Secrets of Tibial Artery Revascularization

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No Disclosures
Angiosome
The Pedal Arch

Figure 1-20

- Anterior tibial a.
- Communicating branch to anterior tibial a.
- Lateral tarsal a.
- Dorsal pedal a.
- Arcuate a.
- Peroneal a.
- Posterior tibial a.
- Communicating branch to posterior tibial a.
- Lateral plantar a.
- Deep plantar (perforating) a.
- Medial plantar a.
Pedal Arch Anatomy

Figure 1-21

A. The contribution of the dorsalis pedis artery to the pedal arch.

B. The plantar circulation and link to the dorsal component.

C. Lateral schematic view of the plantar arch.
Peroneal Artery Collaterals
The Angiosome Concept is Wrong

- ...in the setting of tibial artery revascularization for critical limb ischemia...

- Works in the context of flaps for skin healing
  - 3D vs 2D

- Debates on angiosome directed revascularization
The Angiosome Concept is Wrong

Effect of Single Tibial Artery Revascularization on Microcirculation in the Setting of Critical Limb Ischemia

- 57 interventions of AT or PT only
- Skin Perfusion Pressure measured on the dorsal side or plantar side
- Pressures were not necessarily higher on the respective side
  - 58% of ATA showed higher pressure on dorsal side
  - 40% of PTA showed higher pressure on plantar side
- Improvements in microcirculation irrespective of tibial artery revascularized
- Approximately 50% of feet presented a change not in line with 2D Angiosome Theory
- Didn’t look at peroneal artery revascularizations
The Angiosome Concept is Wrong

- Impact of angiosome- and nonangiosome-targeted peroneal bypass on limb salvage and healing in patients with chronic limb-threatening ischemia
- 120 critical limb ischemia patients underwent peroneal bypasses
  - Location of wound in a peroneal vs non-peroneal angiosome did not affect wound healing (72% vs 70%) or 3-year amputation rates (55% vs 56.5%)
The Angiosome Concept is Wrong

- Impact of angiosome- and nonangiosome-targeted peroneal bypass on limb salvage and healing in patients with chronic limb-threatening ischemia

- Diabetes
  - Amputation-free survival at 3 years 43.7% vs 73.1%

- WIFI Grades
  - Amputation-free survival grade 1 or grade 2 WIFI 87.4%
  - Amputation-free survival grade 3 or grade 4 WIFI 48.4%

- Patency of BOTH Peroneal Branches
  - Amputation-free survival 75% vs 45%

- Patency of Pedal Arch
  - Amputation-free survival 73% vs 46%

- Wound: extent and depth
- Ischemia: perfusion/flow
- Foot Infection: presence and extent
- Based upon existing validated systems or best available data with 4 point scales where:
  - 0 = none
  - 1 = mild-moderate
  - 2 = moderate-severe
  - 3 = severe
**WiFi Use It**

### a. Estimate risk of amputation at 1 year for each combination

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### b. Estimate likelihood of benefit of/requirement for revascularization (assuming infection can be controlled first)

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fl, foot infection; I, Ischemia; W, Wound.

**Premises:**

1. Increase in wound class increases risk of amputation (based on PEDIS, UT, and other wound classification systems)
2. PAD and infection are synergistic (Eurodiale); infected wound + PAD increases likelihood revascularization will be needed to heal wound
3. Infection 3 category (systemic/metabolic instability): moderate to high-risk of amputation regardless of other factors (validated IDSA guidelines)

**Four classes:** for each box, group combination into one of these four classes

- **Very low** = VL = clinical stage 1
- **Low** = L = clinical stage 2
- **Moderate** = M = clinical stage 3
- **High** = H = clinical stage 4

**Clinical stage 5** would signify an unsalvageable foot.
The Angiosome Concept is Wrong

Revascularize the Best Artery!

- SensiLase PAD 3000 device
  - Vasamed Inc, Eden Prairie, MN
Surgeon Volume means more than Institutional Volume

- Outcomes for Critical Limb Ischemia are Driven by Lower Extremity Revascularization Volume, not Distance to Hospital

Versus

- Surgeon, not Institution, Case Volume is Associated with Limb Outcomes after Lower Extremity Bypass for Critical Limb Ischemia in the Vascular Quality Initiative
Surgeon Volume means more than Institutional Volume

High Volume Surgeons at Low-Volume Centers VERSUS High Volume Surgeons at High Volume Centers

- MACE 5.4% vs 3.7%
- Primary Patency 74.2% vs 76.4%
- Freedom from MALE 63.3% vs 67.4%
- Amputation-Free Survival 85.3% vs 76.4%
Resect Fibula for Peroneal Artery Exposure

8 cm of fibula
Can Compromise on Love, but not on Exposure
Detach Soleus from Tibia for Better Posterior Tibial and Peroneal Artery Exposure
Tailor Anastomosis Length to Outflow of Artery

Fig. 2.40. a, b. Aortofemoral bypass; graft size with maximum run-off. a 8-mm iliac graft limb (maximum appropriate size for average adult male); b mural thrombus in 10-mm graft.
Contour Anastomosis

...No Sharp Points...
Dilate Distal Clamp Site

Fig. 2.35, a, b. Correction of clamp defect. a arterial dilator; b finger compression during completion of suture line.
Place Distal Anastomosis Directly onto Patent Recipient Branch

- Bypasses to plantar arteries and other tibial branches: An extended approach to limb salvage
Infrapopliteal Bypasses to Heavily Calcified Rock-Like Arteries


- Artery is partially fractured at 3-4mm intervals with a hemostat.
  - Allows vessel to be occluded, incised, and sutured to.

- Tack down intimal injury with interrupted U stitches
To patch or no to patch

ePTFE bypass
The Neville patch
Thank You

Enjoy the Four Seasons