

Management of Cerebral Palsy (Treatment)

At the end of the lecture the student should be able to:

- Know the different therapies for CP
- Recognize the treatment team for CP
- Identify the goals and principles of physical therapy for cp
- Understand and discuss the neurofacilitation approaches
- Recognize the conventional exercises
- Know aims of bracing and its types used in CP
- Select the mobility aids and assistive aids for CP
- Recognize the adjunct methods to physical therapy

Treatment for cerebral palsy

- Treatment for cerebral palsy is a lifelong multi-dimensional process
- In general, the **earlier** treatment begins the **better** chance children have of **overcoming developmental disabilities** or **learning new ways to accomplish the tasks**
- The earliest proven intervention occurs during the infant's recovery in the Neonatal Intensive Care Unit (NICU).
- Various forms of therapy are available to people living with cerebral palsy

Therapies for cerebral palsy

Treatment may include one or more of the following:

- Medication (drugs) to control seizures, alleviate pain, or relax muscle spasms
- physical therapy;
- occupational therapy;
- speech therapy;
- hyperbaric oxygen;
- Botulinum toxin injection ([Botox](#)) to relax spastic muscles;
- surgery to correct anatomical abnormalities or release tight muscles;
- braces and other orthotic devices; rolling walkers;

Treatment team

- Physicians
- Pediatric neurologist
- Pediatric orthopaedic surgeon
- Pediatric physiatrist
- Physiotherapists
- Occupational therapists
- Orthotists
- Speech therapists
- Neurosurgeon
- Ophthalmologist
- Audiologist
- Dentist
- Nutrition specialist

Goals of management of CP

The ultimate and long term goal of treatment of CP gaining independence in activities of daily living, school or work and social life.

The short term goals of treatment of CP:

- Improve mobility
- Prevent deformity
- Educate the parents
- Teach daily living skills
- Provide community and social support

Rehabilitation & Physiotherapy

- **Rehabilitation** is the name given to all diagnostic and therapeutic procedures which aim to develop maximum physical, social and vocational function in a diseased or injured person.
- **The goal** of rehabilitation is to gain **independence** in activities of daily living, school or work and social life.
- It also involves helping the child to **learn the skills** he will need in daily life, school and while playing with friends.
- **Lastly**, rehabilitation means **decreasing the complications** which arise as a result of the child's neuromuscular impairments.

Components of rehabilitation

- Physiotherapy
- Occupational therapy
- Bracing & Assistive devices
- Adaptive technology
- Sports and recreation
- Environment modification

Planning rehabilitation

- The child begins to receive physiotherapy when he is a baby.
- Occupational therapy starts towards age two to teach ADL.
- The toddler uses assistive devices for mobility.
- Bracing may be necessary as the child begins to walk.
- Sports and recreation are crucial for the school aged child.
- Play is important beginning in infancy throughout adolescence.

Physiotherapy

- Physiotherapy is the basic treatment in all children with CP.
- It begins in early infancy and continues throughout adolescence .
- The primary purpose is to facilitate normal neuromotor development.
- It aims to:
 - ✓ bring the child to an erect position,
 - ✓ give the child independency in ADL, at school and in society
 - ✓ and prevent deformity

General principles of physiotherapy

- The following guidelines may be useful to summarize the principles of treatment :
 - 1- The motor and other functional disabilities are created by the **primary impairments** as well as by **lack** of many **everyday skills**.
 - 2- Physiotherapists consider the influence of other disabilities on the motor programmes. As There is an interaction between the communication, intellectual, perceptual and motor functions.
 - 3- Emphasis needs to be given to the daily functional activities which are priorities of a child and of their families.

General principles of physiotherapy(cont.)

- 4-Normal developmental schedules are only guides in the planning of treatment program
- 5-Management and therapy is planned from infancy throughout an individual's lifespan to take account of clinical change and in an individual's home, schools and community
- 6-Treatment and management need to commence as early as possible for parental support and to minimize musculo-skeletal problems.
- 7-Treatment is directed toward the **problems of gross motor and fine-motor function** .

