Method

- Refer to the Practical Suggestions Section of this Application Note for environmental and patient recommendations.
- Ensure skin probes are calibrated (See moorVMS-LDF user manual).
- Measurements should be made with the patient in the supine position – depending upon the size and position of the foot, the toe would be at (or just above) heart level (de Graff et al, 2000).
- Place a pressure cuff around the proximal phalanx of the toe.

Application

Toe Blood Pressure (TBP) is the measurement of distal limb systolic blood pressure at the toe. TBP is particularly useful in patients with noncompressible tibial arteries, for example those suffering long-standing diabetes, renal failure or other disorders where vascular calcification is present (Clement, TASC II, 2008). TBP can be used in patients with peripheral artery disease (PAD) to assess the severity of ischaemia (Høyer et al, 2013, Høyer et al, 2014, Ubbink, 2004) and ultimately lead to early treatment and/or prevention of the formation of ischaemic ulcers in the lower limb.

TBP measurements have been shown to be possible and reproducible using laser Doppler and automated pressure systems (Høyer et al, 2014, Wahlberg and Gush, 2002). In recent publications TBP was shown to have less inter and intraobserver variability than that reported for ABP (Påhlsson et al, 2008). In addition, a recent study showed good correlation between the moorVMS system and strain gauge plethysmography in a wide range of toe pressures in addition to substantial agreement for diagnostic classification of peripheral arterial disease (PAD) including critical limb ischaemia (CLI) (Høyer et al, 2013).

Routine measurements of TBP can be performed simply and rapidly using the moorVMS-VASC system with a predefined, standardized test protocol. The user-friendly software enables user defined protocols to be set as required for research, however the user is not limited to pre-defined protocols.

Equipment Required

The following equipment is needed for this application:

- VP1T combined optic and temperature skin probe(s)
- PAD double-sided adhesive discs
- Toe Blood Pressure (TBP) assessments using moorVMS-VASC
- moorVMS-VASC ‘cart optional’
- moorVMS-VASC PC software
- Toe Cuff (inflatable pressure cuff)
Method

- Refer to the Practical Suggestions Section of this Application Note for environmental and patient recommendations.
- Ensure skin probes are calibrated (See moorVMS-LDF user manual).
- Measurements should be made with the patient in the supine position — depending upon the size and position of the foot, the toe would be at (or just above) heart level (de Graff et al, 2000).
- Place a pressure cuff around the proximal phalanx of the toe.

Application

Toe Blood Pressure (TBP) is the measurement of distal limb systolic blood pressure at the toe. TBP is particularly useful in patients with noncompressible tibial arteries, for example those suffering long-standing diabetes, renal failure or other disorders where vascular calcification is present (Clement, TASC II, 2008). TBP can be used in patients with peripheral artery disease (PAD) to assess the severity of ischaemia (Høyer et al, 2013, Høyer et al, 2014, Ubbink, 2004) and ultimately lead to early treatment and/or prevention of the formation of ischaemic ulcers in the lower limb.

TBP measurements have been shown to be possible and reproducible using laser Doppler and automated pressure systems (Høyer et al, 2014, Wahlberg and Gush, 2002). In recent publications TBP was shown to have less inter and intraserver variability than that reported for ABP (Påhlsson et al, 2008). In addition, a recent study showed good correlation between the moorVMS system and strain gauge plethesmography in a wide range of toe pressures in addition to substantial agreement for diagnostic classification of peripheral arterial disease (PAD) including critical limb ischaemia (CLI) (Høyer et al, 2013).

Routine measurements of TBP can be performed simply and rapidly using the moorVMS-VASC system with a predefined, standardized test protocol. The user-friendly software enables user defined protocols to be set as required for research, however the user is not limited to pre-defined protocols.

Equipment Required

The following equipment is needed for this application:

- moorVMS-VASC ‘cart optional’
- moorVMS-VASC PC software
- Toe Cuff (inflatable pressure cuff)
- VP1T combined optic and temperature skin probe(s)
- PAD double-sided adhesive discs
- moorVMS-VASC protocol Setup for Toe Blood Pressure.
Analysis

The TBP report contains the TBP chart(s) in addition to the following information:

a. Sequence Statistics Table:
   - Measurement site
   - Deflation (mm Hg/s)
   - BP or TBP (mm Hg)
   - Flux channel
   - Flux (PU)
   - Pressure channel
   - Flux BZ (baseline)
   - Average
   - Time (h:mm:ss)
   - Pressure calculation

b. Site mean Pressure Statistics table (following multiple assessments of limb blood pressure (LBP) or TBP:
   - Site
   - Mean LBP or TBP (mm Hg)

c. The pressure detection point can be selected by the User in the Report Design section from the following options:
   - 1.2 x Biological zero (i.e. LD 1.2 x flux measured during occlusion)
   - 2.0 x Biological zero
   - 1.5 x Biological zero (default setting)
   - 2.5 x Biological zero
   - 5.0 x Biological zero

