Mark J. Garcia, MD, MS, FSIR, was the chief of Vascular & Interventional Radiology, medical director of the peripheral labs at the Center for Heart and Vascular Health and medical director of the Center for Comprehensive Venous Health at Christiana Care in Wilmington, Delaware. He recently left to become the Chief Medical Officer for Merit Medical Systems and to continue his work in the private practice setting. Vascular Disease Management spoke with Dr. Garcia at the 2015 VEITH Symposium about a technique he developed using the AngioJet thrombectomy system (Boston Scientific) for acute and subacute deep vein thrombosis (DVT).

**VDM: Could you tell us more about this thrombectomy technique?**

**Garcia:** When we developed this in 1997 it was really the start of pharmacomechanical thrombolysis. The technique, which at that time had never been described, was to add the tPA or thrombolytic agent into the saline bag and connect that to the AngioJet system.

What makes this technique very different, yet very effective, is that we put the AngioJet catheter through an 8 Fr hockey stick guiding catheter. When you retract the wire into the AngioJet system, it allows the catheter to take the shape of the hockey stick. As you treat the DVT from the central to peripheral aspect, you are spiraling the hockey stick in a 360 degree circle, achieving wall-to-wall apposition of the AngioJet catheter. In effect, you are treating the entire circumference of the vessel, cleaning out essentially the entire vessel instead of just the central lumen, which is typically what happens with other techniques. I’ve called this technique the “rapid lysis technique,” and it is gaining quite a bit of attention, particularly because those who have transitioned their technique to one that uses this have agreed that it is resolves clot more effectively.

The other benefit that we’ve seen is a significant reduction in the number of patients that have needed to go on to catheter-directed lytic therapy for a residual clot. What that equates to is a significant amount of savings over catheter directed thrombolysis as well as a reduction in the bleeding risks. In a performance improvement project that we did at my institution,
we were able to complete DVT pharmacomechanical thrombectomy in a single session in 147 patients. We were able to save nearly $1.5 million compared to if that same population were to get a single overnight infusion of tPA. So, although the up-front costs may be higher for using a device, the fact is that by discharge, you’ve significantly saved this population a financial amount that is not to be ignored, in addition to the benefit of reducing their bleeding risk.

**VDM:** Have you potentially improved the clot removal compared to the overnight tPA?

**Garcia:** What we were able to see on follow-up venography is a significant gain in patency and a marked reduction in the amount of residual clot that necessitated thrombolysis. The additional clinical benefit is that you have debulked much more thrombus, so that if it wasn’t a one and done session and you did need to perform tPA thrombolysis, the amount of time for lysis was significantly reduced. This in turn reduces the time of exposure to the thrombolytic agent, which reduces the risk of bleeding and of significant potential complications that could occur.

**VDM:** Let’s talk a little bit about the research that you are involved in with therapy for DVT. Give us some details about that.

**Garcia:** I initially presented our work at the 2004 SIR annual meeting, and in 2007, it gained national press release recognition at the SIR meeting. This led to increased internet presence, and I started getting questions from patients who had DVT for a long period of time and were wondering if we could treat them because they were suffering from post-thrombotic syndrome. Indeed we saw these patients but because the clot was very organized, old thrombus, we knew that tPA really wouldn’t work in the same fashion as with the acute DVT.

We started attempting to treat these patients by using balloon angioplasty to create a larger working vein lumen followed by using ultrasound accelerated thrombolysis with the EKOS device and we were amazed at our ability to not only cross these chronically occluded veins but to also restore flow after an overnight infusion utilizing the EKOS system. I think the benefits of the EKOS technique have been that it not only lysed the acute thrombus that is created during the intervention, but also, in my belief, the ultrasound waves are actually loosening and softening the old, hard fibrin-rich strictures, so when you come back the second day, you are able to dilate further and get a bigger luminal gain and improved flow.

So, we’ve been following these patients now for 5 or 6 years and what we’ve been able to show, (which also gained press recognition), is our ability to show a significant clinical improvement (in 93% of our patients) as reported by the patients themselves. We were able to restore flow and reduce the symptoms and severity of the post-thrombotic syndrome.

This work led to EKOS (and now BTG) supporting a multicenter study that is looking to evaluate the ability to clinically improve post-thrombotic syndrome, based on the Villalta post-thrombotic syn-
drome scores, as well as the ability to restore flow. When we reviewed patients that we treated in this manner, we saw that our mean Villalta scores decreased from 13.1 pre procedure to 1.9 at 1 year, which is essentially resolution of the post-thrombotic syndrome.

The basis of this research is to demonstrate to our medical peers and patients, that we need to stop saying to patients suffering from post-thrombotic syndrome and chronic DVT, that there’s nothing we can do and they have to live with it. This is no longer the case. My hope and my belief is that the study will be positive and we’re going to show a significant improvement in the quality of life in these patients.

**VDM:** How do you think that will affect the practice of vascular clinicians? What might change?

**Garcia:** Patients have been told up to this point that they have to live with the significant restrictions and quality of life limitations that come with post-thrombotic syndrome. My hope is that continued evaluation of this technique as well as other devices will convince our medical colleagues, vascular specialists, insurance, CMS, and third-party payers that indeed there is something that can and should be done. The quality of life that is quite poor for these patients should improve, and they could get back to activities that they haven’t been able to do for years. I think that this is going to be a new paradigm for treatment in this population, for the likely millions of patients who have this disease.

**Editor’s note:** Dr. Garcia reports consultancy to Boston Scientific, grants from BTG and EKOS, and travel reimbursements and payment for educational presentations from Boston Scientific, EKOS, and BTG.