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Imaging in AVF

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Use of Ultrasound and Doppler in Preoperative Evaluation

Ultrasound helps in imaging the limb vessels and identifying vessel wall condition which may affect fistula outcome. It can identify anatomical variations and help surgeon choose an appropriate access. Surgeon can be prepared of a "Plan B" in case of a on primary failure on the operation table itself. It makes a surgeon more confident and is a wonderful follow up tool.

Concept of Vascular Mapping

Both arteries and veins are mapped from wrist to axilla, this can be done by physical examination or by Doppler ultrasound examination. It gives surgeon a road map as to which AVF is to be created and once this fails which is the next option to be used.

Vascular Mapping using a Doppler Ultrasound

Doppler is surgeon's stethoscope and is best done by the operating surgeon (Fig. 3.1). Vascular mapping substantially increases the number of patients dialyzing with a fistula.¹⁻⁴ Preoperative vascular mapping can potentially change surgical management with resultant increased in the number of AVF construction and appropriate selection of the best available vessels.⁵

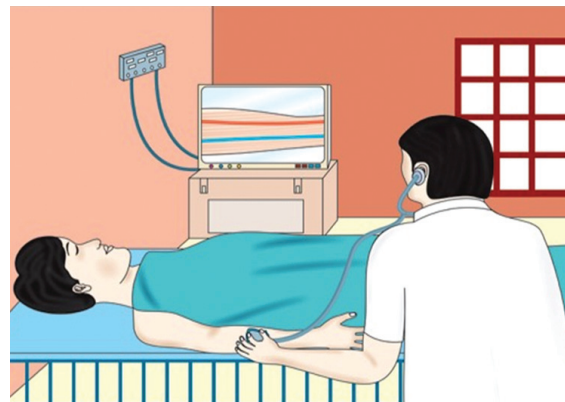


Fig. 3.1: Doppler being surgeons stethoscope

Arterial Doppler Examination

It is done from distal to proximal, internal diameters of all the vessels are recorded, presence or absence of vessel wall calcification is noted and also thickening of the arterial wall is noted. Normal artery is identified as a pulsatile non-compressible structure, with surrounding venae comitantes. Arterial waveforms are observed and normally a triphasic flow should be present. Laminar flow should be seen in all the vessels. Doppler can be used to do Allen's test, to check the integrity of palmar arch.

In Doppler examination surgeon should look for arterial hyperemic response. For this the patient is asked to clench his fist for 2-3 minutes and waveform in the radial artery



Fig. 4.4: Instrument tray

A AVF surgical tray consists of (Fig. 4.4):

1. Surgical blade numbers 11 and 15 on Bard Parker handle.
2. Monopolar and bipolar diathermy on low energy settings.
3. Fine curved mosquito forceps also known as baby mosquito forceps.
4. Adson's tissue forceps both tooth and plain
5. Small Allis tissue forceps
6. Small dissecting dolphin scissors
7. DeBakey atraumatic vascular forceps

8. Bulldog clamps, curved and straight
9. Angled micro-Potts scissors
10. Gerald micro-ring tip forceps
11. Castroviejo's micro-needle holder
12. Small conventional needle holder.

Reference

1. Leaf DA, MacRae HS, Grant E, Kraut J. Isometric exercise increases the size of forearm veins in patients with chronic renal failure. *The American Journal of the Medical Sciences* 2003 Mar 31; 325(3):115–19.

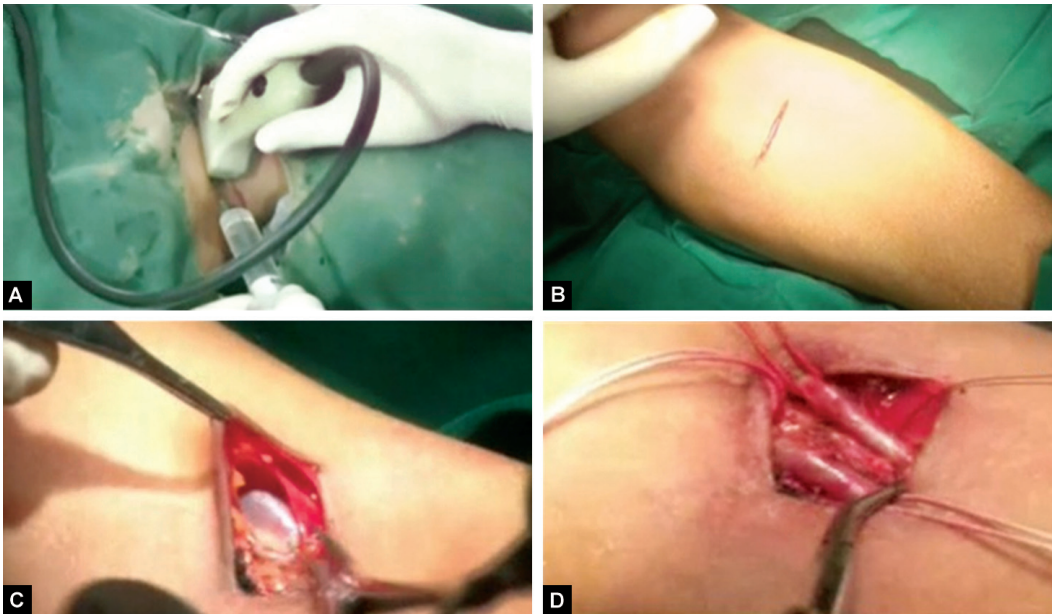


Fig. 6.1A to D: (A) Supraclavicular block being given; (B) Incision for BC AVF; (C) Cephalic vein dissection; (D) Brachial artery dissection

