Vascular Access in the Lower Limb

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The demand for vascular access surgery is increasing rapidly because of the continuing expansion of the dialysis population at over 5% per year throughout the world. The majority of patients with end stage renal failure will require haemodialysis at some stage for which reliable access to the circulation for haemodialysis is essential. Venous preservation in the upper limbs is of paramount importance, avoiding the cephalic and antecubital veins on either side for intravenous cannulation in any patient with established renal failure and those, such as diabetics, at risk of chronic renal failure. This allows autogenous access, such as the radiocephalic AV fistula at the wrist, forearm or anatomical snuffbox in the majority of patients, leaving brachiocephalic AV fistulae for secondary access. Prosthetic AV grafts, with their increased revision rates and infection are required in a few patients with poor or exhausted veins but can be avoided in the majority of patients.

The early identification of patients with deteriorating renal function is important to allow the creation of permanent vascular access in advance so that the use of central venous cannulae for dialysis can be minimised. Dialysis using central venous catheters carries a higher mortality1 and an increased risk of septicaemia, endocarditis and metastatic abscesses.2 Their prolonged use jeopardises upper limb access 3 and frequently leads to central venous stenosis or obstruction. When this occurs, upper limb access can be temporarily salvaged by angioplasty or stenting of the central veins but such patients eventually require AV access in the leg. However, this is more difficult to perform, may require general or spinal anaesthesia and has greater risk of infection than an upper limb fistula.

Because of the clear preference for upper limb access, few surgeons can boast a wide experience of vascular access in the leg. The detailed review and meta analysis of Antoniou and colleagues in this journal is therefore especially welcome.4

Contrary to expectation, experience with AV access using the long saphenous vein is limited but has yielded disappointing results with the frequent occurrence of intimal hyperplasia and poor long term patency.

AV access using the transposed superficial femoral vein, either as a straight graft from the superficial femoral artery or as a loop from the common femoral artery, has been more successful, with low infection rates and excellent primary patency rates of 83% and secondary patency of 93% at 12 months with a low rate of infection (1.6%). However, this comes at a price: the 21% incidence of steal is disturbing. Whilst tapering of the vein at the anastomosis may reduce its incidence5 steal can provide the access surgeon with a very difficult problem, particularly if the resulting ischaemia is severe enough to put the viability of the leg at risk. Such AV fistulae are precious and further options for AV access are limited in such patients. There are few reports of the treatment of steal in the leg: Banding to reduce access flow is unreliable unless performed with strict control of access blood flow and monitoring of the ankle or toe pressures, but this has only been reported so far in the upper limb.6 The distal revascularisation and interval ligation (DRIL) procedure is perhaps the most popular option in the upper limb but there have been few reports of this procedure in the lower limb.7,8 Proximalisation of the arterial inflow is

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another option but usually requires a prosthetic graft extension to relocate the AV anastomosis onto a more proximal artery such as the common femoral or iliac artery and this of necessity negates the advantage of the autogenous access. 9

Prosthetic AV access in the leg has a low risk of steal (7%) but has poorer primary and secondary patency (approximately 45% and 68% respectively at 12 months), more frequent revisions and a particularly high infection rate resulting in the loss of the access in 18%. In three reports of prosthetic AV access in the leg amputation rates of 7–9% were recorded.

There seems to be little difference in patency between prosthetic loop fistulae in the mid thigh and the groin so that in those patients with a usable superficial femoral artery the mid thigh access is preferable as this leaves the groin free for further access and in those patients where access is impossible in the opposite leg the common femoral vein remains available for temporary access via a central venous catheter whilst awaiting maturation.

PTFE is the usual choice for the graft material. Cannulation of PTFE grafts can usually be performed much earlier than autogenous fistulae, which require up to six weeks maturation before needling. PTFE grafts sealed in such a way as to permit early cannulation have recently become available and would potentially avoid the need for a central venous catheter in the post-operative period, but require further evaluation. Biological grafts have lower infection rates but suffer from poor patency and frequent aneurysm formation so are not popular.

In the light of these findings, what should be the recommended access when the upper limb access is impossible? Experience so far has shown that no lower limb access is ideal but, when necessary, superficial femoral vein transposition may be the procedure of choice. However, urgent or emergency revision may be necessary in a fifth of cases for steal. In patients with poor central venous access requiring early access cannulation and those at high risk of steal such as diabetics and patients with distal arterial disease in the leg a prosthetic mid thigh PTFE loop may be preferable.

References