EFFECT OF EXTRACORPOREAL SHOCK WAVE THERAPY ON SPASTIC HYPERTONIA

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Background and purpose:
Spasticity is a disabling complication of stroke. Different not invasive treatments are used in order to reduce the muscle hypertonia. Shock waves are defined as a sequence of single sonic pulses characterised by high peak pressure (100 MPa), fast pressure rise (<10 ns) and short duration (10 μs). Shock waves are largely used in the treatment of bone and tendon diseases and on muscular contractures. Our purpose is to investigate the the long term effect of extracorporeal shock wave therapy (ESWT) on the muscle hypertonia of the hand and the wrist.

Methods:
We studied 20 patients affected by stroke associated severe hypertonia in upper limb. An electromagnetic coil lithotriptor (Modulith SLKâ by Storz Medical AG) was used. The pressure pulses were focused in the flexor hypertonic muscles of the forearm and in the interosseus muscles of the hand: 1500 shots were used to treat flexor muscles of the forearm mainly in the middle of the belly, and 3200 shots for interosseus muscles of the hand (800 for each muscle) using an ultrasound pointer-guide. The energy applied was 0.030 mj| mm^2.
A placebo stimulation was performed a week before the active stimulation in each patient. NIH scale, Ashworth scale and a video with digital goniometer were performed before and immediately after the placebo and active stimulation. Motor nerve conduction velocity from abductor digiti minimi and needle EMG was recorded after 4 weeks. The patients were monitored after one, four, twelve and twenty-four weeks from the active treatment.

Results:
After active ESWT the patients had greater improvement in flexor tone of wrist and fingers than after placebo stimulation. At follow up visits at one and four weeks a significant decrease of passive muscle tone was noted on the treated muscles in all patients. After 12 weeks from the therapy ten of the twenty patients showed persistent reduction in muscle tone,none of the patients showed a return to the baseline conditions. There were no adverse events associated with ESWT. After 24 weeks 10 patients (50%) showed a persistent effect over the treated muscles. Four patients (20%) showed a further reduction of hypertonia and 6 patients (30%) patients showed a return to the baseline level of spasticity. No denervation was observed in all patients after 4 weeks.

Conclusions:
ESWT reduce hypertonia of the wrist and finger muscles in all patients after 12 weeks and in 70% of patients after 24 weeks.