Radial Access for PAD: Can We Get There From Here?

Two radial access experts discuss potential advantages and pitfalls, device availability, and patient candidacy for infrainguinal cases.

WITH SABEEN DHAND, MD, AND AARON M. FISCHMAN, MD, FSIR, FCIRSE

What are the most significant potential benefits of radial access for lower extremity peripheral artery disease (PAD), first for patients but also for practices?

Dr. Dhand: One of the biggest benefits is decreased access site complications. There is minimal risk of hematoma or pseudoaneurysm, which is especially beneficial in obese patients or patients with coagulopathy. Patient comfort is another huge benefit—these patients are much more comfortable postprocedural than patients who had groin access, who are required to lay flat and stay still for 2 to 6 hours, at the minimum. Radial access also gives another approach in patients with hostile anatomies, such as complex iliac arteries, for which coming from above (antegrade) is much easier than going up and over or even retrograde at times. If their common femoral arteries are totally occluded, radial access would serve as another way to approach this type of complex access.

I've also used a radial approach at times to aid recanalization going from an above approach to help create a channel and then eventually treat from a retrograde access. Radial can facilitate another access and help avoid needing to go to riskier access such as brachial in those types of unique cases.

The promise of radial access for lower extremity revascularization procedures has been increasingly discussed over the past decade or more, but anatomic and technologic constraints have limited its growth compared to coronary and other applications. What are the most significant hurdles to developing platforms that can effectively reach the infrainguinal anatomy from the wrist?

Dr. Dhand: There is nothing in particular about the anatomy that poses the challenge. Sometimes you might have tortuous central vasculature in the thoracic aorta, and you would lose pushability or torqueability, but you also lose wire feel, and wire feel is the most important for gentle revascularization of the iliac and infrainguinal arteries. I believe the biggest issues from a technical standpoint are with the delivery sheath size, length, and compatibility. When treating proximal superficial femoral artery (SFA) disease, I want to have at least a 7- or 8-F bailout option if something could go wrong.

Dr. Fischman: When we first started using radial access for other procedures such as liver embolization, we were mostly able to use devices that were already on the market for coronary applications. Although not purpose-built for liver interventions, some of these sheaths and catheters worked as though they were. But for PAD, the technology didn't really exist, and that's been a big hurdle. As Dr. Dhand said, one challenge with PAD from a radial approach is when you encounter a complex CTO. You don't really have the ability to push through a 30-cm occlusion from the wrist. When we started doing radial access for PAD cases years ago,

it was for short-segment stenoses and iliac lesions, not really venturing past the mid SFA.

Radial-specific lower extremity platforms have begun to emerge and gain market clearances. Where do we currently stand in terms of available devices?

Dr. Fischman: In the United States, we don't have a huge selection, but we do now have some devices purpose-built for PAD, such as the R2P sheaths (Terumo Interventional Systems) and some companion balloons and stents, as well as an orbital atherectomy device (Cardiovascular Systems, Inc.) that can get below the knee.

The ideal scenario is for companies to build a whole portfolio on a radial platform because it's unfortunately not as simple as just taking a current stent or balloon and making the delivery elements a little bit longer.

Dr. Dhand: There are now longer shaft lengths and rapid exchange platforms for balloons and bare-metal stents, and that has aided in the ability to perform procedures in the SFA and even popliteal anatomy from the radial approach. But, these devices are currently limited to 6-F delivery, and device options such as stent grafts are very limited. From a practical standpoint, you may not have all of these devices on the shelf as they are in development, which can make going radial a difficult decision knowing that you may not have a readily bailout access.

To that point, how does the possibility of needing a device not currently available on a radial platform affect your approach to access in a given case, particularly a more complex presentation?

Dr. Fischman: You don't want to tackle a really challenging case if you think you will have limitations in terms of what kind of equipment you can use. And, if you want to use a drug-coated balloon, you can't currently do that from a radial approach, at least around the knee or below. If you are comfortable with bare-metal stents, plain balloons, and orbital atherectomy, you can do a lot of cases from a radial approach. But as Dr. Dhand said, you do need to keep in mind that there are bailout scenarios in which you may not be able to deploy a covered stent, for example.

Dr. Dhand: That consideration affects my approach, to the point where I may prefer to use pedal or some other alternative access. This may change as more devices become available, but I am currently willing to consider the radial option in a straightforward case. In a more complex case, I prefer being taking the fight to the sight and being closer to the lesion I'm treating.

