



Musculoskeletal problems in cerebral palsy

Janice M. Quinby^{a,*}, Alwyn Abraham^b

^aDepartment of Orthopaedic Surgery, Freeman Hospital, High Heaton, Newcastle upon Tyne NE7 7DN, UK
^b23 Dene View, South Gosforth, Newcastle upon Tyne NE3 1PU, UK

KEYWORDS

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Summary Cerebral palsy is a common cause of elective referral to children's orthopaedic surgeons. Musculoskeletal problems arise as a result of spasticity and are dealt with medically and surgically. This review discusses the current ideas on management.

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Practice points

- Most common cause of physical disability in children in the modern world
- Arises from an insult to the immature brain
- Musculoskeletal pathology only becomes evident as the child grows
- Treatment of spasticity may be medical or surgical, temporary or permanent, focal or global

Introduction

Cerebral palsy (CP) is the most common cause of physical disability in children in the modern world and it is the most common cause of referral into elective children's orthopaedic units. The rate of CP has risen in spite of falling perinatal and neonatal mortality rates.¹ In particular, there is a differential increase in the more severely affected all four limb involved children who have been born preterm.

CP results from an insult to the immature brain in utero, at birth or soon after birth. The brain lesion is non-progressive. It results in abnormalities of muscle strength and tone, and joint movement. These disorders of movement are not static and tend to progress with growth. Thus, although the brain lesion may be present at birth,

*Corresponding author. Tel.: +44 191 213 7171; fax: +44 191 223 1433.

E-mail address: janice.quinby@nuth.northy.nhs.uk (J.M. Quinby).



Figure 1 Seven-year-old girl with spastic diplegia at mid-stance.

musculoskeletal pathology only becomes evident as the child grows, producing problems such as hip dislocation and scoliosis. As the child enters a period of rapid growth, fixed contractures may develop.

CP is classified by the type of movement disorder present and by its topographical distribution. Spastic CP is by far the most common and may present in hemiplegic, diplegic or quadriplegic form. All children with hemiplegia walk independently. Most children with spastic diplegia walk but may need external aids (Fig. 1), and children with spastic quadriplegia do not usually achieve functional walking.²

Children who are ambulant pose a completely different set of challenges to those set by the non-ambulant CP population, although some medical and surgical treatments are shared.

Musculoskeletal pathology in cerebral palsy

Normal muscle growth requires that relaxed muscle can stretch under conditions of physiological loading. In CP, the hypertonic muscle does not relax

during activity. Spasticity causes not only contractures but also torsional deformities of long bones and joint instability. This in turn can result in the development of early osteoarthritic change.

Thus, the management of spasticity is of paramount importance in limiting deformity and preventing the consequent deterioration in gait and function which has been shown to be the natural progression in this condition.³

The management of spasticity in cerebral palsy

Treatment of spasticity may be medical or surgical, temporary or permanent, focal or global. It requires a combination of physiotherapy, occupational therapy, orthotics and assistive devices, and in the more severely affected, appropriate seating and sleep systems for posture control.

Botulinum toxin A

Intramuscular injections are focal and temporary. Phenol has been used in the past but has largely been supplanted by botulinum toxin A (BTX-A). BTX-A is a protein exotoxin derived from *Clostridium botulinum*. It binds with high affinity and specificity to the presynaptic membranes of cholinergic motor neurones. The discharge of acetylcholine-containing vesicles is prevented, thus stopping neurotransmission.

The clinical result is relaxation of the muscle with a reduction of spasticity. The period of relaxation lasts for 12–16 weeks. This may be followed by longitudinal muscle growth which results in functional improvement over a much longer time span (i.e. 6 months or longer). In other patients the effect is transitory, and the benefit limited to 3 months. During the time of muscle relaxation, physiotherapy may be expected to achieve better results.⁴

The current data sheet recommendations in this country are for treatment of foot deformity only. There is a lack of 'official position' on guidelines for the use of BTX-A, and there are large variations in current practice within this country and abroad. In Belgium, Molenaers advocates the use of single event multilevel BTX-A treatment in a younger age group of patients. His team believes that this, combined with casting, orthotic management and physiotherapy could help to prevent muscle contractures and severe bony deformities. This in turn may delay and/or reduce the need for extensive orthopaedic surgery later.⁵

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