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Improved Axonal Regeneration and Improved Functional Results by Extracorporeal Shock Wave Treatment After Peripheral Nerve Injury in the Rat

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Device and producing company: NA

Introduction:
Although de-focused low energy extracorporeal shock wave therapy (ESWT) is routinely used to treat chronic inflammatory processes, very little is known about the effects of ESWT on injured peripheral nerves and these results concern reduction of pain and induction of unmyelinated nerve fibers degeneration. We aimed to investigate whether ESWT is able to improve the regeneration of injured nerves in an experimental rat model.

Methods:
Sprague-Dawley rats received an 8 mm long homotopic nerve autograft into the right sciatic nerve. All animals were randomly assigned to two experimental groups:
Group1: ESWT (300 impulses, 0.1 mJ, 3 Hz)
Group 2 (control): Nerve graft without ESWT. The specimens were evaluated with serial CatWalk automated gait analysis, electrophysiological studies and morphological investigations. The survival time was either 3 weeks or 3 months.

Results:
At 6 to 8 weeks of survival the ESWT group of animals exhibited a significantly improved functional recovery relative to the controls. Electrophysiological observations at 3 weeks after surgery revealed marked values of amplitude and compound nerve action potentials in the ESWT group, whereas there were no detectable amplitudes in the control group.

Discussion:
These findings were accompanied by significantly greater numbers of myelinated nerve fibers in the middle of the graft and in the distal stump of ESWT animals relative to the controls 3 weeks after surgery. There was no significant difference between the number of endoneural vessels in the ESWT and the control nerves.

Conclusion:
These results suggest that ESWT induces an improved rate of axonal regeneration. This phenomenon probably involves faster Wallerian degeneration, the improved removal of degenerated axons and a greater capacity of the injured axons to regenerate.