we are prone to de-emphasize the importance of the little things that matter. The interventionist can recanalize a difficult chronic total occlusion with deft precision and deploy a next-generation stent with a glorious angiographic result, only to be humbled by a large hematoma or acute access closure. We've all been there, but many of us have not upgraded our access technique with the same frequency and fervor that we change the interventional devices we use. What follows is a call to action for the routine use of hand-held transcutaneous ultrasound to guide safe vascular access.

A CHANGE OF APPROACH

Every year, upon my return from our annual Vascular InterVentional Advances (VIVA) course, I try to implement at least one major change in how I do things at home based on what I learned at the meeting. Sometimes, it is a change in devices based on data; sometimes, it is a different approach to a complex lesion subset; and sometimes, it's a change in medical management and surveillance. A few years back, I had the pleasure to chair a breakout session on the topic of access and closure with several endovascular thought leaders. In the course of the discussion, I attentively listened as Andrew H. Cragg, MD, a world-renowned interventional radiologist, explained that he and his partners universally used ultrasound-guided access for all cases. He went on to point out that those who did not adhere to this approach in his lab were closely scrutinized because the quality of outcomes for those using ultrasound guidance were demonstrably superior. Having always prided myself on attention to access technique, I questioned him further. He went on to educate those in attendance, and as I listened to his words, it was clear to me that what he professed was, in his mind, gospel. I was sold!

The value of hindsight is very clear when I look back at how crude my access technique used to be. Even with the routine use of palpation, fluoroscopically flashing a hemostat, and postaccess angiography, it is a wonder that I did not have more complications than I did. Failure to "see" the vessel before access and using large-bore puncture needles are dated techniques. Since converting to ultrasound-guided micropuncture access, my outcomes have significantly improved. I now use ultrasound for every type of access: femoral, popliteal, pedal, radial, central venous, and especially large-bore catheter procedures.

ULTRASOUND-GUIDED ACCESS TECHNIQUE

The first step in ultrasound-guided access is to scan the vessel—a technique that is easy to learn and carries a minimal learning curve. With ultrasonic gel applied liberally over the desired access site, the operator will carefully survey the anatomy. The advantage of this method is that before puncture, the interventionist can clearly delineate the inguinal ligament, the bifurcation of the profunda femoris and the superficial femoral arteries, and the adjacent femoral vein. After centering on the common femoral artery, one can then hone in on the best site for access by taking note of plaque, calcification, and side branches (Figure 1).

Once the optimal entry site has been selected, a small skin wheal of lidocaine is applied adjacent to the center of the ultrasound probe, and a micropuncture needle is inserted through the skin. It is preferable to hold off on deeper injection of lidocaine at this point, as the fluid injection will distort the ultrasound image and make cannulation more difficult. The micropuncture needle is then slowly advanced with one hand while the other sweeps the ultrasound probe along the axis of the vessel so that the needle is observed as it approaches the anterior surface of the target. Just as the interventionist needs to adjust the angle and focus of the

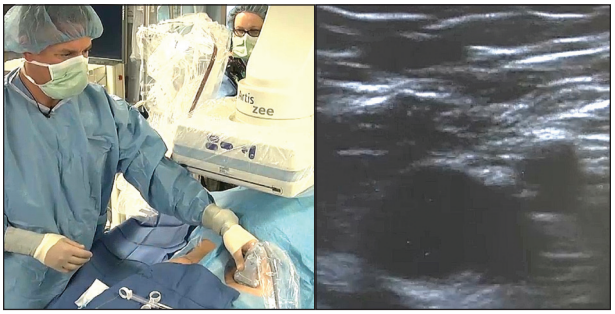

Figure 1. Hand-held ultrasound imaging of the left common femoral artery. All of the required equipment is arranged and organized on the sterile drape. The inset ultrasound image shows the bifurcation of the profunda.

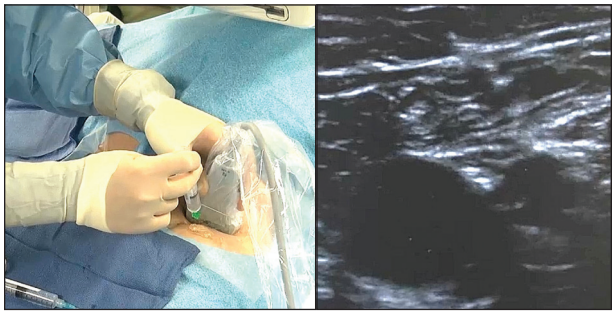

Figure 2. Ultrasound guidance of the micropuncture needle into the anterior surface of the common femoral artery.

Figure 3. Insertion of the micropuncture wire.

Figure 4. Deeper injection of lidocaine after placement of the micropuncture wire, but before dilator and sheath insertion.

ultrasound probe to see the path of the needle, the operator will also need to adjust the needle's angle of entry as dictated by the ultrasound image. With practice, the coordination of these movements will quickly allow for safe micropuncture access (Figure 2).

Confirmation of access is accompanied by a nonpulsatile flash out of the back end of the micropuncture needle, which stands in contrast from what one usually sees with a large-bore needle. For this reason, I like to use a slip-tip syringe with slight back pressure to add a tactile sense to my visual observation. In this manner, my eyes can remain on the ultrasound screen until after I have "felt" the barrel of the syringe give way, thus confirming safe access with multiple senses. At this point, the micropuncture wire is carefully inserted, and fluoroscopic confirmation of transit is recommended. Now, a deeper injection of lidocaine can be carried out before the insertion of the dilator and subsequent sheath (Figures 3 and 4).

CONCLUSION

The impact of this approach to access was important enough that we devoted two 90-minute sessions at this year's VIVA course on the topic. With the leadership of Drs. John Kaufman, Peter Schneider, and John Rundback, we presented an Ultrasound-Guided Quality Initiative, which covered didactics, case presentations, and hands-on training. Admittedly, the description of this technique for those not currently utilizing it is difficult to express in the written words and still photographs of this article. The content of the previously mentioned sessions is archived on the VIVA website (vivaphysicians.org), where you can reference several videos that more expansively cover the pertinent subject matter.

Ultimately, there is no doubt that routinely adhering to an ultrasound-guided micropuncture approach to vascular access is in the best interest of all. For the interventionists, the benefits lie in improved safety and outcomes. For the institution, adoption of a quality improvement program devoted to this technique will most likely reduce health care costs. For the patient, most importantly, dedication to ultrasound-guided micropuncture access by his or her physician means less morbidity. If you are not currently using this technique, resolve to make the change now! ■

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