Interventional management of vascular access

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The autologous arteriovenous fistula needs time to mature and for the vein to enlarge to a size where it can be needled for dialysis. A fistula that fails early is one that either never develops adequately to support dialysis or fails within the first three months of its use.

Non-invasive investigation using color-Doppler ultrasonography (CDUS) has been shown to be a valuable diagnostic modality in the prevention and management of complications of hemodialysis access. The routine CDUS surveillance of newly created arteriovenous fistula 4-6 weeks post-operatively will lead to increased early intervention and an increased functional utilization rate of arteriovenous fistula. Digital subtraction angiography is invasive, but a major advantage over the other imaging modalities is the possibility of performing the endovascular intervention immediately, in case a hemodynamically significant stenosis has been detected.

A great majority of non-matured fistulae can be successfully salvaged using percutaneous techniques. By use of an aggressive approach and employment of two basic techniques, balloon angioplasty and vein obliteration, interventionists can successfully salvage and subsequently utilize an otherwise failed fistula. In a prospective observational study, 100 patients with early failure underwent evaluation and treatment. Vascular stenosis and the presence of a significant accessory vein alone or in combination are found to be the culprits in most instances. Venous stenosis was present in 78% of the cases. A majority of these lesions (48%) were found to be close to the anastomosis. A significant accessory was present in 46% of the cases. Percutaneous balloon angioplasty was performed with a 98% and vein obliteration with a 100% success rate. After intervention, it was possible to initiate dialysis using the fistula in 92%. Actuarial life table analysis showed that 68% were functional at 12 moths. The overall complication rate in this series was 4%.

Many poorly functioning accesses suffer from stenosis, which is a blockage or narrowing in the access. To open a stenosis, we may intervene with angioplasty and/or stent placement to improve blood flow. In angioplasty, a small balloon, mounted on a catheter, is inflated within the blood vessel, expanding the narrowed access. If necessary, we may also insert a metal stent to maintain even blood flow throughout the access. For clotted accesses, we offer thrombectomy, to remove thrombi from the access. Mechanical thrombectomy devices can remove clots from both AV fistulas and grafts, creating a vacuum effect to pull out the clots. Another alternative to remove clots is thrombolysis, which utilizes pharmacological methods to break down or break up these blood clots.

Steal syndrome is a clinical condition caused by arterial insufficiency distal to the dialysis access (area furthest away from the access). Blood is diverted into the fistula or graft and away from the hand. To correct the balance of blood flow, we offer a banding technique, the Minimally Invasive Limited Ligation Endoluminal-assisted Revision (MILLER) procedure to accurately manipulate the access to the proper size and allow for even blood flow. This procedure uses an angioplasty balloon as a sizing dowel, allowing to band accesses to their desired diameter to treat steal syndrome and high-flow accesses.

Central vein stenosis can result in significant arm swelling when an AV access is created on the ipsilateral side. When a patient has central vein stenosis and significant arm swelling, percutaneous angioplasty should be performed. Angioplasty can be repeated in case of recurrence. A stent should be placed after more

than one recurrence or a failed angioplasty.