

Compression therapy in patients with peripheral arterial occlusive disease: A prospective clinical study with the 3M™ Coban™ 2 Layer Lite Compression System for ABPI ≥ 0.5

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Objective

To assess the safety and tolerability of the Coban 2 Lite compression system in patients with an ankle brachial pressure index (ABPI) of 0.5-0.8 and to evaluate blood microcirculation during Coban 2 Lite compression system wear.

Materials and methods

A single-center, open-label study was performed on 15 patients suffering from peripheral arterial occlusive disease with an ABPI of 0.5-0.8 (5 patients with ABPI of ≥ 0.5 and ≤ 0.6 , 4 patients with ABPI of >0.6 and ≤ 0.7 and 6 patients with >0.7 and ≤ 0.8). Coincident chronic venous disease was allowed but not necessary for recruitment. Six of 15 patients suffered from chronic venous insufficiency. All patients received treatment with the Coban 2 Lite compression system, which was in place for 1 up to 4 days. The system was reapplied by study personnel at each clinical visit (days 1, 2, 3, 4, 7, 10 and 14). Study participation stopped after 14 days. Results are summarized from 101 bandage applications.

At each clinical visit safety assessments were performed: measurement of toe pulsation to detect macrocirculation; Laser Doppler flowmetry at the forefoot to assess microcirculation of the dermal capillary system; clinical signs of pressure related skin damage—substantiated by transepidermal water loss (TEWL); pain sensations as potential signs of underperfusion; and sub-bandage pressure was measured at the B1-location. In addition, at baseline and at the end of the study limb volume was measured. A comfort questionnaire was completed at the end of the study.

Results

- An average supine subbandage pressure of approximately 28mmHg was measured immediately after bandage application.
- No pressure related skin damage occurred in patients with reduced arterial perfusion.
- No pain was reported.
- Laser Doppler flowmetry demonstrated positive effects on the capillary system after two weeks of Coban 2 Lite system treatment:
 - increased vasomotion ($p=0.03$),
 - reduced respiratory reflux ($p=0.01$),
 - maintained cardiac activity ($p=0.21$).
- Patient questionnaires showed high wearing comfort although most patients currently were not used to wearing compression bandages.
- Measurements of limbs indicated reduced volume at end of the study compared to baseline.



Discussion

Results of Laser Doppler flowmetry measurements indicate significant improvements of dermal micro-circulation under Coban 2 Lite system.

- Increased vasomotion can be explained by an increase of rhythmic contractions of the peripheral arterial network. It has been shown that this so-called myogenic activity has significant positive effects on overall tissue microperfusion (Sakurai et al, 2006). Myogenic activity is a prerequisite for sufficient skin and wound bed nutrition and oxygenation.
- In general, in patients with chronic venous insufficiency, respiratory movements of the thorax result in an increased venous reflux of the peripheral vascular system. This so-called respiratory reflux is anatomically related to incompetent venous valves (Heising et al, 2009). Reduced respiratory reflux is associated with improved capillary blood flow. The beneficial effect of Coban 2 Lite system on respiratory reflux might have been more significant if all patients in this study would have suffered chronic venous insufficiency.
- The cardiac pulse signal was not reduced by Coban 2 Lite system, which indicates a stable capillary perfusion.

The above findings may have beneficial effects on patients with reduced peripheral arterial perfusion suffering a chronic venous leg ulcer.

Conclusion

The application of Coban 2 Lite compression system was safe for patients with ABPI between 0.5 and 0.8. Coban 2 Lite compression system was well tolerated by these patients. In addition, Coban 2 Lite system demonstrated beneficial effects on the dermal capillary system.

References

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