Practical Suggestions

Microvascular blood flow can be affected by many things. The following practical suggestions are provided as a guide and are not exhaustive:

- Perform measurements in a quiet room whilst maintaining a comfortable temperature (typically 22°C – 24°C). Ensure the patient is acclimatised to the room temperature for 30 minutes prior to the measurements.
- Patients should avoid caffeine, alcohol, vigorous exercise, and smoking for 24 hours prior to the measurements.
- During all measurements ask the patient to breathe normally. Coughing, talking and yawning can all affect microvascular blood flow readings.
- The patient should be in a comfortable, relaxed position and avoid movement during all measurements.
- Cover the feet/legs with a blanket to avoid cooling during acclimatisation and during measurements.

Related Fields

Contact us for Application Notes for: Post Occlusion Reactive Hyperaemia (PORH), Skin Perfusion Pressure (SPP), Pulse Volume (PV) and Ankle-Brachial Pressure Index (ABPI) measurements with the moorVMS-VASC.

Publications

Clement D. 2008 Diagnosis and evaluation of peripheral artery disease – non invasive vascular laboratory and imaging techniques. Based on the Inter-Society Consensus. www.tasc-2-pad.org


Analysis

The TBP report contains the TP chart(s) in addition to the following information:

a. Sequence Statistics Table:

- Measurement site
- Deflation (mm Hg/s)
- BP or TBP (mm Hg)
- Flux channel
- Flux (PU)
- Pressure channel
- Flux BZ (baseline)
- Average
- Time (hh:mm:ss)
- Pressure calculation

b. Site mean Pressure Statistics table (following multiple assessments of limb blood pressure (LBP) or TBP

- Site
- Mean LBP or TBP (mm Hg)

c. The pressure detection point can be selected by the User in the Report Design section from the following options:

- 1.2 x Biological zero (i.e. LD 1.2 x flux measured during occlusion)
- 2.0 x Biological zero
- 1.5 x Biological zero (default setting)
- 2.5 x Biological zero
- 5.0 x Biological zero

Practical Suggestions

Microvascular blood flow can be affected by many things. The following practical suggestions are provided as a guide and are not exhaustive:

- Perform measurements in a quiet room whilst maintaining a comfortable temperature (typically 22°C – 24°C). Ensure the patient is acclimatised to the room temperature for 30 minutes prior to the measurements.
- Patients should avoid caffeine, alcohol, vigorous exercise, and smoking for 24 hours prior to the measurements.
- During all measurements ask the patient to breathe normally. Coughing, talking and yawning can all affect microvascular blood flow readings.
- The patient should be in a comfortable, relaxed position and avoid movement during all measurements.
- Cover the feet/legs with a blanket to avoid cooling during acclimatisation and during measurements.

Related Fields

Contact us for Application Notes for: Post Occlusion Reactive Hyperaemia (PORH), Skin Perfusion Pressure (SPP), Pulse Volume (PV) and Ankle-Brachial Pressure Index (ABPI) measurements with the moorVMS-VASC.

Publications

Clement D. 2008 Diagnosis and evaluation of peripheral artery disease – non invasive vascular laboratory and imaging techniques. Based on the Inter-Society Consensus. www.tasc-2-pad.org


Further Reading

www.moor.co.uk – information about moorVMS-VASC and available probes and pressure cuffs.

moorVMS-LDF user manual for instrument operation and cleaning and handling of optical probes.

Please feel free to consult sales@moor.co.uk for further advice or support with issues not covered in this application note and for details of other application notes using the moorVMS-VASC system.

Important Disclaimer: This information is provided to further clinical research into diagnostic capabilities of laser Doppler. The moorVMS-VASC is CE marked for human use but not specifically for clinical diagnosis of TBP assessments. Calibrated equipment with a current service record should only be used.

Notes


Further Reading

www.moor.co.uk – information about moorVMS-VASC and available probes and pressure cuffs.

moorVMS-VASC user manuals for instrument operation and cleaning and handling of optical probes.

Please feel free to consult sales@moor.co.uk for further advice or support with issues not covered in this application note and for details of other application notes using the moorVMS-VASC system.

Important Disclaimer: This information is provided to further clinical research into diagnostic capabilities of laser Doppler. The moorVMS-VASC is CE marked for human use but not specifically for clinical diagnosis of TBP assessments. Calibrated equipment with a current service record should only be used.

Notes