

Requirements for Research in ESWT Management of Spasticity

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Device and producing company:

DERMAGOLD, Tissue Regeneration Technologies (TRT) (Outside USA - ORTHOWAVE 180c), MTS Europe GmbH PIEZOWAVE, WOLF

Introduction:

Spasticity following brain injury is usually permanent and if unmanaged results in contractures or fixed deformities. There have been suggestions that ESWT can help decrease in muscle tone in spasticity. Because spasticity occurs in a wide range of muscles from the small muscles of the hand to large muscles of the legs it is uncertain as to the techniques required, the optimal equipment design, the muscle groups with the greatest potential for treatment and the study design. This pilot study of two types of ESWT machines on a range of severe spasticity in neurological conditions aimed to answer some of these questions.

Methods:

An uncontrolled trial of ESWT was tried on ten patients with severe spasticity. Two ESWT machines were tried – Orthowave 180 - with both focussed (6 areas) and unfocussed (12 areas) heads and a Wolf Peizo Wave machine (3 areas). Patients included in this pilot study were those patients on rehabilitation wards in a hospital specialising in severe forms of neurological disorders. The patients all had acute onset brain damage due to trauma, anoxia or subarachnoid haemorrhage. The contracted limb was treated at the muscle tendon origins and insertions and also over the muscle belly. Measurement of range of movement was taken using the Neutral Zero Method, a standardised method of measurement of range of movement from a defined neutral point using a goniometer. This gave three measurement components: the range of flexion; the extension; and the level at which the deformity was fixed as a starting point. This assessment was carried out for passive movement of the joints and also the range for active movement by the patient.

Results:

The treatment approach, both in time and area treated, needed to change throughout each session depending on the degree of muscle relaxation during the session, especially in the presence of deformities. The two ESWT devices used had both advantages and disadvantages: The Orthowave therapy head was heavy to hold, especially for long periods, but easily moulded to the accessible skin surface of a contracted hand whereas the Piezowave head was more difficult to easily access some of the joints in a contracted limb. The high noise level of the Orthowave increased the spasticity in some patients and made it impossible to carry out in the presence of other patients thus limiting the treatment environment. Since it started up at a higher energy level than was required for treatment and the level could only be reduced by firing unnecessary shockwaves this added to the noise level without benefiting the patient. The Piezowave was a very quiet machine to work with.

The Orthowave therapy head was easy to use and clean between patient treatments, whereas the Piezowave had to be dismantled after each patient for thorough cleaning. The Orthowave was not easy to push from one ward to another, whereas the Piezowave, a much smaller machine, was stored and moved around the hospital on a large dressings trolley.

Discussion: Since physiotherapy could not be discontinued on ethical grounds it is suggested that the most appropriate study is a randomised cross-over study of physiotherapy + placebo ESWT vs. physiotherapy + ESWT. The nature of spasticity is such that external factors such as sudden changes in temperature and noise increase the muscle tone. The sudden impact noise level is therefore an important factor limiting treatment with ESWT. This study suggests that

the optimal requirements of an ESWT machine for treating spasticity are: small head, flexibility for access to a wide range of joints, quiet, ease of cleaning (or availability of disposable covers) and ease of mobility.

Conclusion: A randomised controlled trial of physiotherapy vs. physiotherapy + ESWT is recommended. The optimal ESWT machine for treating spasticity needs to be quiet, have a small head, be flexible to enable access to a wide range of joints, be easily cleaned (or have disposable covers) and be easily mobile.