Problems of gross motor and fine-motor function

Delayed motor milestones is due to the following problems:

1-Absent or abnormal postural mechanisms.

The postural mechanisms are neurological mechanisms which maintain posture and equilibrium and are involved in locomotion

2- Abnormal movement patterns (synergies) of voluntary movement

3- Weakness and lack of selective motor control.

4- Hypertonicity, hypotonicity and involuntary movements

5- Abnormal postural alignments

6- Abnormalities of muscles, joints and soft tissues

7- Abnormal reflexes or reactions

Main motor problems of CP

All types of cerebral palsy are characterized by:

- 1) Muscle tone abnormality (hypertonia & hypotonia)
- 2) Muscle weakness and lack of selective motor control.
- 3) Released primitive reflexes
- 4) Delay in the development of normal postural reactions(righting, equilibrium, protective reactions)
- 5) Delay gross and fine motor development
- 6) Musculoskeletal abnormality (contracture & deformity)

Physical Therapy Treatment

Physical therapy treatment of CP consists of :

- 1- Neurofacilitation techniques or approaches
- 2- Conventional exercises

Neurofacilitation techniques or approaches

- There are many approaches of treatment for cerebral palsy.
- Many of them are also used for treatment of **children** with other conditions of developmental delay and for **adults with neurological defects**.
- It is difficult to decide which approach is superior.
- Sensory input to the CNS produces reflex motor output. The various neurofacilitation techniques are based on this basic principle.
- All of the techniques aim to: **a)** normalize muscle tone, **b)** facilitate postural reactions , **c)** facilitate normal movement patterns and **d)** develop functional skills.

Neurofacilitation techniques or approaches(cont.)

- 1- Neuro-Developmental Technique (NDT)
- 2- Progressive pattern movements
- 3- Reflex creeping and other reflex reactions
- 4- Sensory motor treatment approach
- 5- Sensory Integration
- 6- Conductive education

1- Neuro-Developmental Technique

- *Bobath and Bobath (1975)* based their system on the idea that there is **lack of inhibition of the reflex** patterns of posture and movement in CP children which **is the fundamental difficulty**.
- They associated these abnormal patterns with abnormal tone due to **over action of the tonic reflexes**.
- They stated that the tonic reflexes (as ATNR, STNR and various primitive reflexes) should **be inhibited**.
- Once the abnormal tone and reflex patterns have been inhibited there should be **facilitation of more mature postural reflexes or reactions**.

1- Neuro-Developmental Technique (cont.)

- The main feature of their work emphasized on :
- Reflex inhibitory patterns; which were selected to inhibit abnormal tone, associated with abnormal movement pattern and posture.
- Sensory motor experience; the reversal or breakdown of these abnormalities give the child the sensation of more normal tone and movements.
- Sensory stimuli are also used for inhibition and facilitation of voluntary movement.
- Facilitation techniques; for mature postural reflexes.
- Key points of control; are used for inhibition or facilitation.
- Developmental sequence; is followed and adapted to each child.
- All day management; Parents are advised on daily management

1- Neuro-Developmental Technique (cont.)

NDT is subjected to certain modification with the following features:

- Handling techniques aiming for
- Specific preparation for
- More normal activity to give possibility
- For performing more functional tasks

Handling and treatment techniques

- Use of Tone Influencing Patterns (TIPs) to modify abnormal postural tone
- Using Key Points of control,
- facilitating more normal patterns of movements and
- stimulating more normal voluntary, task oriented patterns.

2-Progressive pattern movements

- **Temple Fay**, a neurosurgeon in Philadelphia, recommended that CP children must learn the motion according to its development in evolution.
- In general, **Fay** suggested building up motion, from reptilian **squirring to amphibian creeping**, based on the idea that mammals can carry out these early movements through reciprocal motion “on all four” to the primate erect walking.
- He stated that animals carried out these early movements of progression with a simple nervous system, these movements can similarly be carried out in human in the absence of a normal cortex.
- The mid brain, pons and medulla could be involved in the stimulation of primitive patterns of movement and primitive reflexes, so, the handicapped parts of the body may be activated.

