

# Vascular access

## Veins

Native vein fistulas are the best permanent access for haemodialysis, and damaged veins make poor fistulas. Therefore, when inserting IV catheters:

- Avoid forearm veins - use the hand
- Do not use arm with a working fistula
- Take blood on dialysis where possible (liaise with nurses)
- Preserve veins by limiting venepuncture to one arm if possible (preferably dominant arm)

## Fistulas

Fistulas are the gold standard of vascular access. They are end to side vascular anastomoses, usually radiocephalic, brachiocephalic or brachio basilic. They are created by either the vascular or transplant surgeons. May also use synthetic (PTFE/Gortex) grafts which are a conduit between artery and vein.

Remember to update the vascular access screen on Proton after creation.

## When to Organise

Usually refer for fistula up to 1 year before required.

Renal Association guidelines state 67% of people should have fistula if seen by nephrologists >4/12 prior to starting dialysis (good practice).

## How to Organise

- Fax (21208) / email: vascular access referral form to the vascular access coordinator who will either see the patient on the ward (inpatients), on dialysis, or in the nurse led clinic. The coordinator will organize duplex scan of limb vessels, add patient to the appropriate theatre list and organise admission.

## Fistula Creation

- Majority done under local anaesthetic, but some general anaesthetic cases (particularly transpositions).

- Local anaesthetic: Admission to day surgery unit on a non dialysis day.
- General anaesthetic: majority admitted to vascular ward the day before theatre. Ensure adequately dialysed pre-op, with other usual pre-operative assessment.
- Note: stop warfarin 48 hours prior to admission unless specific instructions from surgeons. No heparin, continue with aspirin. Seek advice from co-ordinator/surgeon re combination of aspirin and clopidogrel.
- Antibiotic prophylaxis required: see antimicrobial policy.
- Post operatively: ensure BP adequate. Document pulses and thrill. Restart any stopped drugs, including anticoagulation. Home with prophylactic antibiotics. Instruct patient to contact vascular access coordinator or ward if thrill disappears.

### Time to Use

- Time taken for fistula maturation is variable, average 8 weeks, but up to 6 months.
- Need to examine fistula prior to first use.
- First cannulation should be undertaken by an experienced nurse.

### Complications

- With all complications the vascular access co-ordinator and the surgeon who performed the procedure needs to be informed. Primary failure of fistulas occurs in 9-35% depending on the site. Risk factors for primary failure includes age, raised BMI, female gender, diabetes, peripheral vascular disease or cardiovascular disease.

### Early

Complication	Associations	Action
Stopped	Intravascular volume depletion Hypotension Hypercoagulability Metastatic calcification	Potentially reversible Give Fluids D/W surgeon immediately
Bleeding		D/W surgeon immediately

Infection/abscess	Prosthetic grafts/MRSA	Septic screen inc swab Antibiotics - usually flucloxacillin or d/w med micro
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### Late

Complication	Associations	Action
Bleeding	Infection	Compression. Urgent vascular referral
Thrombosis	Intravascular volume depletion Hypotension Hypercoagulability Metatastic calcification	Potentially reversible D/W surgeon immediately
Infection/abscess	Prosthetic grafts/MRSA	Septic screen inc swab Antibiotics - usually flucloxacillin or d/w med micro
Stenosis/Poor flow/Developing abnormailty/Not maturing	Inadequate dialysis	Inform vascular access co-ordinator, arrange duplex, d/w surgeons
Distal Ischaemia/Steal	Arterial insufficiency or venous HT, large fistulas	Inform vasc access co- ord/surgeon, arrange duplex, may require closure/revision
Aneurysm	True : Pseudo	Inform vasc access coord : requires duplex and surgical revision
High output cardiac failure	Coexistent cardiac disease, large hypertrophied high flow fistulas	ECHO. Inform vasc access coord/surgeon : may req banding/revision.

Duplex scans usually organised by vascular access coordinator but if unavailable then d/w radiologist.

## **Tunnelled Central Catheters (PERMCATHS)**

Semi-permanent access utilised in the intermediate term. Used whilst awaiting fistula/graft placement or maturation. Also used in those with delayed recovery from ARF or those with no further options for native vascular access.

