PANEL DISCUSSION

The Growing Role of Endovascular Therapy in AV Access

Multidisciplinary experts weigh in on the effect of endovascular therapy in Europe.

WITH JM ABADAL, MD, PhD, EBIR; LAMPRINI G. BALTA, MD; RAPHAËL COSCAS, MD, PhD; AND GEERT MALEUX, MD, PhD

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Endovascular arteriovenous fistula (endoAVF) treatment is our daily work, and the demand for it is continuously increasing. Since balloon angioplasty was first reported in 1981 by Dr. Andreas Grüntzig,[1,2] there has been a revolution in both technology and technique.

Nowadays, endovascular procedures in AVF have become the first-choice treatment modality, relegating surgery to a few unsuitable lesions or when percutaneous transluminal angioplasty or stents have failed. The treatment is safe, effective, and technically simple, and it has been stated in the latest guidelines.[3]

AVF surveillance and noninvasive imaging have increased the detection of significant stenosis and diminished the rate of AVF thrombosis. Classic diameter stenosis quantification with angiography is not enough to indicate treatment of the AVF. Clinical and physiologic characteristics and Doppler ultrasound (US) must now be included. Doppler US improves the sensitivity of detecting AVF lesions, adds an important hemodynamic parameter, and confirms treatable lesions before performing angiography. In our experience, US is the main type of imaging guidance used in endoAVF procedures, using fluoroscopy only for central lesions. Technical success relies now on morphologic vessel diameter, intrastenosis velocity peak drop, and AVF flow. These data strongly correlate with the clinical dialysis parameter. Our US guidance also avoids radiation to the patient and staff and the use of iodinated contrast.

With the new declotting devices, effective and fast pharmacochemical treatment of thrombosed AVF can be performed. The underlying stenosis can be treated in the same procedure, and the patient can be sent immediately to hemodialysis, avoiding the placement of a catheter. This all-in-one procedure has gained wide acceptance from our nephrologists and has positively impacted patient quality of life.

Even so, restenosis remains an unresolved issue and is the continued burden of interventional radiology. Patency rates at 6 months and 1 year are not comparable with other vascular territories. Predictors of patency and treatment algorithms should be designed. To solve this problem, high-pressure, cutting, scoring, and drug-coated balloons (DCBs) are emerging as new tools to treat complex stenosis and increase primary patency of AVFs. New stent grafts are used for recurring lesions at frequent intervals with solid data.[4,5]

Lastly, endoAVF creation is now a reality, with preliminary reports in selected patients demonstrating equivalent, if not superior, outcomes and lower complication rates compared with an open surgical technique.[6]

Endovascular treatment must be seen as an effective procedure to treat dysfunctional AVF, and the key is the patient with an AVF. Maintenance of the AVF requires a dedicated multidisciplinary team combining the roles of nephrologist, surgeon, and interventional radiologist to obtain good outcomes.

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Despite all the progress achieved in dialysis technology in the past years, vascular access is both the lifeline and the Achilles' heel for patients undergoing hemodialysis.

Without a well-functioning vascular access, hemodialysis adequacy is reduced, and the relative morbidity and mortality of patients increases.[1] Autologous AVF is recommended as a first option for vascular access, especially due to infections and thrombotic complications that are most commonly associated with AV grafts (AVGs) and central venous catheters[2]; unfortunately, a large proportion of dialysis patients are not suitable for autologous AVF.

Stenosis, thrombosis, and maturation failure are the main problems accounting for a large proportion of failed or abandoned accesses.[3]

NEW AVF OPTIONS WITH WAVELINQ™

The WAVELINQ™ EndoAVF System (BD) offers two additional AVF creation site options compared with surgically created fistula. Creating an AVF through an endovascular procedure preserves vasa vasora and the surrounding feeding tissues, diminishing fibrotic changes at the anastomotic site, which is a main characteristic and drawback of surgical AVF creation. In addition, patients with end-stage renal disease—who are usually old with multiple comorbidities and limited vein accesses—may benefit from an endoAVF creation procedure such as that offered by the WAVELINQ™ EndoAVF System, thus avoiding a surgical procedure along with its risks. The WAVELINQ™ EndoAVF procedure creates an AVF in the deep vasculature (eg, an ulnar–ulnar or a radial–radial AVF). EndoAVF creation improves the field of vascular access by providing patients with more options for AVF, both for predialysis and dialysis patients who had previous failed access attempts.

Additionally, the endovascular technique is a minimally invasive procedure that can facilitate AVF creation in an outpatient setting and will increase the spectrum of specialties and physicians who can perform it. This will hopefully reduce long waiting times by eliminating the time needed for surgical consultation and pre- or postoperative follow-up. Hemodialysis patients with preexisting malfunctioning AVFs are usually well informed and seek alternatives to classic surgical AVF, thus making it our obligation to keep up with the latest techniques in vascular access.

