Near Infrared Spectroscopy (NIRS) Is A Novel Non-Invasive Way To Measure Foot Perfusion When Other Methods Fail: How Does It Work And How Does It Help

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DISCLOSURE
Conflict of interest: none

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NIRS Technical notions 1/2

Light in NIR range can
penetrate tissues
Is Scattered And Absorbed
And REFLECTED
and MEASURED by a detector

Technical notions 2/2

The absorption spectra of deoxy-Hb and oxy-Hb are different

It allows the measurement of relative changes in hemoglobin concentration

A Toe Flexion NIRs assisted Test for Rapid Assessment of Foot Perfusion in Peripheral Arterial Disease: Feasibility, Validity, and Diagnostic Accuracy

The toe-flexion test
10 consecutive toe-flexion movements at a speed determined by a metronome set at 40 beats/minute – one complete movement (flexion and extension) lasts 3 seconds

NIRS optodes positioning

THE TOE-FLEXION TEST, WHEN THE ABI IS NOT RELIABLE OR MEASURABLE

Elaboration and quantification of ischemic area
THE TOE-FLEXION TEST: APPLICATIONS

PAD – Reliable ABI

M, 73
ABI: 1.04 – 0.69

M, 66
ABI: >1.5 bilateral

M, 39
ABI: 0.78 – 0.79

The toe-flexion test: after surgical revascularization

M, 61
ABI: 0.65

January
(before surgery)

June
(after surgery)

AUC -97

FEMORAL PROFUNDOPLASTY

AUC -32

LESSON LEARNED FROM FEM-POP PATENT BYPASS

Foot NIRS assisted test permits to discriminate perfusion between angiosomes

CONCLUSIONS on NIRS

• Measurement under natural conditions; Suitable for repeated measurements, longitudinal monitoring

• Easily transportable, no need of a special infrastructure, suitable for bedside measurements; Easy to learn, not necessary specially trained personnel

• Useful for incompressible arteries, challenging cases like vasculitis, and, in future, for discriminating the foot perfusion in the different angiosomes