



A case report of pediatric rehabilitation of spastic quadriplegic cerebral palsy

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Abstract

Cerebral palsy is commonly associated with a spectrum of developmental disabilities, including mental retardation, epilepsy, visual, hearing, speech, cognitive, and behavioural abnormalities and locomotion. The purpose of this case report was to determine the effect of a physical therapy intervention on these symptoms in a 14 months old male subject with spastic quadriplegic cerebral palsy associated with mild valvular pulmonary stenosis, congenital hypothyroidism with medullary nephrocalcinosis affecting his both kidneys. Sensory diet, neuro developmental therapy along with parental counselling were found to be beneficial with respect to all outcome measures taken after 1 year. Its findings support the use of exercise in subjects with multiple disabled child and provide clinically valuable knowledge regarding the treatment efficacy of cerebral palsy exercise regimens.

Key-Words: quadriplegic spastic cerebral palsy (CP); Neuro developmental therapy; metabolic disorder; CHD;

Case study :

Introduction:

“Cerebral palsy is a group of permanent disorders of development of movement and posture causing activity limitations, attributed to non progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication and behavior by epilepsy and by secondary musculoskeletal problems.”^[1]The incidence of Cerebral Palsy is up to 3 cases per 1000 live births in India.^[2]The prevalence of CP is the range of 1.5 to 2.5 per 1000 live births⁽²⁾. The predominant types of motor impairment are spastic, dyskinetic, ataxic and mixed⁽³⁾

Case report:

A 14 months old male subject, with global delayed development since birth with multiple associated factors. According to parents complaints of patient started to develop since birth. At age of 14 months he could not control his neck, not achieved sitting, not able to understand surrounding atmosphere, poor grasping, poor speech with other multiple developmental disabilities and metabolic disorders. They consulted many doctors in this period and finally came to paediatric physiotherapy department of C. M. Patel college of physiotherapy in 1st December 2016.

According to his mother, she has positive antenatal history of TORCH infection, Pre-eclampsia and oligohydroamniotic fluid. Child has very low birth weight (1.4 kg), also having NICU stay for 3 days, child has history of seizure at 3 months of age. So, admitted in hospital for 1 month and where found small cystic



lesion in bilateral periventricular white matter & benign enlargement of subarchanoid space on MRI of brain dated 1st October 2016. Both kidneys found Medullary nephrocalcinosis on USG whole abdomen dated 2nd October 2016. Mild valvular pulmonary stenosis found 2 D echo with colour Doppler study dated 3rd October 2016. Rickets with white line healing found on x-ray dated 6th Oct, 2016. Also diagnosed child with having congenital hypothyroidism, hypervitaminosis D, protein energy malnutrition grade-1. Child found not any abnormality was detected on BERA test , VEP test and chromosomal analysis test.

His 1st day assessment was :

Gross motor findings:

Prone development: not able to lift his head.

Sitting: In pulled to sit from supine position not abled to lift his head, head drop

Standing: with static standing frame: had severe equines, knock knee with hyper extension, flexion of hips.

Fine motor findings:

Bidextrous reach achieved (10 months)

unidextrous reach achieved (12 months) (Right>Left)

Speech and lngauage findings :

Alert to sound (6 months)

Only cooing present (12 months)

Social development findings :

He recognises his mother, having stranger anxiety. (12 months)

He scored maximum milestones in social function than others domains.

Child also had microcephaly, primitive reflex present , brisk deep tendon reflex ,spasticity present, poor postural control with global delayed development with multiple developmental disabilities.

Baseline outcome of child (Before treatment):

Outcome	Level/score	Specification
GMFCS	Level -5	
GMFM -88	8.23%	Lying:21/51 Sitting :0/60 Crawling : 0/42 Standing :0/39 Walking : 0/72

Physiotherapy Intervention

Nature and purpose of the study was explained to the subject's caretaker, and informed written consent was obtained. The entire session was lasting for 45 minutes, 5 days a week designed to achieved his mile stones.



Parental counselling :

Role of mother:

- ✓ Explain the mother about the function of brain & motor development.
- ✓ Explain her about problem of child disability.
- ✓ Communication from mother to child (laughing ,smiling, hugging ,kissing is not there in CP)
- ✓ Depression of mother affect the child most.
- ✓ Avoid comparison with normal child

Handling & carrying:

- ✓ Mother/ father approach from the front.
- ✓ Keep the child as close as possible enough support is provide.

