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Access Decisions in the Office-Based Lab

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Arterial access is a critical, if not the critical, component of vascular interventional procedures due to the morbidity and mortality of a bleeding access site. My approach relies upon a tacit knowledge of a process that I go through mentally. This description is a way to approach arterial access, and is not meant to be the only way. Patient variables and operator experience will dictate the individual interventionalist's arterial access decisions.

The office-based lab (OBL) has unique challenges. It is frequently a freestanding facility not in proximity to a hospital. There is limited space and personnel, which makes dealing with a complication particularly challenging. Besides the rare, but devastatingly obvious challenge of a patient who has a threatened life or limb, complications in the OBL have other consequences, such as causing delays in the schedule that create discontent among the staff and other patients, additional resource utilization, and harm to the reputations of the provider and facility that can be irreparable. The premise is that state-of-the-art care can be provided in the OBL setting, and constant effort should be applied to meet that premise.[1]

The primary access choices include the contralateral and ipsilateral common femoral artery, contralateral and ipsilateral superficial femoral artery, the ipsilateral pedal artery, and the upper extremity radial or brachial artery. I would like to dismiss the upper extremity access sites as a truly viable option when below knee, and in particular pedal, interventions are required. The loss of guidewire and catheter manipulation, and lack of potentially long-enough wires, catheters, and devices make this access site unreliable. Additionally, the cost of such devices if available can make the procedure and its attendant reimbursement cost prohibitive.

A pre-procedure duplex ultrasound is critical to determine the suitability of the superficial femoral artery and alternative arteries for access. I will ultrasound the artery at the time of the procedure to confirm its suitability as an access point.

The common femoral artery (CFA) is the tried and true access point for most vascular interventions.[2] In the days before closure devices and ultrasound, this large target artery anatomically allowed pressure to be held on the artery over the femoral head. Hemostasis can be obtained in this fashion, but as we all know, it is only a matter of when and not if there will be an access failure. In the office-based setting, failure of a closure device or direct pressure in the CFA can leave no option other than open surgical repair at the hospital if a patent profunda femoris artery adjacent to the puncture site precludes a covered stent. A delay in care on presentation to the hospital can result in significant morbidity and mortality, and you can bet that your hospital colleagues will be sure to portray your interventional skills in the worst possible light if they are responsible for the repair. Regardless, it does remain a viable access option. Importantly, its role may be limited in an obese patient for ipsilateral access.

The popliteal artery can be another access point. It has been shown to be a safe option,[3] but I would caution against its use in the OBL unless there is a good relationship with your vascular surgeon. It can be an anatomically challenging area for open surgical repair, and if you want to see how high you can raise the ire of a surgeon, transport this patient to the emergency department on a late Friday afternoon. It is true that the popliteal artery can

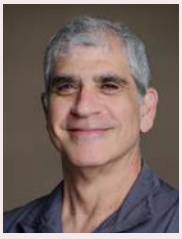

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Table 1. Primary access choices.

Access Site	Pros	Cons
Common femoral artery (CFA)	Large target, ideal for pressure hemostasis.	Few adequate bailout options for failed closure device.
Superficial femoral artery (SFA)	Good target, accessible in obesity, great catheter control,bailout option present for failed closure.	Stenosis may limit access, pressure for hemostasis may not be reliable.
Pedal	Low hemostatic complication rate, great alternate for above-knee disease, can be used in presence of occlusion.	Diameter may limit treatment options, difficult to treat into the foot.

