ASK THE EXPERTS

What Dedicated Radial Technologic Advancement Would Be Most Helpful in Your PAD Practice?

Operators discuss their desire for devices of adequate sheath size and length for transradial access for peripheral interventions, as well as the need for covered stents, drug-coated balloons, and drug-eluting stents suitable for transradial delivery.

With Robert J. Beaulieu, MD; William E. Beckerman, MD, FSVS, FACS, RPVI; and Yulanka Castro-Dominguez, MD

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Transradial access (TRA) has become the "default approach" for the percutaneous treatment of coronary lesions due to lower access site complications and reduced major bleeding rates.[1,2] Yet, this enthusiasm has not been recapitulated in the treatment of lower extremity peripheral artery disease (PAD). There are two current limitations that temper our excitement for TRA in the PAD population: sheath size and catheter/sheath length.

Sheath sizes in the radial artery are typically limited to 6 F (Destination Slender sheath, Terumo Interventional Systems). There are "sheathless" systems that functionally act as catheters and have both 8.5- and 6.5-F sizes (eg, Sheathless Eaucath, Asahi Intecc USA, Inc.).[3] However, because these are catheters, they are sized according to their outer diameter and therefore cannot accommodate balloons and stents requiring an 8.5-F delivery system. Functionally, this limits the tools that can be used through these sheaths to angioplasty balloons and self-expanding stents (SESs). Despite this limited toolbox, two large series have reported success in the treatment of aortoiliac occlusive disease via TRA. However, I am cautious to use this approach because it precludes the use of covered stents at this point, which have proven more durable in this location.[4,5]

On the contrary, SESs and balloon angioplasty are the workhorses of lower extremity interventions. Enter the next challenge: sheath and catheter length. In the United States, the sheath length necessary to treat complex femoropopliteal or infrageniculate segments has not widely been available until recently with the approval of the 149-cm Destination Slender sheath. There are several balloons with long delivery catheters, including the Pacific balloon (180-cm shaft, Medtronic) and the Ultraverse RX balloon (200-cm shaft, BD Interventional). It is necessary to work with rapid-exchange or monorail systems with these balloons; however, wire length quickly becomes an issue from TRA. Stents delivered on longer

sheaths are limited, with only EverFlex (150-cm shaft, Medtronic) available widely. This consideration severely limits potential durability of lower extremity interventions and/or treatment options for postangioplasty dissection. To date, no drug-based technologies have shaft lengths suitable for delivery to the lower extremity via TRA. Despite all this, I am hopeful that as longer sheaths and delivery systems become available, we will realize some of the benefits from TRA that the cardiology community has already capitalized on.

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When I first started navigating the peripheral space from the wrist while in training almost a decade ago, we were almost entirely limited to off-the-shelf endovascular technology intended for transfemoral access. Once we inserted our short 10-cm transradial sheath, the "long" (125 cm) guide catheters and "long-shaft" (150 cm) balloons and stents restricted us to treating lesions of the proximal superficial femoral artery (SFA) and above. Anything distal to that was limited to diagnostic angiograms, a major issue in a patient population where the majority we treated had chronic limb-threatening ischemia and multilevel disease. However, in just a few short years, the technology has advanced by leaps and bounds. Dedicated low-profile hydrophilic sheaths from 85 to 149 cm in length allow safe intervention much further down the leg. Catheters, rapid-exchange balloons, stents, and even atherectomy devices now come in shaft lengths of 200 cm and can easily reach the tibial arteries with the help of new transradial wires that now come in lengths up to 450 cm.

However, in treating PAD from the wrist, there are still a few areas where transradial use is limited by either profile size or shaft length. Most covered stents, both self-expanding as well as balloon-expandable, have limited utility in transradial cases due to either short shafts or a ≥ 7-F profile. With that being said, I find the dearth of transradial technology incorporating paclitaxel (whether on drug-eluting stents [DESs] or drug-coated balloons [DCBs]) to be the most limiting factor in my current transradial treatment of PAD. When using a transfemoral route, I would ordinarily finish most SFA and popliteal artery interventions with DCB to reduce restenosis, reserving DES for long-segment SFA occlusions and spot treatment of dissections. I would love to use the same algorithm while treating PAD irrespective of the access point, and widespread availability of transradial DESs and DCBs would go a long way toward this goal. The transradial approach to PAD has a number of advantages over transfemoral access—namely, reduced access site complications, enhanced recovery, and better patient satisfaction.[1-3] Nevertheless, with these limitations in mind, I tend to reserve TRA for PAD for the sizeable minority of patients who for various reasons (infections, kissing iliac stents, prior endovascular aneurysm repair, bypasses) would not be great transfemoral candidates.

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Similar to how TRA impacted the field of percutaneous coronary interventions, TRA offers promising advantages in lower extremity peripheral interventions. It has the potential to improve patient outcomes and health care costs by reducing femoral access complications and allowing for early ambulation and same-day discharge.[1] For these same reasons, it also has the potential to improve patient satisfaction. However, despite its promise, TRA has had a very slow uptake in PAD interventions, representing < 1.5% of lower extremity interventions in the Vascular Quality Initiative registry in 2020.[2] This is largely due to the limited availability of devices with proper device profile and shaft length to treat all levels of PAD.

Over the last decade, we have seen a continued increase in the number of devices that allow treatment of lower extremity PAD using TRA, from dedicated long sheaths, 200-cm shaft length SESs, and orbital atherectomy devices. One of the devices I look forward to having in my toolbox are covered stents with appropriate shaft lengths and sheath size (5 or 6 F) compatibility for use in the iliac and femoral vessels from a radial approach. This will allow for rescue of femoral access perforations via TRA without having to use the contralateral groin. It will also allow for more regular use of TRA for iliac interventions by providing the operators with the confidence to know that a bailout covered stent is available or when primary covered stenting is needed. Furthermore, having DCBs with proper shaft length that can confidently reach the popliteal segment will also have a big impact on being able to choose TRA for PAD interventions.

It would be ideal if we could have all the tools currently available for interventions from a traditional femoral access approach also in the appropriate length for TRA interventions. This will need continued investment from industry as the practice of radial-to-peripheral interventions continues to grow. ■

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