2-Progressive pattern movements (cont.)

- Based on these ideas, Fay developed progressive patterns of movements, which consist of five stages namely:
 1. prone lying stage
 2. homolateral stage
 3. contralateral stage
 4. quadriped on hands and knees stage (elephant walking)
 5. and finally walking pattern stage.

3-Reflex creeping and other reflex reactions

The Vojta Technique

- **Vojta**, a neurologist, developed his approach from the work of **Temple Fay**.
- The basic treatment is to use proprioceptive trigger points on the trunk and extremities to initiate reflex movement, which produces rolling, crawling, and other specific functions.
- **Vojta** established 18 points in the body for stimulation and used the positions of reflex crawling and reflex rolling. He proposed that placing the child in these positions and stimulation of the key points in the body would enhance CNS development .
- In this way the child is presumed to learn normal movement patterns in place of abnormal motion.
- These stimulations have to be done every day by the family at home at least 4-5 times daily.
- The treatment is believed to be of most benefit in the first or second year of life.

3-Reflex creeping and other reflex reactions(cont.)

The main features are:

- 1- Reflex creeping. The creeping patterns involving head, trunk and limbs are facilitated at various trigger points or reflex zones.
- 2- Reflex rolling are also used with special methods of triggering.
- 3- Sensory stimulation. Touch, pressure, stretch and muscle action against resistance are used in facilitation of creeping.
- 4- Resistance is recommended for action of muscles. Various specific techniques are used to apply the resistance so that muscle action is provoked

4-Sensory Motor Treatment Approach

The Rood Technique

- Margaret Rood, a physiotherapist and occupational therapist, based her approach on many neurophysiological theories. She believed that motor pattern can be modified through sensory stimulation.
- The sensory motor technique depends heavily on tactile stimulation to facilitate normal movement.
- Techniques of stimulation, such as stroking, brushing (tactile); icing, heating (temperature); pressure, slow and quick muscle stretch, joint retraction and approximation, are used **to activate, facilitate or inhibit motor response**.
- She focused on using the sensory stimulation to normalize the muscle tone, after that the child can bear weight on limbs, can move through the developmental sequences of movement.
- Many of the parameters of sensory motor therapy have been integrated into the NDT approach as it is currently used.

5-Sensory Integration Treatment Approach: *The Ayers Technique*

- **Ayers** , who is trained as an occupational therapist. was developed this treatment approach.
- She recognized that some children with CP has difficulties with attention, behavior and visual perception. These difficulties is related to sensory integration
- The basic goal of this therapy technique is to teach children how to integrate their sensory feedback and then produce useful and purposeful motor responses.
- The sensory integration approach tries to have these children access **and integrate all their sensory input to use for functional gain.**

Cont.) (5-Sensory Integration Treatment Approach

- Activities such as catching a ball in different positions may be used as a way of stimulating and requiring integration of visual, vestibular, and joint proprioception feedback systems at the same time.
- **Typical stimulations** include vestibular stimulation and tactile stimulation by brushing , rubbing. Joint compression and traction
- Educating the parents is recognized as an important aspect of the treatment
- **The theory** underlying this system is that sensory input followed by appropriate motor function will contribute to the improved development of higher cortical motor and sensory function.

6- Conductive Education

Peto Technique

- **Andreas Peto** developed conductive education as an educational technique for children with CP.
- The children were treated by conductors in a facility where they lived full time. The main features of this system was the integration of therapy and education by having:
- A conductor acting as, a mother, nurse, teacher, therapists. The conductor was trained in the habilitation of motor disabled children, and had one or two assistants.
- Group of children; about fifteen to twenty children worked together in groups, which was a fundamental part in this training system.
- An all–day program; a fixed time-table was planned. It includes: getting out off bed in the morning, dressing, feeding, toileting, movement training, speech, reading, writing and other school work.