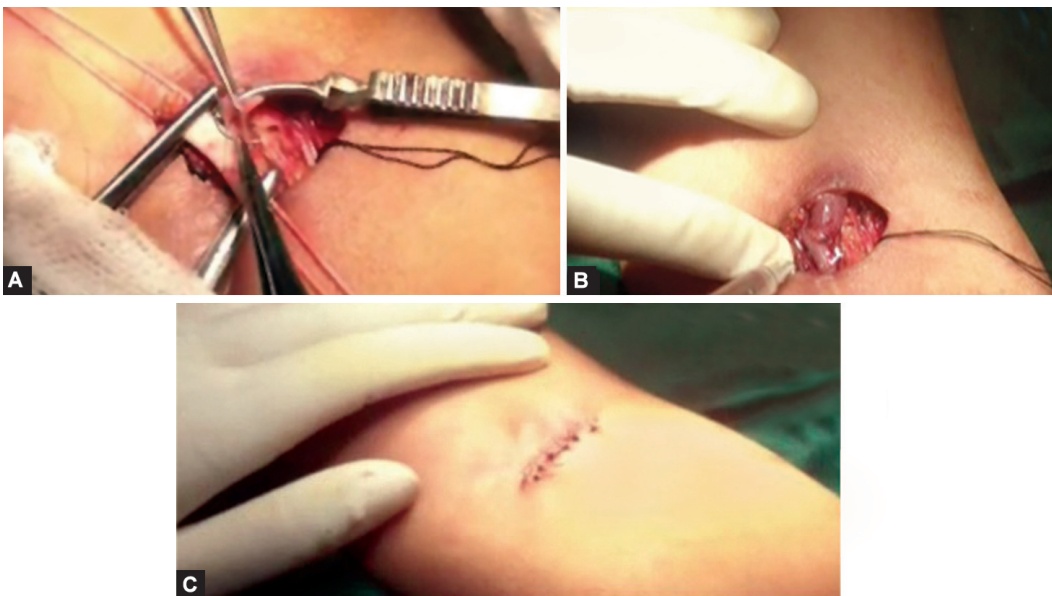


Fig. 6.2A to C: (A and B) Arteriovenous anastomosis; (C) Completed surgery

difficult. Deltopectoral groove is a trouble spot where the outflow tract may get stenosed. One and four-year patency rate of BC AVF is reported to be 74.1% and 61.3%.¹

Reference

1. Elcheroth J, de Pauw L, Kinnaert P. Elbow arteriovenous fistulas for chronic hemodialysis. *Br J Surg* 1994;81:982–84.

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Lower Limb AVF

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They are undertaken when the upper limb options have been exhausted. These AVFs are more complex and technically more challenging. For creating thigh fistula transposition is always required.

In thigh either the saphenous or superficial femoral vein is used. Saphenous vein is anastomosed in a straight or loop configuration to common femoral or superficial femoral arteries. The saphenous vein is quite muscular and there is a high incidence of secondary intervention about 3 angioplasties per fistula. In one series mean primary patency of this AVF was 7 months.¹ In general, straight configuration has a better outcome than loop configuration.

Saphenous vein can be used as an autologous interposition graft for the upper limb AVF.

Superficial femoral vein can also be transposed in a straight or loop configuration. In a series by Gradman the secondary patency rate at 12 months was 86%.² There is a high risk of ischemic complications. Many patients require revision surgery for steal syndrome.

This can be avoided by tapering the end of the femoral vein to 4.5–5 mm. There are no studies comparing the two thigh fistulas.

AVF can be created at the level of ankle using tibial arteries and saphenous vein, the results are not encouraging and literature scant.³

After all the autologous options are exhausted grafts should be used, discussion on grafts is beyond the scope of this text.

Anticoagulation after AVF Creation

There is limited evidence to suggest routine use of heparin, but a single dose of low molecular weight or conventional heparin 5000 IU can be given. Use on antiplatelet prevents early thrombosis in perioperative period, they can be started on clopidogrel 100 mg daily from postoperative day one. Alternately ecosprin 75–150 mg can be started before surgery and continued. Anti-platelet drugs have shown to decrease AVF thrombosis in the first 6 weeks.⁴

References

1. Pierre-Paul D, Williams S, Lee T, Gahtan V. Saphenous vein loop to femoral artery arteriovenous fistula: A practical alternative. *Ann Vasc Surg* 2004;18:223–27.
2. Gradman WS, Laub J, Cohen W. Femoral vein transposition for arteriovenous hemodialysis access: Improved patient selection and intraoperative measures reduce postoperative ischemia. *J Vasc Surg* 2005;41:279–84.
3. Srivastava A, Sharma S. Hemodialysis vascular access options after failed Brescia-Cimino arteriovenous fistula. *Indian journal of urology (IJU): journal of the Urological Society of India* 2011 Apr;27(2):163.
4. Stolic R. Most important chronic complications of arteriovenous fistulas for hemodialysis. *Medical principles and practice* 2013;22(3):220–28.