Pedal Bypass With Deep Venous Arterialization: A Hope For Limb Salvage

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Pedal arterial bypass
• The most extensive arterial reconstruction for critical limb ischemia requiring optimal status of distal pedal arteries

Disclosures
• I have nothing to disclose

Pedal arterial bypass
Infra inguinal lesions

Venous arterialisation (concept)
• Use of the disease-free venous bed as an alternative conduit for perfusion of the peripheral tissue with arterial blood.
Distal venous arterialization

Superficial system

- Dorsal venous arch
- Plantar venous arch
- Greater saphenous v.
- Lateral plantar v.
- Posterior tibial v.

Deep system

- Dorsal surface
- Plantar surface

Principle of surgical technique

- Common femoral artery
- Common femoral vein
- Long saphenous vein
- PTFE graft
- Proximal artery ➔ composite graft ➔ distal pedal vein

Intraoperative angiography

- Distal anastomosis at Rt. dorsalis pedis artery bypass (plantar arterial arch)
- Distal anastomosis at Lt. posterior tibial vein bypass (plantar venous arch)

• a : posterior tibial vein at paramalleolar area
• b : natural vein segment of composite graft at distal anastomosis
• c : plantar vein
• d : plantar venous arch
• e : metatarsal vein
• f : perforating veins
• g : greater saphenous vein

Morris’ Human Anatomy, 1953.
**Preoperative CTA**

**Postoperative CTA**

**Foot circulation**

**Distal anastomosis**
Rt. Iliac a. to posterior tibial v. bypass  
Lt. Iliac a. to posterior tibial a. bypass

Long term outcome: good quality of life

Long term outcomes of PBDVA (n=40)
Endovascular Deep Venous Arterialization

Complementary from Steven WC, Kum, Endovascular, 2015.

Conclusions

- PBDVA has been proved to enhance limb salvage in critical limb ischemia with unreconstructable distal artery.
- PBDVA could tremendously increase not only blood supply to the ischemic foot but also collateral circulation of the whole ischemic leg.
- This hemodynamic change could maintain healthy foot circulation and provide limb salvage in the long term outcome.

Messages

- Before major amputation is decided, please attempt pedal bypass with deep venous arterialization by exploration of pedal vein.
- When pedal vein is in a good condition, the success rate is more than 80%.
- There is nothing to loss but many things to gain for your patients.

The true success of new surgical technique has to be carried out successfully not only in your hospital but also in multiple centers.

Robert B. Rutherford, 2011.
Transcutaneous oxygen pressure

Preoperative: O₂ pressure = 16 mmHg
Postoperative: O₂ pressure = 63 mmHg

Ankle pressure = 60 mmHg
ABI = 0.4
Oxygen pressure = 16 mmHg
Postoperation 1 year
Postoperation 5 years
Immediate postoperation
Postoperation 5 years

Transcutaneous oxygen pressure measurement

Foot level

<20 mmHg
Poor healing
20-40 mmHg
Equivocal
>40 mmHg
Good healing