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Optimizing Time Efficiency for Elective and Emergent Limb Ischemia Procedures

A conversation with Dr. Lucas Ferrer Cardona.

Dr. Lucas Ferrer Cardona is a vascular surgeon with the Dell Seton Medical Center at the University of Texas Hospital in Austin, Texas. At the hospital and at outlying clinics he visits in his outreach work, Dr. Ferrer focuses on limb salvage for a population that includes many lower-income patients with diabetes, end-stage renal disease, and critical limb ischemia (CLI), with acute limb ischemia (ALI) "ever-present." We spoke with Dr. Ferrer about his approach to treating limb ischemia and his experience with the Pounce™ Thrombectomy System (Surmodics, Inc.).

How has your approach to treating limb ischemia changed over time?

When I started training in 2017, the endovascular approach to thrombectomy was just starting to get a foothold, but there was still a strong predisposition for open surgical thrombectomy among the more conservative teaching staff. From an endovascular approach, we were using tPA (tissue plasminogen activator) catheters, the AngioJet™ pharmacomechanical thrombectomy system (Boston Scientific Corporation), and the Indigo® aspiration system (Penumbra, Inc.), but I would say we had inconsistent results in terms of thrombus removal.[1,2] It was also difficult for us to identify which patients would have a technical success with these approaches versus which patients we would need to convert to open surgery.

Since then, I've come to prefer an endovascular approach. I've become more comfortable with endovascular procedures and learned more about the strengths and weaknesses of devices.

How do you select patients for open surgery, tPA, or mechanical thrombectomy?

At this point in my practice, I don't go straight to open revascularization, and I don't go straight to tPA. It doesn't mean that I won't use these approaches, but for most patients, my approach will be endovascular mechanical thrombectomy. Open surgery is reserved for failure of the endovascular approach, while tPA is usually employed as a bridge between staged procedures.

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What is your approach to complex cases?

It depends on the extent of revascularization I need to do. I've had patients come in with complete occlusion and thrombosis of everything from the aorta down to the lower extremities. At that point, my approach is to get the patient through an expedited, simple procedure using mechanical thrombectomy. I'm not looking to get everything open down to the toes in the initial intervention but at least get inflow. I've given enough contrast and exposed the patient to enough radiation for the time being, and I think their clinical condition would benefit from us stopping the procedure and continuing the next day. At that point, I might use tPA as a bridge in between interventions, because the tPA might resolve part of the remaining distal thrombus. But this is unusual; most of the time I don't use tPA, and I no longer use it as frontline therapy.

Can you discuss your selection criteria for mechanical thrombectomy?

It's size dependent. In the iliac arteries and the aorta, I'll likely use the Indigo® aspiration system. In vessels < 7 mm, I use the Pounce™ Thrombectomy Catheter (the Pounce™ Thrombectomy System is indicated for vessels ranging from 3.5-6 mm). For vessels too small for the current Pounce™ System, we currently have the Indigo® CAT RX aspiration catheter (Penumbra, Inc.).

I'm looking forward to the introduction of the Pounce™ LP (Low Profile) System (Surmodics, Inc.; FDA cleared; intended for 2-4 mm vessels). We're already seeing a big benefit for the Pounce™ System in below-the-knee vessels within its range, and the ability to do more tibial vessels would address a big deficiency in our current treatment algorithm. Thrombus in tibial vessels still causes a visceral reaction

for any interventionalist—it's just technically more difficult to obtain a desirable outcome.

What do you see as the strengths and weaknesses of existing catheter-directed treatments?

Starting with tPA, the problem I've found is that sometimes the clot you're targeting can move down. Say you have clot in the femoropopliteal segment or the iliac segment. Depending on where you put the catheter, the clot can just move down as a column to your tibial vessels and then damage your outflow. So, it can turn from a very simple iliac femoral clot to very complex distal thrombus below the knee or the ankle, which is just more labor-intensive to clear. I think the attraction of tPA is that it just involves putting in a catheter and sending the patient to the intensive care unit (ICU). But aside from the technical problem that I mentioned, this obviously introduces the cost associated with an ICU stay and the potential complications related to tPA therapy.[3]

Regarding the AngioJet™ system, aside from my earlier comments, I believe it also introduces risk for embolization,[4] and I find it very time-consuming. You have to do the power pulse for tPA, wait 20 minutes, then come back and do multiple runs. Even with that, I find it difficult to get a perfect result.

Then you have aspiration-only catheters. For a long time, they were very inefficient.[2,5] Recently, there have been improvements to the technology that have improved their effectiveness, but you still have some limitations in terms of the size of the vessels you can treat with the new modifications and French sizes. Now I've started using the Pounce™ System and have found it very efficient and very flexible in its ability to treat different segments of the vasculature and chronicity of thrombi.

How does the Pounce™ System perform compared with aspiration?

I think the most significant benefit of the Pounce™ System over aspiration is that it's effective in treating both acute and chronic clot. Aspiration works great for fresh thrombus, but thrombus is usually not homogeneous. It's typically quite heterogeneous, especially in patients with previous interventions, bypasses, or other types of diseases.

Another significant benefit I've found with the Pounce™ System is the ability to get into smaller blood vessels and get a really good result. In the past, that's been a big deficiency in our treatment algorithm. Also, I've found the Pounce™ System to be time efficient, which is great. It takes me about 45 minutes to treat what I'm going to treat with the Pounce™ System. I find it efficient to be able to treat a range of heterogeneous clots with one device.

Could you expand on the benefit of time efficiency to your practice?

For us, time management is critical. Elective procedures are 60% to 80% of our practice. We schedule these weeks in advance. But, patients

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with ALI or ALI and CLI can't wait. They present at all times, and you have to treat them in a very time-sensitive manner because the outcomes are worse with delays. So, those two realities have to somehow coexist.

That requires time management and efficiency. Let's say I have an emergent patient come with rest pain. If, based on my experience, I feel confident I can get that patient in and out in a timely manner and bring in my other, scheduled patient—and my staff knows that and my cath lab manager knows that—then my flexibility to treat all patients and not have to put some things off and triage some patients increases significantly. Whatever makes that easier, more effective, and more predictable is going to benefit patients and the hospital. You're using less human capital, you're using less space, you're using less time that can be used for treating additional patients.

What's it been like for your staff to transition to the Pounce™ System?

It's been fairly seamless. The device is simple to use and has a limited number of components, so a limited number of staff need to be integrated into the process. For systems that require capital equipment, your scrub tech and the nurse in the room both have to be involved in setting up and operating the device. With the Pounce™ System, even if the tech isn't familiar with the device, I can easily show them, so the process just resolves. ■

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