In conclusion, from a nephrologist's point of view, the key will be to continue screening patients, gather clinical evidence, refine patient eligibility, and ensure the physicians are properly trained and equipped to perform endoAVF. A well-founded cooperation between medical specialties and a well-trained nursing staff are considered of utmost importance for the evolution and wider application of this method.

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For years, in France and especially in the Paris area, AV access care was performed either by vascular surgeons or interventional radiologists. However, these two specialties have different missions and areas of expertise with little overlap. Vascular surgeons were in charge of AVF and AVG creations as well as open revisions of failed AV accesses. Interventional radiologists performed thromboaspiration of occluded AVFs and AVGs in addition to angioplasties of AV accesses and central veins. In the end, the nephrologist in charge of the patient was making the decision to send the patient to the radiologist if he/she wanted endovascular management and to the vascular surgeon for open surgery. This was not always based on a clear paradigm, and it led to exclusivity of endovascular procedures or open surgical managements. This is the past, and it must change.

Fortunately, the rigid referral patterns of the past are changing to better serve the unique situation of each patient. The emergence of new techniques, such as endoAVF creation, DCBs for failed AV accesses, and thrombectomy devices, gives physicians better tools

to develop an optimized treatment plan. At the same time, it's important we stay balanced in our use of new technologies. We must keep in mind that a native AVF at the wrist still might be the best AV access option. Each patient's treatment plan should be individually evaluated for the optimal access creation procedure.

With so many options, it is paramount to build a multidisciplinary (or multitechnique) team that performs high-quality open surgeries and endovascular management of AV accesses. For example, consider the patient with recurrent cephalic arch stenosis who has undergone 9 or 10 angioplasties. With a comprehensive plan for access creation, that patient might be referred to the vascular surgeon for open cephalic-axillary reimplantation. Similarly, open surgeons now have additional options distal to the elbow when the possibility of a wrist fistula has been ruled out. We can now create percutaneous proximal forearm AVFs with endovascular systems such as the WavelinQ™ 4F EndoAVF System. This technology is a game changer for AV management and, when appropriate, must be incorporated into the AVF creation algorithm while still considering the indications and contraindications.

I do not believe in using only open surgery or endovascular management for AV access. I believe in being able to choose the best technique for each situation. It is already clear that endovascular techniques have a growing role in our field. To give our patients the best care possible, physicians taking care of dialysis patients need to master all available techniques by continually training and learning the newest procedures available. It is also important that all specialties involved in the care of the patient (nephrologists, radiologists, vascular medicine) acquire the knowledge for the different options available. Until an established algorithm for AVF creation and management is available, a multidisciplinary approach of AV creation and maintenance will allow us to offer the best care for our dialysis patients.

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Hemodialysis remains the backbone treatment for the majority of patients with end-stage renal disease. Different access methods for hemodialysis exist; however, autologous AVF is the most durable access for these patients. If an autologous fistula is not an option, other accesses such as an AVG or a tunneled dialysis catheter are still an option.

The main drawback of an autologous fistula, however, is the high incidence of venous stenosis, which may lead to a dialysis dysfunction. For more than two decades, balloon angioplasty of these venous stenoses has been the gold standard according to the National Kidney Foundation Kidney Disease Outcomes Quality Initiative guidelines,[1] despite the high incidence of recurrent stenosis. Today, the introduction of DCBs may result in prolonged patency of veins[2] and fewer angioplasty sessions over time.[3] This may impact patient quality of life and reduce the total cost of medical treatment in patients undergoing dialysis. Future research is still needed to better understand the working mechanism of DCBs, including which drug is the most efficient (mainly paclitaxel is used today), and better define the technical aspects of this new technology, including inflation time and combination with regular angioplasty balloons.

Another step forward in the treatment of patients with dysfunctional dialysis fistulas is the introduction of expanded polytetrafluoroethylene–covered stent grafts. For many years, it has been demonstrated that expanded polytetrafluoroethylene–covered stent grafts are superior to conventional balloon angioplasty in patients with venous outflow stenosis associated with an AVG.[4-6] However, there is more evidence that these covered stents are also of major importance in treating efferent venous stenosis in autologous fistulas, especially for treating cephalic arch stenosis.[7] Further research on covered stents versus DCBs, downsizing stent graft delivery systems, and optimizing covered stents for venous applications are interesting challenges for the future.

These new technologies and future innovations may result in better treatment of dialysis patients and, finally, a better quality of life. ■

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