Pulse Volume Assessments using moorVMS-VASC
Application note #107

Application

The measurement of pulse volume is a useful initial test for patients with suspected lower limb peripheral artery disease (PAD). It can also be used as a predictor for critical limb ischemia and amputation. When arterial disease is present the contour of the waveform is seen to change: the slope is seen to flatten whilst pulse width widens. The dicrotic notch is also lost (TASC II). Pulse volume recordings are often used for localising the level of arterial disease and have been shown to be clinically useful in diabetic patients with peripheral vascular disease (Lewis and Owens, 2010).

Unlike ankle brachial pressure measurements and segmental limb systolic pressure measurements, pulse volume recordings are not affected by calcified arteries. Thus pulse volume measurements are particularly useful in diabetic patients with calcified arterial vessels.

The moorVMS-VASC enables controlled, sensitive and reproducible pulse volume measurements in just a few minutes. The system has been designed to incorporate a flexible yet user-friendly interface designed for both users new to field in addition to those with more experience. Standardized test procedures can be saved to aid reproducibility within your institution.

Equipment Required

The following equipment is required for Pulse Volume assessments:
- moorVMS-VASC
- Easy Care Cuff (Inflatable pressure cuff)*
- moorVMS-VASC PC software

*The cuff used will depend upon patient and limb size e.g. arm, thigh, lower leg etc.

Method

- Measurements should be made with the patient in the supine position with the limb to be measured at heart level.
- The patient should remain in the resting supine position for 10 minutes prior to recording pulse volume.
- Place an appropriate sized pressure cuff around the limb (sites commonly include the high thigh, above the knee, below the knee, the ankle and the toe).

Analysis

- A pulse volume chart can be viewed (as shown below)
- Using the Report function the following statistics are available:
  - Duration – length of sequence’s hold period in hh:mm:ss
  - Max amplitude: maximum individual wave’s amplitude mm Hg
  - Min amplitude: minimum individual waves’ amplitude mm Hg
  - RMS: Root mean square of pulse volume
  - IQR: Interquartile range (i.e. range of mid 50%) of pulse volume in mm Hg
  - Pulse rate: mean cardiac pulse rate in CPM (Cycle’s per Minute)
  - Hold pressure: holding pressure in mm Hg during pulse volume recording

Select your pre-defined test using the moorVMS-VASC PC software (adjust for preferred protocol, see moorVMS-VASC User Guide for details).
- The cuff will:
  - Inflate automatically to the pre-set pressure level (typically 60 mm Hg).
  - Hold at pre-set pressure for the pre-set duration (typically 30 seconds).
  - Deflate at the pre-set rate (typically maximum).

Each of the above settings can be determined by the user and the test procedure saved to enable a standard protocol to be used repeatedly.
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- Each of the above settings can be determined by the user and the test procedure saved to enable a standard protocol to be used repeatedly.
You can also measure the peak to peak amplitude of a defined region by moving the start and end points of the blue ROI.

**Practical Suggestions**

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

- Commonly the cuff is inflated to 60-65 mm Hg, sufficient to detect volume changes without arterial occlusion occurring (Clement, TASC-II).
- Perform measurements in a quiet room whilst maintaining a comfortable temperature (typically 22°C). Ensure the patient is acclimatised to the room temperature for 30 minutes prior to measurements.
- Patients should avoid caffeine, high salt food, alcohol, vigorous exercise, and smoking for 24 hours prior to the study.
- During 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.

**Related Fields**

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

**Publications**


**Further Reading**

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

moorVMS-LDF / moorVMS-PRES 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 PV assessments. Calibrated equipment with a current service record should only be used.

**Notes**

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