Muscle Overactivity in the Upper Motor Neuron Syndrome

Conceptualizing a Treatment Plan and Establishing Meaningful Goals

Anne Felicia Ambrose, MD, MS[a,*], Tanya Verghese, MA[a], Carolin Dohle, MD[b], Jennifer Russo, MD[a]

KEYWORDS

• Spasticity • Treatment goals • Goal setting • Muscle overactivity

KEY POINTS

- Spasticity is a condition that presents in a variety of ways, and therefore its treatment must be equally multifaceted and specific to the individual.
- It is important to establish patient-centered goals, which are specific, attainable, measurable, relevant to the patient, and achievable within a specified time.
- Factors to be considered include gathering data regarding effectiveness of prior treatments and their side effects, identifying muscle(s) contributing to the impairment, and impact of proposed treatments.
- Previously, treatment recommendations focused on a stepwise progression.
- Current recommendations suggest combining multiple therapeutic options to optimize results, particularly when spasticity is present with other features of upper motor neuron dysfunction.

INTRODUCTION

Spasticity is defined as a velocity-dependent increase in tonic stretch reflexes with exaggerated movements due to the hyperexcitability of stretch reflexes[1] and is a component of upper motor neuron syndromes.[2] It can be the result of acute injury to the central nervous system along the neural axis or of chronic neurologic conditions,

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[a] Department of Rehabilitation Medicine, Burke Rehabilitation Hospital, Montefiore Medical Center, White Plains, NY 10605; [b] Department of Neurology, Montefiore Medical Center, Burke Rehabilitation Hospital, 785, Mamaroneck Avenue, White Plains Hospital, NY 10605, USA
* Corresponding author.
E-mail address: aambrose@burke.org

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such as cerebral palsy, amyotrophic lateral sclerosis, and multiple sclerosis. Spasticity is sometimes classified according to its origin.[3] *Spinal spasticity* results from the removal or destruction of supraspinal control and leads to increased excitability of motor neurons. *Cerebral spasticity* stems from a loss of descending inhibition.[4]

Spasticity can result in pain, increased disability, and decreased quality of life.[5] It may interfere with the use of the affected extremity; affect mobility, dressing, and hygiene; and increase the burden on caregivers.[5] In the pediatric population, chronic severe spasticity can also impede normal bone growth, resulting in reduced bone length, joint distortion, or abnormal rotation. Left untreated, spasticity may lead to deformities, such as kyphoscoliosis and contractures, that require invasive interventions in order to be corrected.[2]

Approach to Spasticity Management

Spasticity is a multifaceted condition that affects each patient in a unique way. Therefore, treatment must be tailored to the specific needs of the individual. When developing a treatment plan, the following questions should be considered.

Gathering background information

1. What is the cause of the spasticity? Is it true spasticity?
   The patient's history should establish the underlying cause and determine the onset and progression of the condition. Spasticity is usually caused by lesions along the corticospinal tract and may be accompanied by weakness, hyperreflexia, and clonus.[2] The resistance encountered in the affected limb is velocity-dependent, frequently marked by a "catch" followed by release of the tension. When moving the affected joint, one direction is usually more profoundly affected; for example, in chronic stroke, spasticity is frequently more pronounced in the flexor than the extensor groups. *Spasticity* should be distinguished from rigidity, which is seen in extrapyramidal lesions, such as those within the rubrospinal or vestibulospinal tracts, and includes cogwheel (eg, Parkinson disease) and lead pipe rigidity (eg, neuroleptic malignant syndrome or stiff man syndrome).[6,7] This resistance to movement is uniform in all directions and is not velocity-dependent.
2. What are the factors that affect the patient's spasticity?
   The history should include details regarding the manifestation of spasticity and its progression. Patients often report that their symptoms may change according to temperature, emotional status, time of day, level of pain, body position, and the amount of prior stretching.
3. Which tool(s) are the most appropriate to evaluate the patient's physical findings?
   A thorough examination of the muscle groups to evaluate muscle strength, range of motion, tone, and reflexes is critical. Several examples of additional tools that can be used are given in **Table 1**.
4. What functional limitations are the results of the spasticity?
   Functional limitations may include tactile, proprioceptive, visual, auditory, vestibular, cognitive impairments, hemineglect, impaired learning, and procedural sequencing, which can further magnify the patient's disability.
5. What physical abnormalities are noted? Which muscles are affected? Do these muscles have any other function?
   Abnormal position of digits, joints, or limbs require careful examination for imbalance between agonist and antagonist muscles. These muscles should be examined for tone, coordination, and strength. Usually, examination of agonist and antagonist muscle groups shows that one group predominates