Frank R. Arko, MD

Dr. Arko discusses the importance of filter use, his experience with radial artery stenting, and what to do when level-1 evidence contrasts institutional experience.

Specialists who perform endovascular repairs increasingly come from multiple disciplines. As a vascular surgeon, what drew you to the minimally invasive approach when treating patients with vascular disease? The minimally invasive approach to treating vascular disease first developed in the early 1990s while I was doing my general surgical training, and I saw the profound benefit laparoscopic surgery had on patient recovery. During this time, I developed an interest in vascular surgery, having worked with Dr. Clifford Buckley at Scott & White Hospital in Temple, Texas. He was performing a significant amount of lower-extremity percutaneous interventions in conjunction with the cardiologists, including intravascular ultrasound, percutaneous transluminal angioplasty (PTA) and stenting for aortoiliac occlusive disease, and infrageniculate atherectomy for limb salvage. The benefit that these patients derived in terms of recovery when compared to open surgical reconstructions was easy to see.

I then trained at Stanford University Medical Center, where I had the opportunity to learn from vascular surgeons, interventional radiologists, and cardiothoracic surgeons and witness a wide variety of specialists treating the same disease process. This had a tremendous impact on my ability to treat patients with vascular disease, not only from a minimally invasive approach but also from an open surgical option. I still believe that there is a lot to learn and develop from a minimally invasive standpoint, and each of the specialists, including vascular surgeons, interventional radiologists, cardiologists, and cardiothoracic surgeons, have something unique to offer in treating patients with vascular disease.

After remaining on faculty at Stanford for nearly 4 years, I was recruited to the University of Texas Southwestern Medical Center in Dallas, a position I enjoy because it hosts a true multidisciplinary Heart, Lung & Vascular Center where cardiothoracic surgeons, cardiologists, interventional radiologists, and vascular surgeons collaborate to manage vascular disease.

When treating your deep vein thrombosis (DVT) patients, do you routinely place an inferior vena cava (IVC) filter to prevent embolic complications, such as pulmonary embolism (PE)? What is your opinion on the prophylactic use of filters in this indication? This is an interesting question with no clear-cut answer. I almost always place an optional filter in patients with DVT before treatment. Although the reported incidence of PE during routine catheter-directed thrombolysis is very low, I typically use percutaneous thrombectomy devices with adjunctive thrombolysis. I do not think that these procedures are without some risk of distal embolization. The use of distal embolic protection is becoming more standard, not just in carotid stenting, but also in renal angioplasty, lower-extremity interventions, and coronary interventions. Even with a low risk of PE during these procedures, which are often performed on otherwise young and healthy patients, optional, retrievable filters are available and should be used to prevent a life-threatening PE from occurring.

Under what circumstances would you perform surgery for a patient with DVT? It is rare for me to operate on a patient with DVT. I have performed one open surgical thrombectomy on a patient who had *phlegmasia cerulia dolens,* was not a candidate for thrombolysis, and had an ischemic limb. I think the number of patients who require open thrombectomies for DVT is really quite low with all the available percutaneous mechanical thrombectomy devices.

With numerous technologies available or awaiting FDA approval for treating superficial femoral artery disease, how do you determine which treatment is best for each individual patient? That is up to the individual physician and his comfort level with certain tools. The more you use one device, certainly, the more comfortable you become, and the better your outcomes are. Even more important than becoming familiar with any one device is to know its limitations. Fortunately, there are a number of devices for use in the superficial femoral artery available to the physician including, but not limited to, PTA with or without stenting, laser therapy, atherectomy, cryoplasty, re-entry devices, and cutting balloons. Certainly, these technologies have their advantages as well as disadvantages; however, I am most pleased about the variety of devices that allow the physician to treat a greater proportion of patients with limb-threatening superficial femoral artery or infrageniculate disease to save an ischemic limb, often when there is no surgical option.

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What can you tell us about your experiences with radial artery stenting? Upper-extremity vascular disease as a result of radial or ulnar artery occlusions is relatively rare. I have reported on one case in a patient with ischemic digits of the upper extremity in whom the radial artery and ulnar artery were both occluded. This was an extremely frail man who could not undergo surgical reconstruction. We used a brachial approach and recanalized his radial artery with PTA and stenting using self-expanding stents. This resulted in an excellent outcome with healing of all his digital ulcers and relief of his pain. We were fortunate to achieve a nice result endovascularly in this patient and avoid surgery.

Can you tell us about Crux Biomedical and the IVC filter that it has developed? Crux Biomedical is located in Portola Valley, California. It was founded in 2004 by Tom Fogarty, MD, and I have been involved with the company since its start. The device is a new optional IVC filter constructed from opposing nitinol spiral support elements and an ePTFE filter that is self-centering and bidirectional, enabling placement and retrieval from the internal jugular or femoral approach, with a unique retrieval tail for easy capture. Rodney White, MD, and I performed the animal studies. In the animal model, the filter remained patent, did not migrate, and was able to be retrieved at up to 60 days after implantation. The first-in-man experience was performed in Asuncion, Paraguay, at the French Hospital in collaboration with Adrian Ebner, MD. Ten patients were successfully implanted with retrieval of four of the devices at 63 days, with the devices removed in less than 5 minutes. The RETRIEVE study is a multicenter clinical trial that is currently evaluating this filter. Up to now, there have been seven implants all performed by the principal investigator David Rosenthal, MD, from Atlanta. Other trial sites include but are not limited to the Cleveland Clinic, the University of Michigan, UCLA-Harbor, and Orange County.

When level-1 clinical data are published that are in direct contrast to what you believe based on your own clinical experiences, how does it impact your decision making? I think level-1 evidence is important to have and must be closely read and well understood before it can be generally applied to the population. Often, with level-1 evidence, there are very strict inclusion and exclusion criteria for patients. Once level-1 evidence is available, there are patients who often do not fit in this strict inclusion or exclusion criteria. I believe it is important to discuss the available findings of level-1 evidence with your patients, but in the end, you must individualize the care to each patient based on what the physician and patient feel is the most appropriate approach. Medicine is not just a pure science, and a significant amount of art and creativity are still required to achieve the right outcome for each individual. ■