Vulnerability of the spinal cord to injury from extracorporeal shock waves. An experimental study in rabbits

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Introduction:
This experiment studied the vulnerability of spinal cord injury to extracorporeal shock wave treatment (ESWT).

Methods:
In this experiment, twelve rabbits were used and divided into 3 groups (with 4 in each group). All the animals underwent a preceding lumbar laminectomy at L4 one week before ESWT. In group 1, 2000 impulses of high dose (0.62 mJ/mm2 energy flux density) shockwave energy were applied to the spinal cord at the laminectomy site. In group 2, 2000 impulses of low dose (0.18 mJ/mm2 energy flux density) shockwave energy were applied to the same site as group 1. Group 3 did not receive ESWT and served as control.

Results:
None of the rabbits in the study groups (groups 1 and 2) showed weakness or paralysis of the hind limbs throughout the entire post-ESWT period. The spinal cord at L4 level of all the animals were harvested at the 13th day after laminectomy. On gross morphology, the cord from the study groups and the control group showed normal surface appearance. On microscopic examination, the cord from the control group showed normal findings, while the cord from the study groups showed variable degree of myelin damage and neuronal loss.

Discussion:
These microscopic findings appeared dose dependent. In the cord of the low energy group (group 2), the neuronal loss was insignificant compared to the control group.

Conclusion:
ESWT produced variable degree of microscopic changes of the treated cords, but no neurological symptoms. The neuronal injury was dose dependent and mild in the low energy group.