

Acute Effect of Intermittent Foot-Calf Compression on Skin Microcirculation in Patients with Severe Leg Ischemia

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Introduction: Intermittent pneumatic foot-calf compression (IPC) may theoretically improve peripheral circulation. In previous studies, blood flow in the popliteal artery was found to increase during treatment. Hence, IPC could be a therapeutical option in patients with severe leg ischemia. We investigated its effect on the skin microcirculation of the foot.

Patients and Methods: An IPC device consists of a compressor and a foot and ankle cuff, which can be inflated for 3 s, 3 times per min. (ArtAssist[®], ACI Medical, San Marcos, CA, USA). This technique was applied in 9 patients with severe intermittent claudication (mean ankle/brachial index [ABI]: 46%) and 11 with rest pain and/or ulceration (mean ABI: 32%), while sitting. IPC was applied once during one hour. Before, during, and up to 5 min. after treatment, T_{cp}O₂ on the dorsum of the foot, laser Dopple flux (LDF) in the pulp of the big toe, and its skin temperature were recorded simultaneously. Capillary red blood sell velocity (CRV) in the big toe nail fold was assessed before and after IPC. All results are expressed as medians.

Results: All but one patient tolerated the full treatment time. LDF increased significantly during IPC (from 0.15 to 0.35V: $p < 0.001$) and returned to baseline values (0.20V) after stopping IPC. Skin temperature also rose significantly during IPC (from 25.4 to 27.3°C: $p < 0.005$) and remained higher after IPC (27.8°C). T_{cp}O₂ decreased significantly during IPC (from 50.5 to 38.5 mm Hg: $p < 0.005$) and remained lower afer IPC (31mm Hg). CRV was significantly higher after IPC (from 20 to 128 mm/s: $p < 0.05$). These findings were similar in both claudicants and patients with ischemic rest pain or ulcers.

Conclusion: A single IPC treatment can improve food skin microcirculation. The effect seems more prominent on the thermoregulatory part of the skin perfusion, but does not last for long. The T_{cp}O₂ reduction may be due to the pinching straps around the foot during IPC treatment.