

Cerebral Palsy:

Summary

Cerebral palsy (CP) is a heterogeneous group of disorders affecting the muscle tone and the development of movement and posture. CP results from a non-progressive damage to the brain in utero or during infantile development up to the age of 3 years. Depending on the affected brain area, spastic, ataxic, or dyskinetic cerebral palsy develops. While, in many cases, there is no identifiable cause, risk factors for cerebral palsy are prematurity, perinatal complications such as chorioamnionitis, birth trauma with intracerebral hemorrhage, or postnatal infections such as meningitis. The diagnosis of CP is usually not made until features become apparent as children fail to meet certain milestones during the postneonatal period (e.g., inability to roll over or sit independently). Physical indicators of spastic cerebral palsy include spastic paresis of multiple limbs and joint contractures, scissors gait, and persistence of primitive reflexes. Patients with non-spastic cerebral palsy present with dysarthria and abnormal involuntary movements (choreoathetoid, dystonic, or ataxic) that worsen with stress. Seizure disorders and intellectual disability are associated with all types. Diagnosis is mainly based on the clinical picture but cranial ultrasound or MRI can help identify the causative lesion (e.g., hemorrhage, brain malformation). Since there is no cure, management follows a multidisciplinary approach with a focus on treating contractures (e.g., bracing, antispasmodics, physical therapy, surgery) and ensuring social participation (e.g., speech therapy, social support). Depending on the severity and type of cerebral palsy, patients may be slightly restricted or severely disabled and unable to walk.

Definition

- Group of non curable motor syndromes resulting from disorders of early brain development.
- The term static encephalopathy is inaccurate as features of cerebral palsy often change with time.

Associations:

1- mental retardation (50%).

2- epilepsy (30%)

3- impaired hearing

4- impaired vision

5- supra nuclear bulber palsy may lead to:

- feeding disorder (poor suckling & swallowing).
- squint (30%)
- speech disorders.

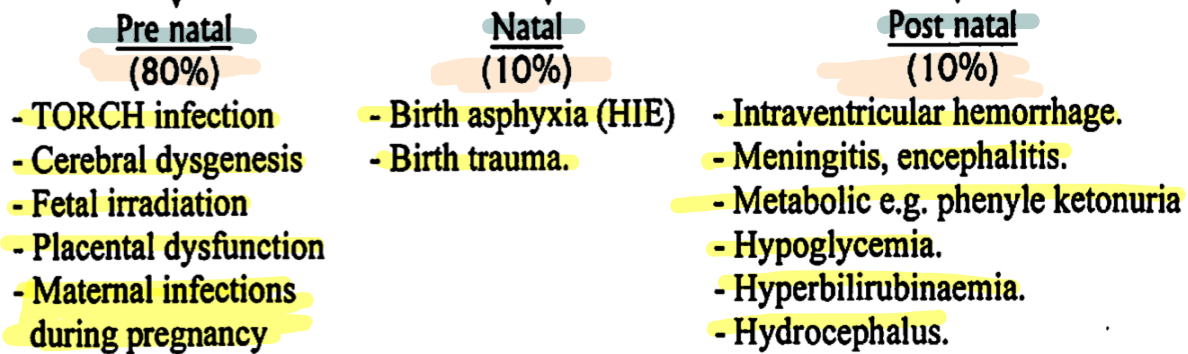
6- Persistence of primitive reflexes.

- NEUROLOGICAL FEATURES OF CP CHANGE OR PROGRESS OVER TIME= NOT STATIC ENCEPHALOPATHY
- CP is associated with motor systems disorders, epilepsy and abnormalities of speech, vision, and intellect.
- Its seizures are epileptical : because it is caused by chronic brain pathology.

EPIDEMIOLOGY AND ETIOLOGY.

