

Shockwave therapy is protective against ischemia induced tissue necrosis irrespective of application time

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Device and producing company:

Dermagold, MTS

Introduction:

Tissue necrosis following hypoxic/ischemic events is critical in many surgical disciplines. Recently, interest in shockwave therapy has grown in many clinical and experimental fields. However, primarily only positive empirical clinical data exist with rare data on underlying mechanisms. The aim of this study was to evaluate if shockwave application is effective either as an elective, post-surgical or follow-up therapy alternative in reducing/avoiding tissue necrosis following ischemic insult.

Methods:

In the ischemic area of a rodent epigastric flap, 300 shockwave impulses (electromagnetic generation; 0.1mJ/mm²) were applied to different time points (24h pre-OP, post-OP, 24h post-OP). The parameters of effectiveness included planimetry (necrosis, shrinkage) and flap perfusion (assessed by 2-D laser Doppler imaging) over a 7-day follow-up period.

Results:

In comparison to the control group (no treatment) all shockwave treated groups showed substantially reduced tissue necrosis regardless of whether the shockwaves were applied prior, post or 24 hours post induction of ischemia. There was no difference within the shockwave groups. Flap perfusion was also enhanced in comparison to the control group, dependent on what time the shockwaves were applied. Perfusion values increased from the time the flaps were treated with shockwaves and were comparable within the shockwave groups on the 7th postoperative day.

Discussion:

Shockwave therapy on ischemia-challenged flaps shows clear protective effect in reducing tissue necrosis. This was independent of the time at which the shockwaves were applied. In addition, flap perfusion was enhanced after shockwave treatment.

Conclusion:

Reduction of tissue necrosis with consecutive increased perfusion due to the upregulation of angiogenesis related receptors (e.g. VEGF-R2) as well as the alteration of the nitric oxide homeostasis might be of pivotal importance.