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SHORT COMMUNICATION

SPASTICITY OR REVERSIBLE MUSCLE HYPERTONIA?

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Background and objective: **The increase in resistance to passive muscle stretch in a paretic limb due to an upper motor neurone lesion is often referred to as muscle spasticity. However, this terminology is inaccurate and does not take into account the complex pathogenesis of the condition or describe the factors that contribute to the clinically observed changes in muscle tone. In this report we propose an alternative terminology and explain the reasons for doing so.**

Key words: spasticity; hypertonia; upper motor neurone syndrome.

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INTRODUCTION

An increase in muscle tone (as measured with the modified Ashworth scale) has been reported in the affected limbs of nearly 80% of hemiplegic stroke patients during the first 6 months of a cerebrovascular event (1) and in 38% of patients at 1 year (2). This increase in resistance to passive muscle stretch is often referred to as muscle spasticity. However, true spasticity appears to be less frequent than is generally thought. In addition, different factors are known to contribute to muscle hypertonia following an upper motor neurone lesion.

The use of the term "spasticity" to describe muscle hypertonia that is a consequence of an upper motor neurone syndrome is inaccurate and is not helpful in daily clinical practice and research. It is does not take into account the complex pathogenesis of the condition or describe the factors that contribute to the clinically observed changes in muscle tone. Nor does it guide the clinical management of the patient's motor disability or predict functional outcomes. In this report we propose the alternative terminology of "reversible muscle hypertonia" and review the evidence that justifies the use of this terminology.

DEFINITION AND TEMPORAL EVOLUTION OF SPASTICITY

The most widely used definition of spasticity was proposed 3 decades ago. It states that "spasticity is a motor disorder characterized by a velocity-dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks, resulting from hyperexcitability of the stretch reflex" (3). However, this definition does not fully explain the muscle hypertonicity in patients with upper motor neurone lesions.

Hyperexcitability of the phasic and tonic stretch reflex is present in only a small number of patients with muscle hypertonia in the first year after stroke onset (4). Furthermore, measurements of the excitability of the spinal alpha motor neurones with the Hoffmann reflex do not correlate with the changes in muscle tone as assessed clinically (5). In addition, the reported prevalence of hypertonia decreases with the chronicity of the lesion (2). This, together with the finding that the stretch reflex gain reduces over time (6), suggests that spasticity is a transient phenomenon in a significant number of patients with upper motor neurone syndrome. It is therefore reasonable to conclude that spasticity, as defined neurophysiologically, is only part of the muscle hypertonia seen in routine clinical practice.

MUSCLE HYPERTONIA AND FIXED CONTRACTURES

A number of factors have been shown to contribute to the resistance of the affected limbs to passive muscle stretch in patients with upper motor neurone lesions. These include changes in the collagen content and elastic properties of muscle, muscle fibre atrophy and alterations in the histochemical properties of muscle (7–9). In addition, thixotropy may also be increased in these patients (10). These changes are potentially reversible with anti-spasticity interventions and should be distinguished from fixed contractures.

Fixed contractures are due to morphological changes in the muscle-tendon unit and the joint's soft tissue. They are characterized by a reduction in the number of sarcomeres, remodelling of the connective tissue in muscle, and alteration in the muscle–tendon ratio (11). The resulting loss of muscle compliance is not reversible by anti-spasticity medication, and should therefore be distinguished from reversible hypertonia.

PROPOSED DEFINITION

In contrast to Lance's definition of spasticity, the term "reversible muscle hypertonia" takes into account all the components of the clinically observed increase in muscle tone, it conforms with the definitions and theoretical framework of the International Classification of Functioning, Disability and Health (12),

and confirms that muscle hypertonia is potentially treatable with conservative methods. Thus, the definition distinguishes this disorder of muscle tone from fixed contractures.

For the above reasons we propose the term "reversible muscle hypertonia" instead of spasticity. We define reversible muscle hypertonia as a focal, regional or generalized constant or posture- and/or activity-related state of skeletal muscle tension due to an upper motor neurone lesion that clinically manifests as resistance to passive muscle stretch, which may interfere with body functions, tasks and actions.

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