Technique For Assessing Lower Extremity (Foot) Perfusion

Mehdi Shishehbor, DO, MPH, PhD
Cleveland Clinic
Cleveland, Ohio

Ankle Brachial Index

- 1.00 - 1.4: Normal
- 0.91 - 0.99: Borderline
- 0.70 - 0.90: Mild disease
- 0.40 - 0.69: Moderate disease
- 0.00 - 0.39: Severe disease

ABI >1.3 is abnormal and consistent with calcified vessels - unreliable


ABI Does NOT Predict Severity of Rutherford Class

ABI Does NOT Predict Vessel Patency

TBI Has a Better Correlation With Infragenicular Vessel Patency

How to Apply the Angiosome Concept in the Outpatient Clinic

52-Year-Old Male, Severe DM (HgbA1c:13), HTN, HL

Transcutaneous Oximetry/TcPO₂

- Measures oxygen tension 1-2 mm deep in the skin from the local capillary (nutritive) perfusion
- Useful for wound healing prediction in extremities
- Can be used to assess response to HBOT (hyperbaric oxygen therapy)
Transcutaneous Oximetry/TcPO$_2$

- TcPO$_2$ >70 mmHg = Normal Value
- TcPO$_2$ <40 mmHg = Impaired Wound Healing
- TcPO$_2$ <30 mmHg = Critical Limb Ischemia

- Low values of TcPO$_2$ (<40 mmHg)
  - Peripheral arterial disease
  - Edema
  - High altitude
  - Inflammation
  - Pulmonary disease
  - Callous, skin diseases (scleroderma)


- Peripheral arterial disease
- High altitude
- Pulmonary disease
- Heart failure

Skin Perfusion Pressure (SPP)

- Measurement (mmHg) of the capillary opening pressure after occlusion
- Uses blood pressure cuffs to occlude blood flow, followed by controlled pressure release allowing gradual return of blood flow
- During cuff deflation, laser Doppler is used to determine return of blood flow (reactive hyperemia)
- The pressure at which movement is detected is the skin perfusion pressure

Laser Doppler and SPP

SPP Interpretation Guideline (mmHg)
- 50 or >= Normal skin perfusion
- 40 – 50 = Mild ischemia
- 40 + = Wound healing probable/mild to moderate ischemia
- 30 – 40 = Gray zone for healing/moderate ischemia
- 30 or < = Wound healing unlikely/critical limb ischemia

New Technologies

Intraoperative Fluorescence Angiography
- Provides real-time capillary perfusion assessment
- Determines surface tissue viability
- Imaging head
  - Charged coupler device camera (CCD)
  - Laser light source
- IV administration of indocyanine green (ICG)
  - Binds to plasma proteins
  - Hepatic clearance: safe for patients with renal dysfunction

Fluorescence Angiography

Preintervention
Post-intervention (anterior tibial artery angioplasty)

THANK YOU!!