- CP is the most common and costly form of chronic motor disability in childhood.
- Prevalence of 2/1000.
- Most children with CP had been born at term with uncomplicated labors and deliveries.
- Features pointing to antenatal factors causing abnormal brain development (in 80%) .
- Many CP children had congenital anomalies external to the CNS.
- ↓10% of children with CP had evidence of intrapartum asphyxia.
- Intrauterine exposure to maternal infection is associated with a significant increase in the risk of CP in normal birthweight infants:
 1. chorioamnionitis
 2. umbilical cord inflammation
 3. foul-smelling amniotic fluid
 4. maternal sepsis
 5. temperature greater than 38°C during labor
 6. urinary tract infection
- The prevalence of CP is increased among low birthweight infants, particularly < 1,000g at birth → intracerebral hemorrhage and periventricular leukomalacia (PVL).

Causes



Presentation:

- 1- Delayed mental milestones.
- 2- Delayed motor milestones.
- 3- Feeding difficulties.
- 4- Abnormal gait.

Clinical Types

1- Spastic cerebral palsy

Criteria:

- 1- The commonest type (75%).
- 2- Pyramidal tract lesion signs:
 - Hypertonia.
 - Hyperreflexia
 - Positive Babinski sign.
 - May be clonus.

2- Ataxic cerebral palsy

Criteria: of cerebellar ataxia(trunkal ataxia, nystagmus, stacatto speech,intention tremors, incoordination of voluntary movements,hypotonia)

3- Extrapyrimalal (dyskinetic, athetoid) cerebral palsy

Common causes: Kernicterus & birth asphyxia

Criteria:

- Hypotonia, replaced with time with hypertonia & rigidity.
- Abnormal movements chorio athetosis.
- Supra nuclear palsy → feeding & speech disorders.
- May be deafness.

3- Atonic cerebral palsy

- Hypotonia → floppy infant
- Preserved deep tendon reflexes

5- Mixed cerebral palsy

Types of Spastic cerebral palsy:

Types:

1- Spastic hemiplegia:

- Hand preference occur at early age.
- Walking is delayed, gait is circumductive.

- ✓ decreased spontaneous movements on the affected side and show hand preference at a very early age.
- ✓ The arm is often more involved than the leg and difficulty in hand manipulation is obvious by 1 yr of age.
- ✓ Walking is usually delayed until 18–24 mo, and a circumductive gait is apparent.
- ✓ growth arrest, particularly in the hand and thumbnail, especially if the contralateral parietal lobe is abnormal, because extremity growth is influenced by this area of the brain.
- ✓ Spasticity is apparent in the affected extremities, particularly the ankle, causing an equinovarus deformity of the foot.
- ✓ An affected child often walks on tiptoes because of the increased tone, and the affected upper extremity assumes a dystonic posture when the child runs.
- ✓ Ankle clonus and a Babinski sign may be present, the deep tendon reflexes are increased, and weakness of the hand and foot dorsiflexors is evident.
- ✓ 1/3 have a seizure disorder that usually develops during the first year
- ✓ 25% have cognitive abnormalities including mental retardation.
- ✓ CT scan or MRI (more sensitive) study may show an atrophic cerebral hemisphere with a dilated lateral ventricle contralateral to the side of the affected extremities.
- ✓ important cause of hemiplegic CP: Focal cerebral infarction (utero or neonatal stroke) → intrauterine or perinatal thromboembolism (thrombophilic disorders, especially anticardiolipin antibodies), Infection Genetic/developmental ,Periventricular hemorrhagic infarction.

2- Spastic diplegia:

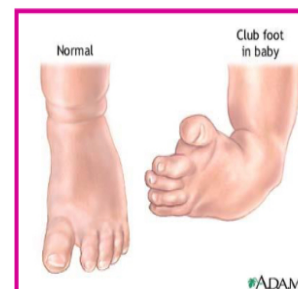
- Crawling is commando like rather than four limbed crawling. حبة حبة
- When suspended from axilla the lower limbs take scissoring posture.

