Retrograde Approach For Lower Limb Intervention

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Disclosure

Speaker name:
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I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☒ I do not have any potential conflict of interest
Introduction

• Angiographically CLI patients typically has CTO, calcified vessels, with tibial artery/multilevel disease

• Difficult CTO: Long lesions, flush SFA occlusion, severity of proximal and distal caps, calcification, length > 50mm, involvement of P3 and proximal tibial occlusions

• Limb salvage and mortality is directly related to outflow
Figure 5. Step-by-step approach to accomplishing retrograde tibial endovascular work.
Retrograde Approach

• First described in 2009 for popliteal arteries
• Subsequently distal SFA, mid-body and below knee vessels
• Transpedal
• Transmetatarsal

Noory E, J Endo Ther 2009.
Schmidt A, J Endo Ther 2012.
Walker C, VEITH 2010
Palena LM, J Endovasc Ther 2012
Retrograde Access Points

Figure 3. Available modified Schmidt access points when ultrasound is utilized.
Noninvasive Assessment

- ABI may be abnormal due to incompressible calcified tibial arteries
- Doppler may be limited
- CTA depends on individual centre based on protocols
- Best test would be angiography to determine lesion location, CTO length, calcification and vessel reconstitution
Ultrasound Guided
Ultrasound Guided

Figure 7. Ultrasound-guided access of the distal left PT artery (A). Retrograde wires from the PT and DP access (B).
Angiography Guided

• Easier for most interventionist
• More radiation exposure to the operator’s hands
• Diluted contrast usage by injecting from the top (antegrade/retrograde crossover sheath)
• Guided by lateral and anterior projection to show the arteries, especially the tibials
Figure 2. Access levels. Low/distal posterior tibial access (A). Low/distal dorsalis pedis access (B). High/proximal anterior tibial access (C). High/proximal peroneal access (D).
Micropuncture set
(Cook Medical)

4F pedal access kit
Figure 8. View of the four access points in the right CFA, left occluded SFA, left PT artery, and left DP.
Figure 5. View of the sheath in the occluded SFA and the traditional access sheath in the right CFA.

Figure 6. The sheath advanced in the thigh area (A). A retrograde supporting catheter from the modified Schmidt access crossing into the CFA (B). Prolonged balloon angioplasty after snaring the wire from the CFA after crossing (C).
Trans Anterior Tibial Access

Transpedal (Ant Tibial)
Transmetatarsal

- After failed antegrade, transcollateral, pedal plantar attempt
- Antegrade femoral sheath 5F
- 0.5mg nitrate IA to prevent spasm
- Verapamil 4.5mg IA, 0.5mg SC with lignocaine
- Dorsum of foot through 1\textsuperscript{st} dorsal metatarsal artery using 21G needle under fluoroscopy and 0.018 wire
- Rendezvous technique of wiring
- Hemostasis at metatarsal artery level

Palena LM, Manzi M, EVT 2014
Retrograde Transmetatarsal Access

Figure 2. Endovascular treatment. Intraluminal recanalization failure in the pedal and plantar arteries (A). First metatarsal artery punctures and retrograde recanalization of the first metatarsal artery and of the pedal artery (B, C). Antegrade angioplasty and hemostasis at the access site (D).

Figure 3. Patency of the anterior and posterior tibial arteries (A, B). Patency of the pedal artery, with direct blood flow to the arch and the forefoot (C, D).
Advantages of Tibiopedal Access

- Small diameter artery - increases catheter or wire possibility inside the lumen
- Less likelihood of entering side branch or collateral
- Distal portion of vessel occlusion is easier to cross
- Shorter arterial segment to cross compared to from the groin
- Safety potential in unsuitable or hostile groin, obesity
Disadvantages

- Small diameter vessels are prone to spasm and dissection
- Vessels are often calcified
- Approach near the ankle has sharp angulation hence difficult sheath passage
- Deeper vessels (eg peroneal) has higher risk of developing compartmental syndrome
Summary

- CLI is commonly complicated with long CTO, calcified segments with multiple lesions involving SFA, popliteal and BTK
- The option for retrograde access puncture should be available once antegrade approach fails
- Almost all vessels are amenable for retrograde access with a balloon hemostasis antegrady