

Lanarkshire Oximetry Index



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Purpose

The Lanarkshire oximetry index (LOI) is a noninvasive procedure using a pulse oximeter for assessment of peripheral arterial perfusion to determine if it is safe to apply venous compression bandaging.

Indications

Assess peripheral arterial perfusion when:

- there is evidence of calcified vessels (ankle brachial pressure index [ABPI] > 1.3)
- you have difficulty locating arteries with Doppler
- the patient has diabetes or lymphedema
- you work in a facility where you only need to perform one to two vascular assessments a month.

Precautions

The pulse oximetry signal may be difficult to detect if the patient has grossly dystrophic toenails, extreme cyanosis, or a condition in which there is peripheral vasoconstriction (such as Raynaud's disease). Additionally, LOI will not detect localized arterial disease in which there is adequate collateral circulation. If it is necessary to assess blood flow to individual arteries, Doppler ABPI should be used.

Frequency

Perform LOI per facility or agency policy. Arterial perfusion may deteriorate over relatively short periods; reassess every 3 months or more frequently if the clinical situation indicates a change.

Equipment

Equipment needed for LOI includes:

- sphygmomanometer with appropriately sized cuff. Cuff sizes suggested below are guidelines for arm circumference but may also be applied to leg circumference.
 - limb circumference 22-26 cm: small adult cuff (12 x 22 cm)
 - limb circumference 27-34 cm: adult cuff (16 x 30 cm)
 - limb circumference 35-44 cm: large adult cuff (16 x 36 cm)
 - limb circumference 45-52 cm: adult thigh cuff (16 x 42 cm)
- fingertip pulse oximeter with SpO₂ and pulse rate
- writing instrument and paper.

Steps

1. Explain the procedure to the patient.
2. Ensure the patient is comfortable with both feet elevated in a semirecumbent position.
3. Place an appropriately sized blood pressure cuff around the upper arm.
4. Place the pulse oximeter sensor on the index or middle finger. The pulse oximeter unit will display two numbers: The first represents the patient's heart rate; the second is the percentage of

circulating oxygenated hemoglobin. Pulsatile blood flow is also displayed, either by a waveform or by a column of lights.

5. Record a baseline reading. Inflate the sphygmomanometer cuff to 60 mm Hg, then in 10-mm Hg increments, allowing approximately 10 seconds between increments. Once 100 mm Hg is reached, the incremental changes can be increased to 20 mm Hg.
6. Record the pressure reading that is one below the point where the audible signal is lost on the pulse oximeter; for example, if the signal is lost at 180 mm Hg, record a pressure of 160 mm Hg.
7. Don't inflate the cuff further if 180 mm Hg is reached before the loss of the audible signal; record a maximum pressure of 180 mm Hg.
8. Repeat the measurement on the other arm; when calculating the LOI (see step 13), use the higher of the two readings.
9. Place an appropriately sized cuff around the ankle immediately above the malleolus. It's important to protect fragile skin or ulcers beforehand (for example, with a sterile towel or cling film).
10. Place the oximetry sensor on one of the first three toes.
11. Inflate the cuff in the same way as described above and record the pressure at which the signal is lost (or 180 mm Hg if this is reached before the loss of the signal).
12. Repeat the measurement on the other leg; when calculating the LOI, use the higher of the two readings.
13. The LOI for each leg is calculated by dividing the toe pressure by finger pressure and expressing the figure gained as a decimal. For example, if the toe pressure = 140 mm Hg and finger pressure = 120 mm Hg, the LOI is equal to toe pressure/finger pressure (140/120) = 1.17.
14. The readings are similar to ABPI readings:
 - Normal: LOI = 0.8
 - Moderate arterial disease: LOI = 0.5-0.8
 - Severe arterial disease: LOI = 0.5
15. Reassess after the application of compression:
 - Once the patient is deemed suitable for compression, apply an appropriate graduated stocking to the leg; then place the sensor on one of the first three toes.
 - Check the signal with the leg horizontal; then elevate the leg slightly for 30 seconds and check the signal again. This will ensure that the blood flow is still present and not adversely affected by the compression or the position of the leg.
 - A loss of signal is indicated by flattening of a waveform on the oximeter, loss of SpO₂, or greater than a 10% drop in SpO₂ from baseline. If there is a loss of signal, arrange for further assessment before proceeding with full compression.

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References

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