

Effects of Shock Waves on Microcirculation, Perfusion, and Pain Management in Critical Limb Ischemia

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Abstract

Shock waves (SW) are used to control pain in different clinical conditions (eg, painful knee, elbow, and shoulder, etc). The effects of SWs may be due to cellular “stunning” (particularly nervous components). It may also be the consequence of unknown metabolic actions on tissues, which may include changes in cellular permeability, the liberation of proteins and mediators locally acting on pain and nerve endings. The aim of this study was to evaluate the reduction in pain and the improvement in microcirculation induced by SW treatment in a 2-week study in patients with chronic limb ischemia (CLI). Of the 32 patients with CLI, 30 (20 with rest pain only, 10 with necrosis) completed the study. The treatment was well tolerated. Foot radiographs performed before and after treatment indicate no bone damage after treatment. Foot (tibial arteries) blood pressure was unchanged after 2 weeks. The increase in laser Doppler flux was significant ($p < 0.05$) after treatment. The ORACLE score at 2 weeks was decreased ($p < 0.05$). The same trend was observed with the analogue scale line for pain ($p < 0.05$). Partial pressure of oxygen (PO_2) increased ($p < 0.05$) and partial pressure of carbon dioxide (PCO_2) decreased ($p < 0.05$). In all patients an increase in pain-free walking distance was observed (the distance increased on average 2.4 times). Flux improvement was still present after 1 month. The outcome at 3 months in these patients indicates that the improvement (concerning the survival of the limbs) was persistent. In conclusion SWs treatment in CLI produced changes both on the microcirculation and pain. These results are very interesting, confirming previous observations, and opening new treatment options in CLI. The skin flow improvement did not relate to an increase in pressure.