Positioning :

- ✓ **For adductors hyper tonicity:**At your waist with legs apart on both side of trunk .
- ✓ **Prone:** More symmetrical but usually need to be raised of the floor such as on a wedge in order to use the hands & head. A sand bag or strap place across the child's bottom may be needed to help the child to maintain position.
- ✓ **Side lying** Both hands are within his vision & are more likely to be used together. All positions should be given alternatively & change frequently
- ✓ **Sitting in various position:** prop sitting, cross leg sitting, lonf sitting , corner sitting

Physiotherapy treatment protocol:

Initial stage (14 months to 16 months)

- **Sensory diet** on whole body with different textures.
- **Neuro developmental therapy includes:**
- ✓ Positioning in correct posture with help of pillows and assistive devices. Lots of visual and auditory stimulations with toys were added. Positioning maintain for 10 minutes: prone on elbow , corner sitting
- ✓ Facilitation of rolling
- ✓ Facilitation of neck extensors
- ✓ Prone push ups on swiss ball

Achieved milestones : (14 to 16 months)

Gross motor	Fine motor	Language and speech	Social
Neck control achieved in pulled to sit from supine position Neck control achieved in prone position for 2-3 minutes	No improvement	No improvement	No improvement



Treatment protocol (17 months to 19 months)

- **Sensory diet** on whole body with different textures.
- **Neuro developmental therapy includes:**
 - ✓ Positioning in correct posture with help of pillows and assistive devices. Lots of visual and auditory stimulations with toys were added. Positioning maintain for 10 minutes: prone on elbow , corner sitting
 - ✓ Facilitation of rolling
 - ✓ Facilitation of internal and external oblique muscles
 - ✓ Facilitation of neck extensors
 - ✓ Prone push ups on swiss ball
 - ✓ Vestibular stimulation on swiss ball.

Achieved milestones : (17 to 19 months)

Gross motor	Fine motor	Language and speech	Social
Neck control good Rolling started partially Sitting in tripod manner achieved for 5 minutes	No improvement	Monosyllables	Waves 'bye-bye' achieved sometimes.

Treatment protocol (20 months to 22 months)

- **Neuro developmental therapy includes:**
 - ✓ Facilitation of rolling
 - ✓ Facilitation of internal and external oblique muscles
 - ✓ Facilitation of creeping on swissball
 - ✓ Sitting on swiss ball : facilitate core muscles
 - ✓ Sitting on bolster with weight shifting for 10 minutes
 - ✓ Sitting on wedge for 10 minutes forward and backward
 - ✓ Kneeling position with forward support
 - ✓ Started standing on standing frame with AFO and gaiters for 10 minutes

Achieved milestones : (20 to 22 months)

Gross motor	Fine motor	Language and speech	Social
Purposeful rolling achieved Independent sitting achieved Creeping started for 3-	Immature pincer grasp achieved	Monosyllables	Waves 'bye-bye' achieved.



4 steps			
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Treatment protocol (23 months to 25 months)

- **Neuro developmental therapy includes:**
 - ✓ Sitting on swiss ball : facilitate core muscles
 - ✓ Sit to stand through Forward support
 - ✓ Stand from kneeling, Press the ball and stand up, Half kneeling and then stand up
 - ✓ Backward supported standing with AFO and gaiters – facilitation of trunk rotators , facilitation of hip abductors (weight shifting strategy)

According to progression treatment plan should be modified and progression was done

After treatment plan progression: (at age of 25 months)

Gross motor findings:

Prone development : child can maintain quadruped position by self. Child can creep by self, rolling achieved.

Sitting: child can achieved sitting from supine by himself with minimum assistance. Child can maintain independent sitting with both hands are free to manipulate objects.

Standing : kneel to stand achieved with minimal support. back self supported standing achieved for 5 minutes with AFO. Front self supported standing achieved for at least 20 minutes.

Fine motor findings:

Bidextrous reach and unidextrous reach achieved. Immature pincer grasp achieved .

Speech and language findings : Bisyllables achieved , 1-2 words with meaning achieved.

Social development findings : He comes when called and play a simple game., copies parents in task. He achieved reduction of spasticity with good postural control.

Future plan:

- ✓ Long term goal for him is to improve independent standing and walking for minimum support

Baseline outcome of child (After treatment):

Outcome	Level/score	Specification
GMFCS	Level between 2-3	
GMFM -88	52.05%	Lying:51/51= 100% Sitting :52/60=86% Crawling : 19/42= 45.2% Standing :07/39=17.04% Walking : 08/72= 11.11%



Result :

- Pre and post data along with percentage improvement are shown in this table.

Outcome	Pre	Post
GMFCS	Level- 5	Level – between 2 to 3
GMFM-88	8.23%	52.05%

The patient showed significant improvement in gross motor function after 1 year of physiotherapy treatment.

Conclusion:

A combination of patient and parents compliance, neuro developmental technique , use of assistive devices and maintaining a healthy and active lifestyle contributed to the success of this rehabilitation approach. It led to an improvement in gross motor milestones, fine motor milestones , functional capacity and make him independent in future . thus supporting the use of exercise regimens in spastic quadriplegic cerebral palsy.

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