Access (Antegrade, Retrograde, Pedal)

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DISCLOSURES

Consultant/Medical/Scientific Boards
- Abbott
- Boston Scientific
- Cardiva
- Cook Medical
- CR Bard
- Lake Regional Medical
- Medtronic
- Spectranetics

PVD Training
- Abbott
- Bard
- Boston Scientific
- Spectranetics
- TriReme Medical

Stockholders
- CardioProlific
- Cardiva
- Spectranetics
- Vasamed

Speaker’s Bureau
- Abbott
- Bard
- Boehringer-Ingelheim
- Bristol-Myers-Squibb/Sanofi
- Cardiva
- Cook Medical
- Cordis
- DSI/Lilly
- Spectranetics
Access is often the most crucial part of a peripheral intervention.

- Must allow the operator to reach the lesion and deliver therapy.
- It may improve ability to cross.
- Often no palpable pulse.
- Bleeding and thrombotic complications are associated with morbidity, mortality, and worse patency outcomes.
- Access complications are the most common causes of malpractice suits.
Common Accesses in PVD

- Retrograde femoral
- Contralateral femoral
- Antegrade femoral
- Brachial
- Radial
- Popliteal
- Axillary
- Transpedal
Factors affecting access

• Obesity
• Prior Vascular Surgery
• Prior Stenting
• Infection
• Anticoagulation Status
• Anatomy
• Need for Early Ambulation
• When there is no palpable pulse one may be aided by:
  – Dystrophic calcification
  – Anatomic Markers
    • Radial Artery - Anatomical Snuff Box
    • Femoral Artery – Lateral to the femoral vein
    • Relationship with bony structures noted by prior angiography
  – Angiography from above
  – A guidewire placed at anatomic puncture site
  – Ultrasound
• Once access is obtained
  – It is important to not be occlusive (small sheaths, vasodilators).
  – Considerations of femoral closure.
    • Should be over the femoral head with femoral access.
    • A single wall entry has the potential for less bleeding complications particularly when there is aggressive anticoagulation.
• Micro-puncture
It’s the largest of access vessels and typically the easiest approach.

- Puncture site should be over the femoral head to allow compression.
  - Punctures above inguinal ligament associated with retroperitoneal bleeding.
  - Low punctures associated with hematomas and AV fistulae.
Contra-lateral Femoral

• Advantages
  – Easy puncture
  – Can perform angiography on both legs
  – Can visualize distal vessels that fill only by profunda
  – Useful in very proximal SFA lesions

• Disadvantages
  – Less wire control (torque)
  – Less support
  – Occasionally difficult to reach particularly if planning pedal arch reconstruction
Contralateral Femoral (Technique)

• Place a guidewire down the contralateral artery. This may be assisted by utilizing a IMA catheter, a right Judkins, or AngioDynamics modified pigtail.

• Place the guidewire as far distal as possible. This will provide greater support. The stiffer the guidewire the greater the support.

• If the guidewire prolapses up the aorta use a softer wire, then once the wire has been placed distally advance a small flexible catheter distally and exchange for a stiff guidewire.

• If the sheath prolapses into the aorta place a low profile balloon into the contralateral iliac and utilize this to advance the sheath by anchoring the balloon.
Antegrade Femoral

- **Advantages**
  - Provides excellent support and wire steering
  - Can reach lesions easily

- **Disadvantages**
  - Limited to visualizing one leg
  - Associated with more bleeding complications
  - Need adequate room for sheath placement
  - Can’t visualize distal vessel filling via collaterals from above the sheath tip
Antegrad Female (Technique)

• Try to enter the common femoral artery over the femoral head
  – Utilize fluoroscopy to identify bone or dystrophic calcification.
  – If available utilize US
  – When not palpable and no dystrophic calcification consider placing a guidewire or performing angiography from another access site utilizing small catheters if no US.
  – If the guidewire selects the profunda use ipsilateral obliquity to steer the wire medially towards the SFA.
  – Always check to make sure the sheath is non occlusive.
Popliteal Approach

• Advantages
  – Can be utilized to cross femoral occlusions not crossable from above.
  – May allow the operator to reach lesions in certain anatomical subsets.

• Disadvantages
  – When utilizing this approach for PVD there is never a palpable pulse – Must use angio or US for entry
  – Can’t work on IP vessels and SFA at same setting.
  – Bleeding and AV fistulae.
  – Sheath may be occlusive in diseased vessels.
  – Typically patient must be prone.
Popliteal Approach (Technique)

- Access obtained from above for angiography.
- Puncture performed of the angiographic dye column viewed fluoroscopically or with US.
- Suggest sticking above the patella to avoid AV fistulae.
Brachial Approach

• Advantages
  – Can be utilized with femoral, iliac, and aortic occlusions.
  – Provides excellent support for axillary and subclavian interventions as well as renal and mesenteric intervention particularly in patients with vessels with downward takeoff.