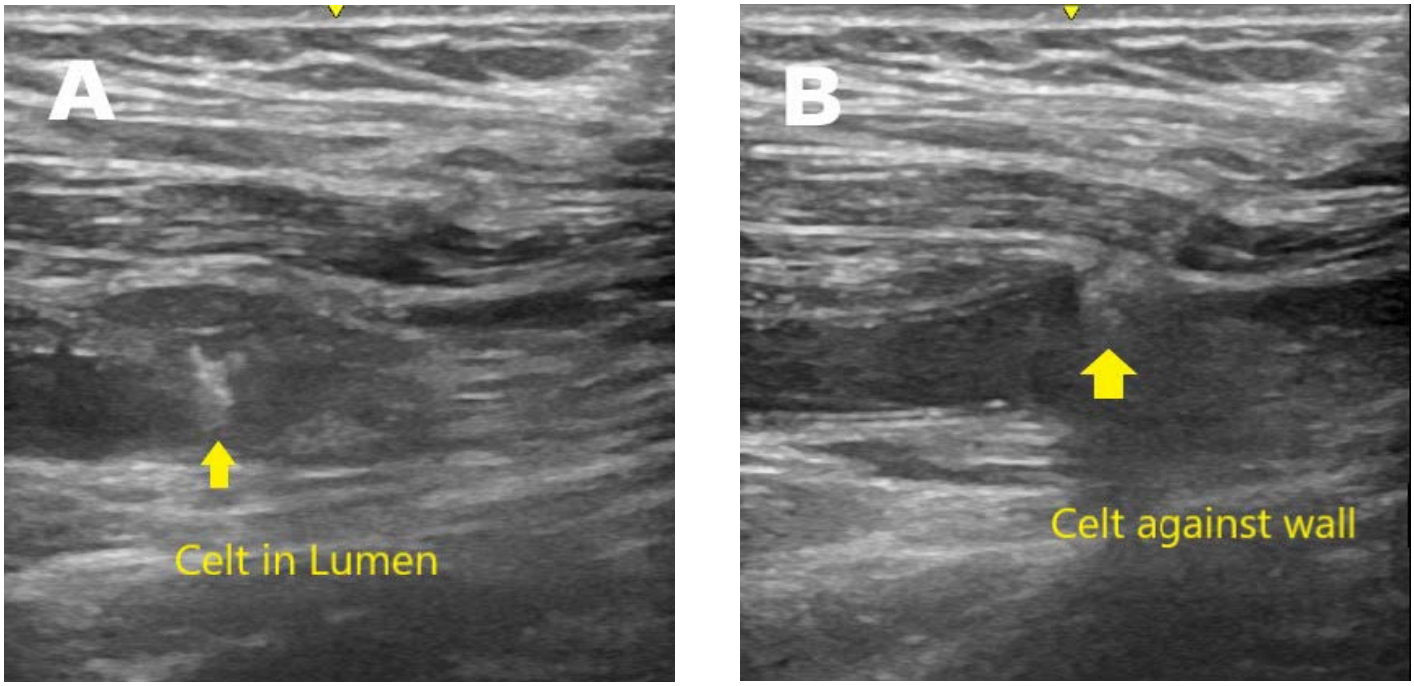

Figure 1A-B. Transcutaneous ultrasound showing (A) Celt ACD vascular closure device (Veryan Medical) in lumen and (B) Celt ACD against wall.

be closed with a closure device and it is amenable to a covered stent as a bailout procedure, but one should be certain that this bailout is an option before beginning the procedure.

Pedal arteries can be useful either as a primary or secondary access during the procedure.[4] This access has a low complication rate due to small vessel size and superficial proximity of the artery, allowing adequate pressure to be held. It can permit treatment options for the superficial femoral or popliteal artery, especially as an adjunct to the failure of an antegrade access. It can be utilized even in the presence of tibial artery occlusion, albeit with less reliability. Pedal artery diameter may limit some treatment modalities, but the use of slender sheaths may mitigate luminal discrepancy between devices and sheath in some instances. Treating below-knee disease in other tibial or pedal arteries may be difficult.

The superficial femoral artery (SFA) allows antegrade access for interventions below the knee and into the foot.[5,6] Excellent manipulation, steerability, and pushability can be obtained with standard length wires, catheters, and devices. Even in obese patients, the superficial femoral artery is still accessible. Closure devices perform reliably well, and fairly good pressure can be held in the proximal portion of this artery, if needed. In the event of access site failure, a covered stent can be deployed for hemostasis, and pressure can be held at the failed access site while alternative access can be obtained and the stent is deployed. Its limitation is in the presence of severe disease or occlusion. Heretofore this access site would have been condemned, but with the availability of ultrasound, closure devices, and bailout options, an SFA access site is particularly attractive in the OBL environment.

My access site preference is the proximal superficial femoral artery. I use a 21-gauge micropuncture needle from the 5 French (Fr) Merit MAK (Mini Access Kit; Merit Medical) under direct ultrasound guidance to perform an anterior single-wall puncture of the artery. It is critical to observe the needle point all the way to the anterior wall and into the artery. Anterior wall puncture affords the best opportunity of a successful closure at the end of the procedure. You must be mindful of the lumen size of the artery, but in general, the superficial femoral artery can accommodate 6 Fr and 7 Fr sheath sizes or their slender sheath equivalents without much difficulty. If your sheath size is occlusive or near occlusive, be sure to adequately anticoagulate and limit the amount of time you will spend on the intervention.

Pedal access is an excellent primary access, particularly with large-caliber tibial arteries in the treatment of the superficial femoral or popliteal artery, but small-caliber arteries should not be excluded for use. Specifically, if the SFA is not suitable for access due to proximal occlusive disease, then my approach will be from an ipsilateral pedal access. Access is performed with a Prelude IDeal (Merit Medical), a 5 Fr slender pedal access kit, and again, access is performed under direct ultrasound guidance. Ultimate sheath size will be determined based upon the tibial artery diameter and device to be utilized. Again, use of slender sheaths can permit use of a smaller diameter artery. This access site can be crucial to success after a failure to cross from antegrade for SFA or popliteal artery occlusion. I prefer to use the posterior tibial artery due to the more in-line anatomy, which simplifies the procedure compared to the anterior tibial artery, since the genu can create challenges. Occluded arteries can be accessed and utilized, but this can add tremendously to the complexity of the case. Short segments of occluded artery with a patent artery

at the access point can generally be used with a higher degree of success. Closure is with direct pressure or a radial compression device, SafeGuard Radial (Merit Medical).

I will use a contralateral up-and-over technique when there is proximal SFA disease or occlusion in the presence of significant tibial occlusive disease. This is my preferred entry point when the tibial access site is small in caliber and highly diseased as well. Again, I access the proximal SFA for the same reasons as previously discussed. After angiography and femoral-popliteal artery intervention, I may stage the patient for treatment of distal tibial and pedal disease at a later date through a now-possible ipsilateral access, depending upon the circumstances of the procedure at hand.

I try to limit all procedures to a duration of less than 2 hours. This minimizes patient fatigue and tolerance of the procedure. It also limits the amount of radiation, sedation, contrast, and anticoagulation, with their attendant risks. At the 2-hour mark, I should have completed the procedure or reached a point that I can stage the patient for completion on a later date. If a termination point has not been reached, I may continue, bring the patient back for an attempt on another day, or consider an open surgical procedure.

I use a closure device for all femoral access.[7] Closure of the artery requires specific attention to detail, and its importance should not be minimized, particularly in the OBL environment. The operator should be intimately involved with this process. My closure device of choice Is the Celt ACD vascular closure device (Veryan Medical).[8] It can be visualized under both ultrasound and fluoroscopy, gives a secure closure, and works well in the presence of arterial calcification. The Celt ACD vascular closure device requires sufficient training and experience to utilize effectively **(Figures 1-2).**

At the end of the day, you need an arterial access that will both allow the interventionalist to achieve the desired intervention with a low complication rate, and when that complication occurs, can be treated in the OBL without hospital transfer.

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