

Hemodialysis Vascular Access: The Perils and Potentials

Vascular access continues to be the “Achilles’ heel” for hemodialysis; it causes heightened morbidity and mortality, particularly in incident hemodialysis patients.

Registry data from around the world continue to report poor fistula maturation rates, and the majority of patients are starting dialysis with central venous catheters. In the USA in 2013, 80% of patients started dialysis with a catheter; a figure which has changed very little since 2005.^[1] In the UK in 2011, 57% of patients started dialysis with a catheter.^[2] Starting dialysis with a catheter is associated with an 8-fold increase in rates of infection requiring prolonged hospital admissions, with a ≤ 1.4 million spend on methicillin-resistant *Staphylococcus aureus* infection.^[3] A Canadian study reported that the failure of a first fistula was associated with a doubling of the cost of vascular access care in the 1st year of hemodialysis.^[3] As the number of dialysis patients increases globally, the extra costs associated with vascular access complications continues to deplete already stretched healthcare resources. In the UK, the Department of Health responded by introducing a financial incentive; providing extra remuneration to dialysis centers for patients dialyzed through a fistula or graft, with a tariff uplift of 33%.^[4] In India, the situation is challenging, the number of hemodialysis patients is rising, vascular access is not a priority among hemodialysis providers, and the cost for the patients is huge.^[5]

Fistulae created with conventional techniques have poor maturation rates. In a large prospective, randomized controlled trial of antiplatelet therapy, only 40% fistulae were successfully used.^[6] In a multinational study, the poor fistula maturation rates resulted in multiple procedures and admissions, and despite this, a large proportion of patients started dialysis with a catheter.^[7]

In the study reported in this issue of Indian Journal of Nephrology “Brachio-Cephalic AV Fistula through Median antecubital vein BC-AVF-MAV” is step forward to address and possibly improve the vascular access predicament.^[8] The investigators describe a novel technique of using the antecubital fossa veins to create an upper arm fistula. This has several potential advantages; first, it eliminates the need for a second procedure to superficialize the basilic vein; second, it avoids the need for a graft, which has its own disadvantages, and third, it preserves the basilic vein for future use. The results in the 26 patients are encouraging, particularly in a population with a significant proportion being diabetics, with low primary (4%) and secondary (8%) failure rates. However, the technique needs to be tested in larger cohorts, using different surgical groups and perhaps in an older population.

Accurate prediction of fistula maturation has remained difficult. The ultrasound assessment, as used in this study, of the diameter of the vein and artery has been the most popular method but was not shown to be effective in a large randomized trial of antiplatelet therapy.^[6] Estimation of blood flow and mapping of local blood vessel using ultrasound and magnetic resonance imaging has been used with limited success.

Endothelial dysfunction predicts intimal hyperplasia and atherosclerosis, which can lead to fistula thrombosis and stenosis. Endothelial function is poor in predialysis and hemodialysis patients and may be a good predictor of fistula outcome. In a small sample endothelial function as measured by brachial artery flow-mediated dilatation was associated with poor outcome.^[9]

To improve patient experience, reduce morbidity, and reduce the costs of dialysis; it is essential to develop better methods of patient and vessel selection and prediction of surgical success as well as novel methods of fistula creation, as described in this issue of Indian Journal of Nephrology.

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