Remember to update the vascular access screen on Proton for insertion/removal

### **When to Organise**

- Fistula not created
- Fistula not mature
- Fistula problem meaning it cannot be used
- Prolonged ARF req dialysis with numerous temporary lines.

### **How to Organise**

Take completed radiology request card to the 'vascular labs' and discuss case with interventional radiologist. Permcaths placed under fluoroscopy.

### **Pre Procedure:**

- Bloods including FBC/U+E/Clotting/G+S required
- Consent form (completed in radiology)
- Prophylactic antibiotics: see prophylactic antibiotic regimens

### **Post Procedure:**

Permcath can be used immediately. No need for CXR to check position.

Do not use for any purpose other than haemodialysis/CMH

## **Complications**

<b>Problem</b>	<b>Action</b>
Bleeding/haematoma post insertion	Apply pressure and dressing

Infection	Exit site swab, blood/line cultures, Empirical antibiotics May require line removal
Blockage/Poor flow	Check line position May require urokinase/line stripping (see below)
Inadvertent bolus of heparin lock	Dialysis with no further heparin. If bleeding d/w Haem SpR

If permcath providing poor blood flows (<150 mls/min) or is blocked then:

1. Flush with 30ml boluses of normal saline. Remember permcaths are locked with 5000u/ml heparin which must be removed before finishing.
2. Urokinase/Alteplase/Stripping - see below.

## Temporary lines

Used in acute renal failure and as a temporary measure in patients with ESRF whose other access is not available (for example, malfunctioning fistula). Do not use for any purpose other than haemodialysis/CMH. Remember temporary lines are 'locked' with 5000u/ml Heparin and this must be removed first.

Inserted using sterile Seldinger technique under USS guidance to minimise complications. Use either double or triple lumen (IV fluid/drug administration). To prevent thrombus formation both lumens of catheter are instilled with heparin (5000u/ml), the amount required is clearly labelled, this limits systemic heparinisation.

### 1. Internal Jugular lines

- R sided easier to insert than L and get higher blood flows.
- 16cm line usually used.
- Allows measurement of CVP if triple lumen used
- Difficult to place in pulmonary oedema
- Complications include carotid artery puncture (minimised with USS) and pneumothorax (less risk R>L)
- Check CXR mandatory

### 2. Femoral Lines

- 19cm line usually used

- Complication rate of insertion lowest (femoral artery perforation minimised with USS, apply compression)
- Easier to place in pulmonary oedema
- Preferable for patients with respiratory disease/distress as avoids possibility of pneumothorax.
- Infection rate higher than other temporary lines.

### **3. Subclavian Lines**

- Least preferred route
- Increased risk of stenoses/thromboses with consequent loss of ipsilateral arm for future HD access
- Check CXR mandatory

### **Unblocking catheters**

INDICATION FOR UROKINASE/ ALTEPLASE - clearing of clotted dual lumen catheters, and those giving insufficient blood flow rate (<150ml/min) where flushing with boluses of 30ml saline has been ineffective. If these protocols do not clear the problem, for a tunnelled catheter consider radiological intervention for 'stripping' or investigation.\

### **Protocol for urokinase**

- Dilute dry-powdered Urokinase, 5000 units/vial, with normal saline. The added volume of saline should be the total volume of both lumens. The volume of each permcath lumen is clearly marked on the end pieces of each.
- Instil the reconstituted Urokinase into each permcath lumen as a bolus and clamp the line.
- After 30-40 min aspirate the Urokinase lock and attempt dialysis. If unsuccessful repeat the above procedure up to a maximum of 3 times.
- If patency cannot be restored the patient may need a temporary line and catheter-ogram and/or stripping of fibrin sheath arranged with radiology.

### **Catheter stripping**

Fibrin sheaths can be removed mechanically from semi-permanent lines. A snare is inserted via another route (usually femoral vein). Discuss with interventional radiologists.

## **Anticoagulation**

Controlled trial evidence has suggested that anticoagulation for vascular access protection is more likely to cause serious bleeding than to save access. There may be individual circumstances where the balance of risk is different.

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