Salvaging Dialysis Fistula and Grafts

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While renal transplantation (KTP) is the ideal treatment for the end-stage chronic kidney disease (CKD) patients, this is available only to a fraction of these unfortunate patients. Furthermore, the percentage of CKD patients who receive a KTP in India is abysmally low as compared to the Western world. The vast majority needs long-term dialysis; maintenance hemodialysis (MHD) is usually the lifeline for them. Peritoneal dialysis is generally not preferred as it is cumbersome, less efficient, and more expensive than MHD. A well-functioning dialysis access procedure is the essential prerequisite for MHD. The tragedy is that almost all fistulas and grafts fail over time. Since the number of access sites/procedures is finite, it is imperative that all efforts are directed to “keep the fistula going” for as long as possible. Salvaging a dialysis fistula (or graft) assumes special importance in the light of the above-mentioned facts.

It is imperative that a failing fistula (or graft) be identified before it actually closes down. A failing fistula is far easier to treat than one which has actually thrombosed. A formal fistula surveillance program in the dialysis unit is ideal. While this requires some investment in terms of time, money, and effort, a simple sensitization of the dialysis technician toward the “red flags” can often lead to an early detection. Criteria to detect a failing fistula are varied but reasonably well defined. Clinical parameters include the presence of a good thrill; if only a pulse is present (without accompanying thrill), it indicates distal venous stenosis. Gross edema of the limb with tel-talae collateral veins over anterior chest wall is pathognomonic of central venous occlusion. Excessive access site bleeding after removal of dialysis cannula is another sign of proximal stenosis. Failure of fistula to mature over a reasonable time (normally 6–8 weeks) indicates a technical problem.

The most objective criteria – urea clearance with dialysis (Kt/V) – are difficult to utilize in clinical practice. Elevated venous pressure during dialysis is an early sign of a problematic fistula. Pressures in fistula >50% of mean arterial pressure (after the dialysis pump has been switched off) are considered significant. Rising trend of fistula pressures over a period of time is even more important than absolute values and mandates further evaluation. Flow measurements are more cumbersome and generally not available in most dialysis units as these require special hemodialysis monitors. The National Kidney Foundation Kidney Disease Outcome Quality Initiative guidelines recommend further evaluation if the flow rate is <600–800 ml/min, especially in a prosthetic graft. Others have suggested a lower threshold of 900 ml/min. The dialysis unit should follow some sort of guidelines. Routine duplex ultrasound surveillance is attractive for fistula monitoring; however, it has failed to produce evidence that it is useful. It should be reserved for situations where clinical examination is confusing or difficult. Contrast venography – whether computed tomography or catheter based – is the most objective form of evaluation and should be utilized whenever indicated.

Strategies for salvaging failing dialysis fistulas fall into two broad groups: open surgical and endovascular. These are not mutually exclusive. Surgical revision can be performed using patch angioplasty, interposition grafting, redoing proximal anastomosis, or using a jump graft at the venous end of graft. Each of these can be tailored to solve the problem at hand – short-segment stenosis, longer lesions, proximal anastomotic stenosis, or stenosis at the venous end of dialysis graft, respectively. Ligation of a collateral side branch or translocating the fistula to a more superficial plane (especially in the obese) is sometimes required. The use of surgical bypass to treat central venous occlusion is rarely performed as sternotomy is required. Advantages of endovascular/catheter-based (percutaneous) techniques are well known. Balloon angioplasty (conventional or with a cutting balloon) and stenting using bare metal or covered stents are generally preferable to surgery where feasible and where costs are not a constraint. Unfortunately, the last one (cost) is often the

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determinant in India. These are sometimes combined with fistula thrombolysis before angioplasty/stenting. The role of specialized devices such as the AngioJet or the Arrow-Trerotola device in treating dialysis access thrombosis is not fully clear. Hybrid approach (combining simultaneous open surgical and endovascular procedure) is useful in complex lesions where stenoses in anastomotic as well as outflow vein are concomitantly present.

Traditionally, catheter-based endovascular interventions are performed in Cath Lab or under C-arm imaging. Such imaging provides excellent anatomical details, precise treatment of lesions, follow-up angiographic documentation, and quality control. However, this requires availability of the imaging facility, access to the Cath Lab (often a problem in Indian setting to the vascular surgeon), increased cost, and radiation hazard. Ultrasound-guided repair of a failing fistula has been proposed by several groups, notably Enrico Ascher et al. An office-based procedure, it overcomes almost all the disadvantages of the Cath Lab-based procedures. However, it may not be all that simple as it sounds. Banerjee et al. report their experiences with office-based fistuloplasty under ultrasonography (USG) guidance in this issue of the Journal. Their initial success rate of 84% is impressive, but issues with patient selection and ultrasound- and catheter-based skills remain unanswered. In general, USG-guided fistula angioplasty has not been found superior to the conventional procedure under Cath Lab imaging. They have largely been used to treat stenosis in native veins; they are not useful in treating anastomotic stenosis – whether at the arterial or the venous end. Finally, a failed procedure adds to the effort of fistula salvage and treatment costs.

Dialysis access procedures – fistulas and grafts – need active surveillance and prompt interventions to detect and treat the failing access procedure. Failure to do so comes at a high cost to the individual and the society. Treatment is surgical or by catheter-based interventions. The latter has the advantage of being less invasive and relatively simple. Office-based procedures including USG-guided fistuloplasty are increasingly being utilized to treat these patients. Randomized controlled trials are required to test these procedures “head to head” and to clearly define the role of each procedure.

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