THERAPY OF SPASTICITY WITH FOCUSED ACOUSTIC WAVES BY TREATING MYOFASCIAL KEY POINTS

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ABSTRACT

Aim of the study is to analyze the effect of mechano-sound vibrations at a frequency of 120 Hz on limited areas of the spastic muscles through the searching for specific "key points," specific areas that, if properly stimulated, allow a reduction in the tone of the entire muscle. We evaluated and treated a sample group of 10 patients with spasticity; aged between 63 and 70 years. All subjects were assessed by: Ashworth Scale, passive R.O.M.; assessment of active motility, Bahkta Test, Surface EMG. Treatment with focused acoustic waves at 120 Hz was performed twice a week for 8 weeks with distal-proximal stimulation. After 8 weeks of treatment patients are underwent injection of botulinum toxin into the most dysfunctional muscles. We found a mean reduction in the level of spasticity on the Ashworth scale; increase of ROM passive extension of the wrist, knee flexion and ankle dorsiflexion; increase in muscle strength in the hemiplegic side; increase in the mean score on Bahkta The electromyographic analysis showed a significant reduction of the minimum value (uV) of the basal tone of all the treated muscles. The results show the validity of the application of focused acoustic waves in the treatment of spasticity. The "experimentally" identified key points are all situated in close proximity to fascial structures, connective tissue, tendons and ligaments. This is in line with the location of type III and IV "interstitial" mechanoreceptors, involved in the clasp-knife phenomenon. The use of focused acoustic waves, associated with specific stretching and muscle strengthening, can therefore be regarded as a good method for preparation to the next phase of treatment, such as for example preparing the tissue to inoculation of botulinum toxin, and then to prolong and potentiate the effect in the months after inoculation.

INTRODUCTION: "Muscular tone" can be defined as the level of muscular tension at rest, kept so that it can be able to respond promptly and accurately to each motor command, both voluntary or reflex. As far the muscles have reflex activity that is independent from cortical command, they are, in fact, a single and inseparable system. Is no coincidence that a damage to the central nervous system severely impairs motor skills. It should be noted in fact that cortical activity is mainly inhibitory. The simple motor act of grasping an object is reflected in the brain, not so much with the excitement of the muscles performing that movement, as with the inhibition of those who might hinder harmony and fluidity. The significance of spasticity as a result of damage to the nervous system, can not be exhausted in the simple "overtone". Spasticity is a motor disorder in which the increase in muscle tone is one of several components. People with spasticity lose, first of all, the ability to inhibiting which prevents them performing "voluntarily" the most common and simple movements of everyday life. It is necessary, therefore, to know and understand the pathophysiological mechanisms underlying spasticity in order to set an appropriate rehabilitation protocol. In spasticity, at rest, there is a pronounced and prolonged response to muscle stretch; both fibers of the group Ia and group II could, in this case, play a role in the stress response, which could be processed by mono-and poly-synaptic circuits; there is also a reduced task- and phase-dependent modulation of the stretch reflex, revealing abnormalities of supraspinal control. Studies on the effect of vibration spastic hypertonia shown that mild periodic mechanical stimuli, if protracted, and administered in the form of vibration are considered a potent signal for the muscular and joint proprioceptors. The literature has shown some important aspects related to the effects obtainable by a vibratory stimulus according to its characteristics. In particular appears to be crucial the frequency of vibration, since the window between 80 and 120 Hz is of considerable power on the cortical and subcortical circuits. Aim of the study is to analyze the effect of mechano-sound vibrations at a frequency

of 120 Hz on limited areas of the spastic muscles through the searching for specific "key points," specific areas that, if properly stimulated, allow a reduction in the tone of the entire muscle.

MATERIALS AND METHODS: We evaluated and treated a sample group of 10 patients with spasticity; aged between 63 and 70 years. The inclusion criteria were: spastic hypertonia at least 1 at Ashworth Scale; age between 50 and 80 years; no concomitant disease with poor prognosis in the next 6 months. Exclusion criteria were: intake of antispasmodic drugs; inoculation of botulinum toxin. All subjects were assessed by: Ashworth Scale, passive R.O.M.; assessment of active motility, Bahkta Test, Surface EMG. Treatment with focused acoustic waves at 120 Hz was performed twice a week for 8 weeks with distal-proximal stimulation. An effective stimulation showed muscle relaxation; ineffective stimulation gave increase in hypertonicity. In this case we came back to treat the point immediately adjacent. After 8 weeks of treatment patients are underwent injection of botulinum toxin into the most dysfunctional muscles.

RESULTS: After 8 weeks, we found a mean reduction in the level of spasticity on the Ashworth scale from 3.5 to 2.2; average increase of ROM passive extension of the wrist from 29.1 ° to 33.5 °; in knee flexion from 47.5 ° to 54.2 °; in ankle dorsiflexion from 24.3 ° to 26.7 °. Average increase in muscle strength of MRC scale in the hemiplegic side from 1.8 to 2 in the extensor muscles of the forearm and wrist, and from 1.8 to 2.3 at the level of the hamstrings. Increase in the mean score on Test Bahkta from 2 to 2.5. The electromyographic analysis showed a significant reduction of the minimum value (uV) of the basal tone of all the treated muscles.

CONSIDERATIONS: from what has been described it is clear the validity of the application of focused acoustic waves in the treatment of spasticity. All patients showed, although with different degrees, improvement of all parameters taken into consideration, except for the increase, albeit modest, of the minimum value of the basal tone in some muscles in two patients. This is justified by the fact that the basal muscular tone, particularly in patients with spasticity, may vary in relation to factors both external and internal to the subject. The most interesting results emerge, especially in patients with spasticity to mild / moderate (respectively 1 and 2 points at Ashworth scale). The "experimentally" identified key points are all situated in close proximity to fascial structures, connective tissue, tendons and ligaments. This is in line with the location of type III and IV "interstitial" mechanoreceptors, involved in the clasp-knife phenomenon. A larger sample would be necessary in order to canonize and standardize the treatment and, above all, compare if the key points turn out to be comparable between different patients. The use of focused acoustic waves, associated with specific stretching and muscle strengthening, can therefore be regarded as a good method for preparation to the next phase of treatment, such as for example preparing the tissue to inoculation of botulinum toxin, and then to prolong and potentiate the effect in the months after inoculation. It would be interesting to assess whether the proposed treatment protocol may be equally effective transducers using auto-static instead of the moving handle. This may be useful to demonstrate whether the stimulation of key points should follow a precise temporal and spatial criterion, as we have supported, or not.