Cerebral Palsy (CP)

CP affects 1 in 400 children and is the commonest cause of long-term neuromotor disability in children. It describes a heterogeneous group of disorders of movement and / or posture that are persistent, and attributable to a non-progressive injury to the brain sustained before the age of two years. Although the lesion is static, the clinical manifestations of the disorder may vary with the child’s growth and development.

The most commonly used classification scheme is based on the anatomical distribution of motor impairment:

1) **Hemiplegia**: involvement of both arm and leg on the same side
2) **Diplegia**: significant leg involvement with little effect on the arms
3) **Quadriplegia**: involvement of all four limbs
4) **Double hemiplegia**: involvement of all four limbs with greater impairment in the arms than the legs

Movement disorders can co-exist with the clinical pattern of motor impairment, and these can be used to qualify the classification scheme. They include spasticity (most commonly), rigidity, hypotonia, dystonia, ataxia or a mixture of these disorders.

Although CP is primarily a motor syndrome, it is frequently associated with other impairments and disabilities:

- One in three have a learning disability
- One in four do not become ambulant
- One in three have seizures
- Visual impairment - refractive errors, squint, hemianopia, cortical blindness
- Deafness- both conductive and sensorineural
- Disorders of speech, language and swallowing

**Hypoxic-Ischaemic (H-I) Injury**

Hypoxic-ischaemic (H-I) injury to the brain is associated with subsequent CP, and there is a regional susceptibility to H-I injury, which is age-dependent. For instance preterm infants are at risk of germinal layer haemorrhage - intra-ventricular haemorrhage (GLH-IVH), which is usually unilateral and if large, can affect nearby parenchymal tissue, leading to contralateral hemiplegia.

The white matter is particularly vulnerable to injury in preterm infants, and can give rise to cystic periventricular leucomalacia (PVL), and subsequent diplegia. (More subtle abnormalities to white matter are very common in survivors of preterm birth, but their functional correlates are not yet known).

In contrast, the basal ganglia and thalami are more vulnerable than white matter to H-I at term, so acute birth asphyxia and hyperbiliruinaemia at term are more likely to give rise to CP syndromes characterised by dystonia.

Frequently there is no evidence of H-I or preterm birth, and in these cases congenital infections ('TORCH' - toxoplasmosis, rubella, cytomegalomvirus, herpes simplex), acute bacterial / viral sepsis, hyperbilirubinaemia, neurometabolic syndromes and evidence of infarction should all be sought as possible causes.
Clinical Types
The commonest types of CP are hemiplegia and diplegia, which are typically associated with increased tone and upper motor neurone signs in affected limbs. This leads to characteristic postures, which are reminiscent of the patterns seen in an adult with a stroke.

Upper limb
With increased tone in the upper limb, there is internal rotation at the shoulder, elbow flexion, forearm pronation, wrist flexion, and thumb-in-palm.

Lower limb
In the lower limb, there is hip adduction / flexion, knee flexion, ankle equines, hindfoot valgus, metatarsal varus with hallux valgus. Unlike adults, affected limbs are often underdeveloped and if unilateral, show shortening compared with the other side. If both legs are affected, there is a characteristic diplegic gait with adduction of the hips leading to “scissoring”.

Management
It is essential that the management of children with CP takes place within a multidisciplinary framework. This must include a paediatric orthopaedic surgeon to look after the musculoskeletal complications that frequently arise secondary to spasticity across developing joints (contractures, pain, subluxation and dislocation).

CP presents real challenges, which are best met by a multidisciplinary team working in partnership with parents. Physiotherapy has a vital role to play in helping to prevent deformity and contractures but it can also encouraging the use of the affected and relatively affected limbs helping to improve mobility and coordination. The aim is for each child to reach his or her maximal potential. Many techniques can be used, including group physiotherapy and hydrotherapy.

In conclusion, CP is an important cause of childhood disability which primarily affects motor development.

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