6- Conductive Education(cont.)

- The movements form the elements of a task or motor skill. The tasks were carefully analyzed for each group of children. They included activities of daily living, motor skills including hand function, balance and locomotion.
- The purpose of each movement was explained to the children and the movements were repeated throughout the day,
- Rhythmic intention was used for training the elements or movements. The conductor and the children state the intended motion: e.g. “I touch my mouth with my hands.
- Individual sessions were conducted for some children to help them to participate more adequately in the work of the group.

Conventional exercises

- Active and passive range of motion to maintain full ROM and prevent contractures
- Stretching of tight muscles
- Strengthening of antagonist muscles
- Balance training
- Suspension (static & dynamic)
- Fitness for wheelchair adolescent

Strengthening and stretching exercises



Equilibrium reactions and balance



Bracing

Braces are devices which hold the extremities in a stable position.

Goals of brace prescription

1. Increase function
2. Prevent deformity
3. Keep joint in a functional position
4. Stabilize the trunk and extremities
5. Facilitate selective motor control
6. Decrease spasticity
7. Protect extremity from injury in the postoperative phase

Braces in CP

- Ankle foot orthoses: AFOs
- Knee-ankle foot orthoses: Plastic KAFOs and knee immobilizers
- Hip abduction orthoses
- Thoracolumbosacral orthoses: TLSOs
- Foot orthoses: FOs
- Hand splints
- Spinal braces
- Suits (Therasuit, Lycra suits)

Knee-ankle foot orthoses KAFOs



Ankle foot orthoses AFOs



Hand splints



Foot orthoses



knee immobilizer



Spinal brace



Therasuit



Example of a lycra garment



Mobility aids & Assistive Devices

- A child with CP needs to move around, to explore his surroundings and to interact with his peers.
- A variety of mobility aids and wheelchairs provide differing degrees of mobility to these children
- **Types of Mobility Aids**
 - ❖ Transfer aids (standers & board)
 - ❖ Gait aids (walkers , Canes, crutches)
 - ❖ Wheelchairs
 - ❖ Seating systems

Canes



Crutches



Walker



Wheelchair



Seating systems



Stander



Assistive aids

There are a variety of assistive devices used in children with CP to gain function. These devices aim to increase the child's independence in activities of daily living, communication, education.



Occupational therapy

- Occupational therapy aims to improve hand and upper extremity function in the child through play and purposeful activity.
- OT is teaching the child activities of daily life. These include how to write, draw, cut with scissors, brush teeth, dress and feed or control the wheelchair.
- Occupational therapists help children find the correct equipment to make the function easier.



OT teaches the child ADL such as dressing and buttoning up.

Sports and recreation

- Disabled children need to be involved in sports and recreational activities just like their peers.
- Sports and recreational activities also form part of the rehabilitation program.
- Physical activity plays an important role in physical development, general fitness and health and provides fun & recreation.
- Sports provides the only means of improving the child's neuromotor abilities and preventing deformities when he is at school.
- **Swimming and horseback riding (hydrotherapy & hippotherapy)** are sports that have significant therapeutic effects in CP as follow
 - ✓ increase muscle strength and range of motion
 - ✓ improve sitting balance and body control
 - ✓ Provide fun

Horse back riding Hippotherapy



Swimming Hydrotherapy



Tricycle

Adjuncts to therapy

- **Localized injections of botulinum toxin** are given into muscles that are spastic, aiming to reduce the muscle hypertonus that can be painful. A reduction in muscle tone can also facilitate bracing and application of exercises.
- **Hyperbaric oxygen therapy (HBOT)** in which pressurized oxygen is inhaled inside a hyperbaric chamber aiming to improve oxygen availability to damaged brain cells to reactivate some of them to function normally.

Assignment

Assessment of gross motor milestone by Gross motor function
Measure (GMFM)

Thank you