

How many shockwaves are enough? Dose-response relationship in ischemic challenged tissue.

Author:

Rainer Mittermayr 1+2, J. Hartinger1, M. Hofmann1, F. Krammel1, M. van Griensven1, W. Schaden², H. Redl1

Institutions:

1) Ludwig Boltzmann Institute for experimental and clinical Traumatology, Austrian Cluster for Tissue Regeneration 2) Trauma Center Meidling, AUVA, Vienna, Austria

Device and producing company:

DermaGold, Tissue Regeneration Technologies (TRT), USA manufactured by MTS Europe GmbH, Germany

Introduction:

Recently, we showed beneficial effects of extracorporeal shock wave therapy (ESWT) on ischemic challenged tissue. We were able to show that ESWT improved flap outcome irrespective of application time (elective treatment 24h preoperatively, 1h postoperatively or treating manifest ischemic tissue 24h postoperatively). In the current study we investigated flap outcome in response to various total amounts of impulses.

Methods:

In the ischemic area of a rodent epigastric flap, different amounts of total shock wave impulses were applied (30, 300, and 1,000) which corresponds to 1.4, 14, and 47 pulses/cm², respectively. Parameters of effectiveness included planimetry (necrosis, shrinkage), flap perfusion (assessed by 2-D laser Doppler imaging), and immunohistochemistry over a 7 day follow-up period.

Results:

All shock wave treated groups showed substantial reduced tissue necrosis compared to control. Looking at the total amount of pulses within treatment groups, animals receiving 300 impulses showed the best results (less necrosis). Neither lower nor higher amounts (30 and 1,000, respectively) further improved flap outcome. No significant differences were found in the perfusion and immuno-histochemical parameters.

Conclusion: ESWT in soft tissue complications such as ischemia has clear beneficial effects. A dose response relationship was found in reducing tissue necrosis.