

P601

Effect of shock-wave therapy on spastic equinus foot in patients affected by cerebral palasy

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Different non-invasive treatments are used to reduce muscle hypertonia. Shock wave (ESW) are defined as a sequence of single sonic pulses largely used for bone, tendon diseases and muscular contractures. In our previous study we have documented the significant decrease of spastic hypertonia in the affected hand of patients with stroke after treatment by ESWT (Stroke vol. 36, n°9, September 2005 1967-1971). The aim of this study is to examine the effect of shock wave treatment in spastic equinus foot in a group of children with cerebral palsy.

We evaluated 12 children with cerebral palsy. Placebo stimulation was performed one week before active stimulation in each patient. Clinical examination included a single passive range of motion (electronic goniometer) evaluation of the ankle of the affected side, and grade of spasticity (Ashworth Scale) of the plantar flexor muscles. Podobarometric evaluation was consisted of a force plate (PAS system). In each subject, the clinical measures were performed before and immediately after placebo. One week later, identical clinical measures were performed before, immediately after, after one, four and twelve weeks from the active shock wave treatment.

No significant changes were noted after placebo. After active ESW, the average baseline evaluation Ashworth results for the plantar flexor were 3.0 (Sd 0.5). Immediately after the active treatment, the Ashworth for the plantar flexor dropped to 2.0 (Sd 0.4) ($P < 0.001$). Post hoc comparisons showed a significant difference of muscle tone of plantar flexors between baseline and after the first week ($P < 0.001$), between baseline and after four weeks ($P < 0.02$). There were no statistically group differences between baseline and after twelve weeks ($P = NS$). As regards the podobarometric measures, the time effect was statistically significant ($F [4,9] = 78.127, P < 0.001$). In the post hoc comparisons the significative increase of the whole plantar surface area (cm^2) on the treated limb between baseline and immediately after (40.3 vs 80.2; $P < 0.01$), between baseline and the first week (40.3 vs 70.1; $P < 0.05$), between baseline and the four weeks (40.3 vs 68; $P < 0.05$). No statistically group differences between baseline and the twelve weeks ($P = NS$).

Our findings suggest that shock wave therapy may be useful in decreasing flexor tone in the lower limbs spasticity in children and open a new field of research in the noninvasive treatment of this disease. Further studies with a larger group of patients with cerebral palsy are necessary.