- ✓ Bilateral spasticity of the legs greater than in the arms.
- ✓ The first noted when an affected infant begins to crawl → The child uses the arms in a normal reciprocal fashion but tends to drag the legs behind (commando crawl)
- ✓ If the spasticity is severe, application of a diaper is difficult because of the excessive adduction of the hips.
- ✓ Examination of the child reveals
 1. spasticity in the legs
 2. brisk reflexes & ankle clonus,
 3. bilateral Babinski sign.
 4. scissoring posture of the lower extremities is maintained when left from axilla.
 5. Walking is significantly delayed and the child walks on tiptoes.
 6. the feet are held in a position of equinovarus
 7. Severe cases: disuse atrophy and impaired growth of the lower extremities with normal development of the upper torso → disproportionate growth.
- Intellectual development is excellent for these patients, and seizures is minimal.
- The most common neuropathologic finding is periventricular leukomalacia, (in the area where fibers innervating the legs course through the internal capsule). Causes: Prematurity, Ischemia, Infection & Endocrine/metabolic (e.g., thyroid)

3- Spastic quadriplegia:

- The most severe type.
- High incidence of associations e.g. (mental retardation, seizures,... ..).

- The most severe form of CP because of marked motor impairment of all extremities and the high association with mental retardation and seizures.
- Swallowing difficulties are common as a result of bulbar palsies, often leading to aspiration pneumonia.
- The most common lesions seen on pathologic examination or on MRI scanning are severe PVL and multicystic cortical encephalomalacia.
- Neurologic examination shows:
 1. increased tone and spasticity in all extremities,
 2. brisk reflexes,
 3. Flexion contractures of the knees and elbows are often present by late childhood.
 4. Speech and visual abnormalities are prevalent in this group of children.
 5. Spastic quadriplegia often have athetosis and classified as mixed CP.



4- Spastic monoplegia.

5- Spastic paraplegia.

ATHETOID CP

- called choreoathetoid or extrapyramidal CP
- Less common than spastic cerebral palsy.
- Pathology: putamen, globus pallidus, thalamus, basal ganglia
- infants are characteristically hypotonic with poor head control and marked head lag
- Develop increased variable tone with rigidity and dystonia over several years.
- Feeding may be difficult, and tongue thrust and drooling may be prominent.
- Speech is typically affected because the oropharyngeal muscles are involved.
- upper motor neuron signs are not present, seizures are uncommon, and intellect is preserved in many patients.
- most likely to be associated with birth asphyxia.
- CAUSES:
 1. acute intrapartum near-total asphyxia
 2. kernicterus secondary to high levels of bilirubin, MRI → bilateral globus pallidus lesions.
 3. Metabolic genetic disorders such as mitochondrial disorders and glutaric aciduria.

Investigations

- 1- CT & MRI → detect degree of brain atrophy.
→ may detect the cause e.g. brain malformations.
→ rule out brain tumors & degenerative brain disease.
- 2- TORCH screen.
- 3- Metabolic screen.
- 4- For associations ⇒ audiometry, fundus ex. & EEG for cases with epilepsy.

Treatment

- Psychosocial support
- Care of feeding & defecation
- Physiotherapy
- Anti spastic drugs e.g. Dantrolene sodium, baclofen, Botox A injection
- Assist vision and hearing
- Assist walking: Walkers, standing frames, motorized wheel chair
- Treat epilepsy
- Rehabilitation according to the degree of mental retardation

- A team of physicians from various specialties, as well as occupational and physical therapists, speech pathologists, social workers, and developmental psychologists.
- Personal autonomy (economical, physiological and physical) – golden years for that is when mother can carry her baby.
- Parents should be taught how to handle their child in daily activities in ways that limit the effects of abnormal muscle tone.
- Series of exercises designed to prevent the development of contractures, especially a tight Achilles tendon.

To Sum up:

CEREBRAL PALSY

1. Nonprogressive motor dysfunction
2. Prematurity is the greatest risk factor
3. Spastic cerebral palsy is the most common type
 - a. Hyperreflexia
 - b. Hypertonia
 - c. Equinovarus deformity (feet point down and inward)
4. "Commando crawl" (child pulls itself with arms while dragging the legs behind) is often seen due to contractures of lower limbs
5. Brain MRI may show periventricular leukomalacia and basal ganglia lesions

Cerebral palsy	
Risk factors	• Prematurity • Low birth weight
Clinical features	• Delayed motor milestones • Abnormal tone, hyperreflexia • Comorbid seizures, intellectual disability
Diagnostic workup	• MRI of the brain • ± Electroencephalography • ± Genetic/metabolic testing
Management	• Physical, occupational, speech therapies • Nutritional support • Antispastic medications

