



Tardieu Scale

Summary

Description: The Tardieu Scale is primarily used by clinicians to describe spasticity in people with neurological conditions such as stroke, traumatic brain injury, spinal cord injury, multiple sclerosis and cerebral palsy. Spasticity is defined by Lance as 'a motor disorder characterised by a velocity-dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks, resulting from hyper-excitability of the stretch reflex'.¹ The Tardieu Scale has gained momentum over the past 15 years as the preferred clinical assessment of spasticity. This is because the Tardieu Scale assesses resistance to passive movement at a slow and fast velocity. Therefore, it can broadly differentiate between the two key factors explaining increased resistance to passive stretch, namely contracture (non-neural factors) and spasticity (neural factors).

Tardieu et al.² first described their novel method for measuring spasticity in 1954. This method was developed by Held and Pierrrot-Deseilligny³ and subsequently translated into English for use in a randomised, controlled trial.⁴ In 1999, the Tardieu Scale was further modified to include standardised joint positions and velocities.^{5,6} The most important components captured in the Tardieu Scale are the angle of muscle reaction at a slow velocity, the angle of muscle reaction at a fast velocity and the quality of muscle reaction at a fast

velocity. The scale is administered by applying passive stretch to a muscle group at two velocities. The first stretch is 'as slow as possible' (V1) and is used to determine angle of muscle reaction at slow velocity; this is equivalent to passive range of motion. The second stretch is either at the 'speed of the limb segment falling under gravity' (V2) or 'as fast as possible' (V3) and is used to determine both the angle of muscle reaction and the quality of muscle reaction at the fast velocity. The angle at which the muscle reaction occurs is typically measured with a goniometer, and quality of muscle reaction is measured on a 6-point scale, where 0 indicates 'no resistance through the course of the passive movement' and 5 indicates that 'the joint is immobile'.²⁻⁵

There are large numbers of studies that have looked at different aspects of the Tardieu and Modified Tardieu Scale in different patient populations. The reported Kappa statistics and intraclass correlation coefficients are highly variable, with reliability more convincing in stroke than in cerebral palsy.^{7,8} Researchers have validated the Tardieu Scale by comparing results with other measures of spasticity, including electromyography. These studies indicate that in comparison with the Ashworth scale, the Tardieu Scale more effectively identifies the presence of spasticity and differentiates it from contracture.^{9,10}

Commentary

The key strength of the Tardieu Scale is that, in contrast to the Ashworth scale, it includes assessments at two different velocities to discriminate between contracture and spasticity. It is this feature alone that makes the Tardieu Scale the most clinically relevant assessment of spasticity. The Tardieu Scale has many limitations. Perhaps the most significant limitation is that interpretation of the scale relies on a good understanding of the difference between contracture and spasticity. A second limitation is that some new users may consider the widely available instructions accompanying the scale to be inadequate. Various authors have subsequently explained the scale, and new users will find this additional detail useful.^{5,9} There are many variations of the original scale currently used in clinical practice. All of these variations have the potential to cause confusion. Some clinicians use a 5-point scale rather than a 6-point scale to assess the quality of muscle reaction,⁹ and some ignore the option of using V2, instead relying on V3 when assessing at a fast velocity. In addition, others have introduced new terms, namely R1 and R2, to describe the angle of muscle response for V3 and V1, respectively.⁵

The Tardieu Scale is widely used in research; however, its composite nature and reliance on a short ordinal scale can make it challenging to use in some types of research. The Tardieu Scale and

the Modified Tardieu Scale are freely available in publications,^{4-6,9} and outcome measures websites.^{7,11}

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