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A leading interventional radiologist explains the strength of multidisciplinary documents, the 5-year outlook for VTED, and why technology has an impact on decision making.

What have you learned about treating peripheral arterial occlusion (PAO) in recent years? Not all clinical scenarios and occlusive lesions in the periphery are the same. In addition, no one endovascular treatment option has shown clear superiority. How we treat PAO is also being driven by industry, as well as individual and institutional anecdotal biases rather than good outcomes data. I still struggle with determining the exact role of lasers, atherectomy devices, covered versus bare versus drug-eluting stents, cutting versus scoring balloons, subintimal recanalization, and cryoplasty versus plain old balloon angioplasty. We also know so little about the impact of various antiplatelet agents and other drugs in terms of the benefit of maintaining vascular patency and reducing restenosis after a percutaneous intervention. In short, I have learned how little I know.

Last year, you worked with the Society of Interventional Radiology to publish quality improvement guidelines for treating lower-extremity deep vein thrombosis (DVT) using endovascular thrombus removal. What impact have the guidelines had? Societal guidelines and recommendations usually influence the individuals of those societies the most, but often the information does not reach other clinicians who are not members of the specific society. What seems to influence practice patterns as much as anything within a community, or more specifically, an institution, are local relationships, interactions, and outcomes relative to various treatment algorithms. Whether the changes in practice patterns make it easier for referring clinicians to provide and improve care for their patients also affects the rate of acceptance of published guidelines.

Societies that want to make an impact on the treatment of venous thromboembolic disease (VTED) must reach out to physicians who encounter patients with VTED such as emergency medicine physicians, primary care physicians, and general, orthopedic, and bariatric surgeons. The pertinent information about VTED should be provided in their respective journals, preferably with multidisciplinary authorship. The language and proposed recommendations must be relevant to these physician groups so that "preaching to the choir" is minimized.

What advances will endovascular treatment of VTED make in the next 5 years? The diagnosis of VTED will continue to improve in the next 5 years. Although we have known about VTED for years, "the emperor has been without clothes," as we have not been able to make headway with its treatment because the consistent ability to noninvasively diagnose VTED has been lacking. The ability to make a diagnosis is improving with the routine availability of 16- to 64-slice multidetector CT scanners. High-quality and accurate CT angiography for the diagnosis of pulmonary embolism (PE) is becoming more commonplace. In addition, high-quality MR venography to detect intrapelvic DVT and duplex ultrasound to detect lower-extremity DVT are becoming more available and reliable as noninvasive methods to diagnose VTED. With the ability to noninvasively diagnose VTED more consistently, physicians will be better able to monitor its course with therapy. Clinical trials are also being developed that will hopefully generate objective data to show that more aggressive minimally invasive treatment algorithms will have a positive impact on certain patients with severe VTED. In addition, the combination of new drugs (eg, plasmin or plasmin-like lytic agents) and more effective mechanical thrombectomy devices will allow treatment of patients with significant VTED more safely and quickly. Finally, all the low-molecular-weight heparins and heparin-like medications, which have been shown to cause less bleeding complications and less heparin-induced thrombocytopenia, will make treating patients with more complex hypercoagulable states easier. Advances on multiple fronts—imaging, diagnosis, medical therapy, devices, lytic drugs, anticoagulants, and potentially, objective

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scientific data—will lead to improvements in VTED treatment.

After you earned your medical degree at Wake Forest University, what led you to a specialization in interventional radiology (IR)? During my internship in internal medicine at the University of Massachusetts, I became fascinated with the technology that was being developed in radiology, such as MRI, CT, and the minimally invasive procedures. My chairman, Dr. James Dalen, was a cardiologist who was widely known for his contributions to the area of PE and nurtured my interest in VTED. I told him that I was considering becoming an interventional radiologist, and he encouraged me to pursue this relatively new specialty. I felt that patient care would be an integral part of IR, so I decided to complete my internal medicine residency and then went on to diagnostic radiology training at the University of North Carolina (UNC).

While at UNC, I became an avid ACC basketball fan, but more importantly, had the privilege to learn from Drs. Matthew Mauro and Paul Jaques. I was then fortunate enough to be able to pursue my IR fellowship under the mentorship of Klemens Barth, MD, at Georgetown University. After my fellowship, I went to the private sector to establish a practice. I discovered that the radiology group that I joined was not ready to work with an interventional radiologist who wanted to establish a clinical practice. I returned to academics to work with Drs. Charles Tegtmeyer and J. Bayne Selby, Jr., at the University of Virginia (UVA) in Charlottesville. As an added bonus, I was able to reconnect with ACC hoops. Dr. Tegtmeyer, who is considered to be one of the fathers of angioplasty, and IR for that matter, was a great clinician and a technical wizard. Along with Drs. Mauro and Barth, Dr. Tegtmeyer was a significant influence in my career both in terms of patient care and practice development.

How do you integrate current technology into your practice? We have been lucky at UVA to have the support of the Health System and our Chair, Dr. Michael Dake. With this support, we have developed a physical plan with nursing care facilities and clinical space that allows us to care for patients with state-of-the-art equipment. This 7-year project is gradually coming to fruition and includes new technology that we will be able to integrate into our IR practice and use to investigate the role of new technology and its ability to enhance minimally invasive percutaneous therapy. We had the first clinical dual-source multidetector CT scanner (Definition, Siemens Medical Solutions, Erlangen, Germany) on the East Coast installed into our department in April 2007. This CT scanner allows for cutting-edge noninvasive cardiovascular imaging. We also have a state-of-the art cardiovascular MRI scanner that is juxtaposed to one of our angiography suites, connected by an MRI-compatible door that will allow for direct patient transfer of a patient from our angiography suite to the MRI scanner. All of our angiography equipment is superb, with 3D angiography and DynaCT (Siemens Medical Solutions) capabilities available to us. We are also in the process of installing a new and exciting angiography suite that will allow more flexible and perhaps most extensive angiographic and CT-like evaluation of patients with a single C-arm fluoroscopic unit. The technology also extends to devices, as we are fortunate to be involved with several different device-related clinical trials.

What effect does access to high-tech equipment have on patient care? The technology has advanced so much that the equipment produces extremely clear images. Multiple physician specialties can understand these images because it correlates with anatomy that we all learn, and this can be good for collaboration and for treatment planning. The more pathology and detail that can be defined, the more likely it is that we can develop a treatment and follow-up plan. However, there has been at least one untoward effect of this rapid technology advancement. The more dependent a physician becomes on imaging, the less clinical acumen is being used in decision making. Our future physicians are not honing their bedside clinical and judgment skills as much as they should. The art of taking a good clinical history and performing a directed physical examination is slipping to the wayside. The ability to see the overall clinical situation in conjunction with the radiographic images remains more important than any image alone. Also, just because you can, does not mean you should. We can now do things to and for patients with our devices and technology, regardless of whether or not they need it. This decision making process of "do I or don't I?" will be relevant forever; I just hope technology does not obscure this pragmatic judgment factor.

Having said this, there is no question that part of the attraction to being an interventionist is the ability to visualize a problem and then fix it as minimally invasively as possible. With the advancement in technology, the images and devices that we can now use to help an individual are amazing. It is truly a "high" to be able to have an impact on the well-being of an individual with some of the current technology. However, I am concerned that sometimes the hype and marketing can obscure the process of clear clinical decision making. ■