**Dialysis Access Care: Are We There Yet?**

This month, ASN Kidney News editorial board member Edgar Lerma interviewed Tushar J. Vachharajani, MD, FASN, FACP W. G. (Bill) Hefner Veterans Affairs Medical Center in Salisbury, NC, and Jack Work, MD, of Emory University in Atlanta.

**Tushar J. Vachharajani  Jack Work**

**Q:** Time and again we have heard the old adage that dialysis access is the Achilles heel of hemodialysis. What is currently being done to address this issue? Please discuss the Fistula First Initiative and the Kidney Disease Outcome Quality Initiative (KDOQI) Preservation of Veins.

**A:** The survival of patients receiving maintenance hemodialysis depends on a well-functioning vascular access, which continues to remain a weak link in our quest to provide optimal care. The arteriovenous fistula (AVF) has been recognized as the most preferred of the three commonly used vascular accesses: AVF, arteriovenous graft (AVG), and central venous catheter (CVC). A well-functioning AVF has been shown to have the lowest complication rate of stenosis/thrombosis and infection, a lower cost of maintenance, and prolonged patency compared with the other types of access.

The Fistula First Breakthrough Initiative (FFBI; www.fistulafirst.org) was implemented by the Centers for Medicare and Medicaid Services with the primary goal of increasing the use of AVF for hemodialysis. The FFBI framework provided educational materials and tools to track outcomes through 13 well-defined processes known as change concepts. As a result of the aggressive implementation of this program, the prevalent AVF rate in the United States increased from 22.8 percent in 1997 to 59.8 percent in September 2011.

The high incidence of primary AVF failure, reported as 20–60 percent, is the second major hurdle in achieving the current target of 66 percent AVF use in the prevalent hemodialysis population. Preserving veins, improving surgical skills, and educating the dialysis community have been recognized as some of the key factors in overcoming this barrier. KDOQI Guideline 7 and FFBI Concept 12 outline the role of vein preservation. An important strategy to preserve veins for future AVF creation involves the judicious use of peripherally inserted CVCs (PICCs). FFBI has a position paper on the proper use of the PICC in patients with chronic kidney disease (CKD) stages 3, 4, and 5.

**Q:** Where does the United States stand in comparison with other countries in terms of AVF/AVG use? To what do you attribute this discrepancy?

**A:** According to U.S. Renal Data System 2011 data, 82 percent of patients in the United States have a CVC as the primary access for their first outpatient hemodialysis session, with only 14 percent beginning treatment with a functioning AVF. Catheter use in the incident population in other countries, according to data reported by the Dialysis Outcomes and Practice Patterns Study, is as follows: United Kingdom (60 percent), Sweden (58 percent), Belgium (73 percent), and Canada (70 percent), and it remains high compared with Germany (23 percent), Japan (26 percent), Spain (32 percent), France (39 percent), and Italy (40 percent).

Nearly a quarter of the prevalent population in the United States, Canada, the United Kingdom, Belgium, and Sweden remains dependent on CVCs. AVF use at first dialysis was highest in Germany (72 percent) and Japan (68 percent). The 2.5-fold increase of AVF use in the United States since 1997 (52 percent) in the prevalent population over the past decade has been a remarkable improvement resulting from the aggressive implementation of the various guidelines, but AVS use remains low compared with Japan (91 percent), Italy (85 percent), Germany (80 percent), France (74 percent), Spain (70 percent), Australia–New Zealand (77 percent), and the United Kingdom (67 percent).

The wide discrepancy of access type in the United States arises from several barriers. Dedicated and sustained teamwork is essential to maintain the momentum achieved over the past decade. The importance of early referral to a nephrologist, better education about vascular access, improvement of surgical skills, improvement of cannulation techniques, and changing the attitude of the patient and the dialysis community can all assist with achieving the target of 66 percent AVF use. The average time from referral to AVF creation in the United States is much higher compared with 5–6 days in Italy, Japan, and Germany. According to data from the Dialysis Outcomes and Practice Patterns Study, despite seeing a nephrologist more than 4 months before starting dialysis, more than 60 percent of patients in the United States began dialysis with a CVC. In the United States, a growing obese and elderly CKD population with associated comorbidities of diabetes and peripheral vascular disease continues to pose a challenge to successful AVF creation.

Financial and regulatory barriers in the United States prevent the timely creation of AVFs. Although 60 percent are uninsured or underserved patients will eventually qualify for Medicare coverage, a patient who is unable to train for home dialysis must wait at least 3 months with a CVC before becoming Medicare eligible and before reimbursement for vascular procedures becomes available. This results in prolonged exposure to CVCs and explains the high rate of catheter use at the initiation of dialysis in the United States.

**Q:** Since the recognition of interventional nephrology as a subspecialty, do you think there has been a change in AVF/AVG rates?

**A:** The recognition of interventional nephrology as a subspecialty by the American Board of Internal Medicine brought the issue of vascular access planning and care to the forefront. The fragmentation of access care, which was earlier considered as acceptable, has now been transformed into an organized team effort. The interventional nephrologist as a team leader can help coordinate care among the surgeon, primary care physician, interventionalist, dialysis staff, access coordinator, and patient.

The general awareness of the need to pay equal attention to establishing a successful AVF simultaneously, along with all the other issues in patients with CKD, is crucially important for the overall success of renal replacement therapy. The timely manner in which failing accesses are treated has helped reduce the hospital stay and prolong the patency of both AVFs and AVGs. The subspecialty is still young, but as more physicians (nephrologists, radiologists, and surgeons) gain interest and skills in vascular access care, the level of care will steadily improve over time.

