

Special Considerations in Pediatric Assessment

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KEYWORDS

- Spasticity • Pediatric • Cerebral palsy • Secondary complication • Prevention
- Physical examination

KEY POINTS

- Children's growth should be taken into consideration when assessing and managing spasticity.
- Early and regularly repeated aggressive, comprehensive spasticity management can prevent musculoskeletal complications and functional deterioration and improve quality of life.
- Comprehensive history taking and systematic physical examination are critical in the assessment for spasticity treatment.

INTRODUCTION

Cerebral palsy (CP) is the most common (90%) condition associated with spasticity in children and young people.¹ In CP, spasticity results from a dysregulated reflex-arc from upper motor neurons of the medullary pyramid to the motor end plate of the limb musculatures.² It is caused by an intricate change along different interdependent pathways.^{2,3} Unlike the pathology in adults whose motor system was already developed at the time of injury, for instance, like stroke, children who with a prenatal brain abnormality are affected by reorganization of supraspinal input and impaired motor maturation.² Children with CP may have concomitant extrapyramidal involvement causing additional movement disorders, including dystonia (10%–15%), ataxia, flaccidity, and athetosis.¹ Other causes of spasticity in children

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include traumatic brain injury, stroke, spinal cord injury, and inherited disorders, such as Wilson disease, Hallervorden-Spatz disease, and hereditary spastic hemiparesis.⁴

The difference between adult and children in terms of spasticity management is the fact that children grow. In growing children, their muscles and bones grow at the same ratio. However, in children with spasticity, their muscles are shorter, smaller,² and cannot catch up with their bone growth. Such length discrepancy between bones and spastic muscles gets worse during children's growth spurts; close follow-up throughout children's growth is critical to prevent secondary complications. Aggressive stretching of spastic muscles will minimize the length discrepancy between bone and spastic muscles. Early physical therapy and repeated spasticity management with chemoneurolysis could reduce the need for multiple orthopedic surgeries, such as muscle tendon lengthening or skeletal procedures, as well as help functional improvement and delay functional deterioration as they get older.⁵

DIAGNOSIS

Clinical Presentation

Spasticity is defined as velocity-dependent increased resistance to passive muscle stretch.⁶ Spasticity can affect the entire body or certain body parts. Most children with CP can be classified according to which body area is affected: hemiplegia, diplegia, and tetraplegia.⁷ If a child has spasticity in trunk muscles, the spasticity can cause postural and gait impairments. If there is bulbar involvement, it can cause dysphagia and dysarthria. Other functional impairments include difficulty in movement, sitting, transfers, hygiene, and dressing.

Secondary Complications

Management of spasticity becomes very important because of its complications, especially when not treated. Spasticity causes shortening of muscles, which hampers normal muscle lengthening during children's growth and contributes to muscles, soft tissue contractures, and functional limitation.² Spasticity, for example, prevents normal derotation of the femur that results in coxa valga of the femur.⁸ In addition, spasticity of the muscles around the hip contributes to hip subluxation, especially in nonambulatory children.⁹ In return, hip subluxation can cause pain in the hip area. Prolonged postures in flexion or extension of joints or continuous involuntary movements can cause peripheral neuropathy.¹⁰ Such pain and musculoskeletal complications from spasticity can further disturb sleep, present major difficulties for care workers, and deteriorate children's function.¹¹

Assessment

- Assessment of children with spasticity needs to be considerate and systematic.
 - Detailed history taking and thorough review of system and medications review
 - Observation of children in the most comfortable setting and throughout the encounter
 - Thorough static and dynamic examination

Spasticity will be most notable through physical examination: reflexes are brisk and can have accompanying upper motor neuron signs, such as extensor plantar signs and clonus.² It is important to know if the present spasticity of children is their baseline because any noxious stimulation or discomfort can increase spasticity. The most

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