• Disadvantages
  – It’s a small vessel
  – Bleeding and thrombotic complications are common
  – Reach
Brachial Approach (Technique)

• Anesthetize the antecubital fossa.
• Utilize micro puncture needles to access the brachial artery.
• If no palpable pulse can use US or place a wire via the radial artery to help identify the brachial artery which may be quite mobile.
• Utilize pressure to immobilize the artery.
• Once access is gained utilize the smallest feasible hydrophylllic sheaths to limit vessel trauma.
• Utilize drug cocktail.
Radial Artery Approach

• Advantages
  – Bleeding complications non-existent. (Can utilize in fully anticoagulated patients)
  – Vessel reliably lies in the anatomical snuff box.
  – Vessel is often palpable even with proximal lesions.
  – Excellent support for axillary, brachial and subclavian intervention.

• Disadvantages
  – Limited to small sheaths
  – Reach
  – Risk of radial artery occlusion
Radial Artery Approach (continued)

- Must first perform Allen Test or modified Allen test to insure there is a patent ulnar artery.
- Anesthetize area with 50:50 mix of 1% Lidocaine and Tridil.
- Micropuncture technique
- Place micro sheath and give “cocktail”
- Utilize hydrophyllic sheaths no larger than 6F
- Useful in iliac, mesenteric, renal, carotid, subclavian, brachiocephalic, vertebral intervention.
Axillary Artery Access

• Advantages
  – Large artery
  – Central location allows interventionist to reach almost any site.

• Disadvantages
  – Close proximity to brachial plexus with risk of permanent nerve damage
  – Vessel not fixed (it rolls)
Suggestions for Axillary Access

• Use only when no other site is suitable
• Use the smallest sheath possible to deliver therapy
• Place a small wire via radial artery to mark the axillary and perform micro-puncture utilizing fluoroscopy aiming at the wire
• Monitor the patient very carefully for signs of brachial plexus compression.
The interventional therapy of critical limb ischemia requires crossing lesions. Often total occlusions that can’t be crossed from above can easily be traversed intraluminally from below.

– Collaterals
– Operator can’t discern where true lumen should be
– Distal cap of occlusion may be softer than the proximal cap
The popliteal approach was developed to cross occluded SFA’s from below but it has many disadvantages in CLI.

- Patient must be prone
- There must be a patent popliteal
- Can’t treat concomitant infrapopliteal disease
- Risk of bleeding and AV fistulae
- Crossing and delivery of final therapy must be via popliteal
- Sharp angle of sheath entry negates push force
- Physician exposed to more radiation
• The pedal approach (via anterior tibial, peroneal, or posterior tibial artery) is a viable approach particularly in limb salvage cases. It is particularly useful when the popliteal and IP vessels are occluded and can’t be crossed from above.
• Advantages of pedal approach
  – Patient is supine
  – Can work from above and below to cross lesions and deliver therapy
  – Can use with popliteal and IP occlusions
  – Higher incidence of luminal crossing
  – Less bleeding
• Disadvantages of pedal approach
  – More difficult access
  – Smaller vessels
    • Don’t want to occlude a potential distal graft site - Typically only place microcatheters
    • Limited to smaller sheaths when this is the access site from which final therapy must be delivered
13 Steps Involved in Pedal Access Cases
Step 1

- Access obtained from above
  - Antegrade femoral puncture (Typically 6F or 7F)
  - Contralateral femoral access with crossover sheath (Typically 6F or 7F)
  - Occasionally axillary or brachial access
Step 2

• Vasodilators given via sheath above (200 – 400 µg of NTG)
Step 3

• Angiogram from above to image vessel
Step 4

- Local anesthesia using Lidocaine and Tridil mixed 50:50
Step 5

- Micropuncture
  .018 wire access under direct visualization (angio or US)
Step 6

- If pedal access is to cross only (vast majority of cases) then a 2.9F micro-sheath with hemostatic valve (to lessen risk of vessel occlusion)

- If pedal access is to cross and deliver therapy a sheath is introduced
  - 2.9 French if only PTA
  - 4F
  - Have used up to 7F
Step 7

- Drug cocktail administered into pedal vessel
  - Anticoagulant (full dose)
  - Ca++ channel blockers
  - Vasodilators
Step 8

- Cross lesion with the wire (can actually work from above and below simultaneously if necessary). Advance the microcatheter over the wire across the occlusion into a normal vessel segment.
Step 9

- Steer the wire into sheath above and externalize the wire (This often requires reshaping the wire after the occlusion has been crossed with the microcatheter).
Step 10

- Remove microcathether from below and cross the lesion with this from above (over the guide wire which can be tethered above and below)
Step 11

- Remove the wire from below and apply light pressure to the entry site (typically rapid hemostasis is achieved with full anticoagulation and antiplatelet therapy)
Step 12

- Place wire with the soft end distally via the microcatheter
Step 13

- Deliver final therapy
Transpedal Approach

• Safe with only one vascular occlusion in 227 patients presenting with critical ischemia

• Allows successful intervention in many patients who otherwise have no options

• Can be performed by any interventionist without special equipment
Summary

• Access in peripheral interventions is a key determinant in the success of an intervention and in potential complications
Closing Remarks