**Q:** One concern during the early years of interventional nephrology was the turf war with vascular surgeons and interventional radiologists. Have there been any changes since that time?

**A:** The initial apprehension of the various physicians involved in vascular access care is slowly
changing with the recognition that vascular access care is better provided by a team than with a fragmented approach. Every team member has a specific role, and no individual member is dispensable.

The ever-growing CKD population, and the shortage of physicians with interventional and surgical skills, make it virtually mandatory to implement a team approach to provide optimal care. Various successful collaborations between vascular surgeons, interventional radiologists, and cardiologists have been established in the academic arena. These collaborative efforts have resulted in improved AVF rates in these institutions, as was reported in the November 2010 issue of the Clinical Journal of the American Society of Nephrology and the September 2011 issue of Seminars in Dialysis. Several national meetings have now been organized through the collaborative efforts of all these specialties. For example, the meetings of Controversies in Dialysis Access, the American Society of Diagnostic and Interventional Nephrology, and the Vascular Access Society of the Americas involve participation by all these disciplines.

Q: Please describe the growth of interventional nephrology as a distinct discipline within nephrology. What do you think are its future directions?

A: Interventional nephrology is being increasingly recognized as a necessary field not only in the United States but also globally. The American Society of Diagnostic and Interventional Nephrology (www.ASDIN.org) was established in 2000 and has seen steady growth in its membership. The American Society of Nephrology, the International Society of Nephrology, and the European Renal Association—European Dialysis and Transplant Association now recognize the field of interventional nephrology. There is growing interest in the procedural aspect of nephrology, which is being increasingly viewed as a recruiting tool for nephrology fellowship programs not only in the United States but also worldwide.

Q: Are there any screening or surveillance methods that can reliably predict AVF/AVG failure? Does Medicare cover this?

A: Monitoring and surveillance of dialysis vascular access is essential for early diagnosis and intervention to maintain patency and prevent thrombosis. Monitoring is essentially a regular and thorough physical examination of an access before each dialysis session. Surveillance is the use of sophisticated equipment to measure trends in flow or pressure and to detect access dysfunction. Physical examination alone is generally adequate, provided it is performed regularly and by an experienced person. Surveillance tests are controversial, and as yet there is no consensus regarding an ideal method or frequency at which they need to be performed. Surveillance testing requires additional personnel and equipment costs, which Medicare does not cover. Unfortunately, to date, randomized controlled trials have failed to support surveillance as a means of prolonging access survival.

Q: How do you think the bundling issue is going to affect the economics of interventional nephrology?

A: Bundling of dialysis care currently does not include the procedures performed by an interventional nephrologist. The procedures performed on a dialysis access are reimbursed separately based on specific Current Procedural Terminology codes. The use of a thrombolytic agent during a thrombectomy procedure is the only nonreimbursable cost; it is bundled in the dialysis-related reimbursement. If vascular access care were bundled, vascular access centers would become cost centers rather than profit centers, which could lead to incentivizing optimal care rather than profitable care.

Q: What advances have been made over the past few years in terms of dialysis access?

A: The alternative to a successful AVF remains elusive. Research into synthetic and bioengineered grafts is being actively pursued. Early reports of tissue-engineered grafts from human allogeneic smooth muscle cells have been promising. Synthetic grafts coated with heparin or carbon are being studied as an alternative to the standard polytetrafluoroethylene grafts. A hybrid graft–catheter access (HeROdevice) has been recently introduced into clinical practice; experience with it so far is limited.

Q: What are the different types of hemodialysis catheters? What are the indications for, and advantages of, one over the other?

A: A plethora of tunneled catheters are available in the market. Differences in the catheters may be based on tip design (step tip, split tip, symmetrical), coatings (external or internal, antiseptic or antibiotic), shaft design (straight or curved), or placement technique (antegrade or retrograde). Each design has some advantages and disadvantages, but universally the goal should be to minimize the length of time the catheter is in place and to transition the patient to a permanent arteriovenous access as soon as possible. A catheter should be viewed as a bridging access, not as a permanent access, because of its high rate of infection-related complications and high cost of maintenance.

Q: Please tell us about the Atlas of Dialysis Vascular Access. What were the objectives in doing this project, and how do you think it will benefit the nephrology community?

A: Nephrology trainees receive limited vascular access–related education during their fellowships. Additionally, dialysis care in the United States is largely dependent on nurses and patient care technicians, who have limited training opportunities. There certainly was a need for a quick pictorial guide with easy online access to enable understanding of the basic anatomy and common access–related complications seen in clinical practice. A picture is worth a thousand words and can leave a lasting impression in a few short seconds. The ultimate goal is to provide an easy reference that will improve the awareness and understanding of the importance of dialysis vascular access to the entire dialysis community, including patients, nephrology trainees, dialysis staff, and physicians. The atlas can be easily accessed through various online sites, including ASN-online.org and www.fistulafirst.org.

Q: Do you have any Practice Pointers for our readers?

A: Routine and thorough physical examination of an AVF can help early identification of problems and enable timely intervention. Recognizing the signs of central venous stenosis (Figure 1) on inspection can potentially prevent the permanent loss of valuable limited-access sites. Monitoring pseudoaneurysms and documenting their size in the medical records can help with timely intervention and salvaging the access. A rapidly enlarging pseudoaneurysm with shiny skin and inability to tent the skin over the pseudoaneurysm in an AVF needs to be revised surgically with aneurysmorrhaphy rather than ligation (Figure 2). A pseudoaneurysm twice the size of an AVG (the normal AVG lumens size is 6 mm) can benefit from surgical revision as a primary option rather than the still controversial approach of covered stent placement.

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