Dr. Fischman: That's a big hurdle for a lot of operators, whether a bailout is available. If you don't feel comfortable with your device availability or bailout options, you probably shouldn't attempt that case.

What are your primary means of determining PAD patient candidacy for revascularization via the radial approach?

Dr. Dhand: Hostile anatomies may present the best opportunity for radial access in PAD. The select patients I've approached this way are significantly obese or have heavily diseased common femoral arteries without many other options—cases in which a groin, popliteal, or pedal approach are not feasible.

Dr. Fischman: I think it's a lot easier to do some cases from a radial approach. Some examples are patients who have an aortic stent graft that might not allow up-and-over femoral access, occluded femoral arteries, or patients with femoral bypass grafts. Antegrade access in some patients can be higher risk, too. I think pedal access is a reasonable option if femoral access can't be achieved, but in my view, radial access may be safer in some cases. The patient's height can also be a factor.

What potential complications unique to radial access should be understood well in advance of a first radial case, and how can they be avoided, either through ruling out candidacy or technical aspects?

Dr. Fischman: General access site complications such as pseudoaneurysm and hematoma are considerably lower with radial access compared to femoral, but they are definitely not zero. Radial artery occlusion is around 1% to 2% in most experienced operators' hands, although that can be mitigated by some techniques such as vasodilator administration, subcutaneous nitroglycerin, closure bands, and the concept of patent hemostasis. These may improve access and decrease the risk to the artery. There are a fair amount of techniques we employ that are not specific to PAD applications.

If the patient doesn't have a patent arch or for example someone with a Barbeau D waveform, you have to consider the risk of hand ischemia. There has been a considerable amount of data to suggest that even Barbeau D waveforms can be accessed safely, and in many cases, we do access them. But when decid-

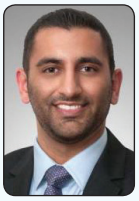
ing between femoral and radial, if the patient has a Barbeau D waveform, I wouldn't use radial access unless it's absolutely necessary.

PAD patients generally have risk factors for other complications though, including advanced diabetes and diabetic changes to their arteries, which could potentially involve their radial arteries. These patients also typically have smaller vessels. And, they have atherosclerosis—not just in the vessel you are treating but in those vessels leading up to it. Coming down the aortic arch can be treacherous in those patients. The most significant and feared complication of transradial access is stroke.

Dr. Dhand: I agree, especially in the PAD population with extensive atherosclerosis, the most relevant complication anyone should be aware of is the potential for stroke when crossing the neck arteries over the aortic arch. Now, there is plenty of data to show that the risk is low, but it is not zero. Any operator needs to take careful attention to their technique when crossing the neck and aortic vasculature.

Dr. Fischman, Mount Sinai's TREAT symposium focusing on radial access was an online course before the global meeting space went virtual. What made the Mount Sinai team go this route before it was the only option?

Dr. Fischman: We started the TREAT symposium 6 years ago, at which point Dr. Rahul Patel and I were among only a few physicians who were regularly using radial access in the periphery. There wasn't a lot of radial content at other meetings, so we thought it would be a good opportunity to start a symposium. We wanted to create a continuing medical education course that included didactics and live cases, because we thought it would be very useful for people to see exactly how we do it. As time went on though, we realized that the didactics were not as relevant because many attendees had seen these elements in subsequent years. So we decided for last year's edition to focus specifically on the live cases, and we invited guest speakers and moderators from around the world to participate. The virtual setting was the best way to do it. ■



Sabeen Dhand, MD
Interventional Radiologist
PIH Health
LA Imaging and Interventional Consultants
Los Angeles, California
sabeen.dhand@pihhealth.org
Disclosures: None.

Aaron M. Fischman, MD, FSIR, FCIRSE
Program Director, Interventional Radiology
Mount Sinai Health System
Associate Professor of Diagnostic, Molecular and Interventional Radiology
Associate Professor of Urology
Associate Professor of Surgery
Associate Professor of Medical Education
Icahn School of Medicine at Mount Sinai
New York, New York
aaron.fischman@mountsinai.org
Disclosures: Advisory board for Terumo, Boston Scientific, and Embolx; consultant to Johnson and Johnson; royalties from Merit Medical; investor in Adient Medical; research support from Boston Scientific.