# CASE STUDY –

# SAYAN DAS

## Spastic diplegic Cerebral palsy with intellectual disability, apraxia, and with features of Autism Spectrum Disorder (ASD).

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# BIODATA OF THE PATIENT

**NAME: -** SAYAN DAS

**AGE: -** 12 years

**SEX: -** MALE

**FATHER'S NAME: -** MAHESH DAS

**MOTHER'S NAME: -** NIRSIPTA DAS

**ADDRESS: -** CUTTACK, ODISHA

# SUBJECTIVE EVALUATION

## Chief Complaint: -

- Inability to walk
- Delayed speech and language development (absent speech)
- Impaired hand eye coordination
- Intellectual disability

## History Of Present Illness: -

- The patient, a 12-year-old male child, presented with concerns of inability to walk properly without assistance, delayed speech and language development, and intellectual disability. The parents report that the child only speaks syllables such as 'ma' and has very limited incomprehensible speech. The child understands commands but does not obey them. The child also has difficulty walking and standing, with increased stiffness in the lower limbs.

- ❖ **Prenatal birth history: -** No such history
- ❖ **Perinatal birth history: -** FTND, Normal and immediate birth cry.
- ❖ **Postnatal birth history: -**

- The child had pneumonia with high grade fever at the age of around 4 months and was admitted to NICU for 10 days for the same.
- The parents first noticed delays in the child's development around 5 months, when they failed to reach expected milestones such as neck control and the subsequent milestones.
- There is also a history of occasional seizures 4-5 years back.
- The child's stiffness in the lower limbs has gradually worsened over time, making it difficult for him to move his legs or stand without support.
- The parents have tried various therapies, including physical therapies, started at the age of 2 years at a Physiotherapy setup after which they have seen significant improvement in reaching child’s developmental milestones. They are concerned about the child's future development specifically standing and walking independently and are seeking further evaluation and guidance at The Hope Rehab Centre since August 2023.
- **Onset:** 4 months
- **Duration:** Chronic
- **Progression:** Gradual worsening of stiffness and tightness in lower limbs.
- **Aggravating factors:** when the child is excited, sad or scared (extremes of emotion), or when he/she is trying really hard with an activity

- **Relieving factors:** None

**Associated symptoms:**

- Intellectual disability
- Limited social interaction and eye contact
- Absent speech
- Repetitive trunk movement (stereotypy)

**Treatment History: -**

Patient is on Valproate medication for the treatment of seizures.

**Family History: -**

The patient has one four-year younger brother who has not been diagnosed with any such disorder.

**Socioeconomic History: -**

The father of the patient owns a business.

The patient lives in a well-furnished house.

## Past illness: -

The child had pneumonia with high grade fever at the age of around 4 months and was admitted to NICU for 10 days for the same.

## Developmental milestones

All developmental milestones were delayed.

The child reached all developmental milestones after receiving physical therapy at the age of 3 years in the following order –

- Neck control
- Supine to sit
- Sitting
- Kneeling
- Kneel walking
- Kneeling to standing by pulling onto support
- Walking with full assistance

# OBJECTIVE EVALUATION

## On Observation: -

- **General observation-**

Patient came to the department, walking with jump knee gait with mother's assistance.

- **Physical observation-**

Slow weight gain and growth.

Head circumference is within normal limits.

There is B/L flat foot and eversion of foot.

Repetitive trunk movements are observed in sitting.

Limited social interaction and eye contact.

- **Behavioural observation-**

The patient appears to be uncooperative to commands.

Patient does not responds to their name when called.

He exhibits repetitive body rocking movement.

He seems to be self-soothing and comforted by these movements.

## Musculoskeletal evaluation: -

**T/C/D –**

- Tightness present in bilateral Hamstring as tested by 90-90 hams test.
- Tightness present in bilateral rectus femoris as tested by Ely's test.
- Tightness present in bilateral short adductors.

## Neurological evaluation: -

**Examination of sensory system** – Sensory system is intact.

**Examination of motor system-**

- **Muscle tone** – Hypertonia in bilateral hip and knee flexor and ankle plantar flexors.

  Normal tone in bilateral upper limb.

- **Muscle power** – 3/5 in all muscles of lower limb.

  4/5 in all muscles of upper limb.

- **Coordination** – Not tested because the patient was not co-operative.

- **Involuntary movements** – Repetitive trunk rocking movement present.
- **Gait** – Jump knee gait. Child walks with hips in flexion, knees in flexion and ankles in plantarflexion as if getting ready to jump.

**Examination of Reflexes –** Deep Tendon Reflexes (DTR)

| | Right | Left |
|---|---|---|
| Quadriceps tendon | 3+ | 3+ |
| Tendo achilles | 3+ | 4 (clonus present) |
| 2+ | 2+ | Biceps |
| 2+ | 2+ | Triceps |

**Examination of Reflexes –** SUPERFICIAL REFLEXES-

Plantar reflex- Left side Babinski reflex.

## Functional abilities

- Able to sit from supine (independent).
- Able to roll
- Able to kneel walk
- Able to sit independently
- Able to stand from kneel by pulling onto support
- Able to walk with manual assistance in jump knee gait.

# DETAILED ASSESSMENT REPORT

| | |
|---|---|
| Gross Motor Activities | Poor in Gross motor activities |
| Fine Motor Activities | No fine motor activity |
| Meal Time Activities | No meal time activity |
| Dressing | Can't dress himself |
| Grooming | Can't groom himself |
| Toileting | Toileting in bed |
| Receptive Language | Some receptive language present |
| Expressive Language | No expressive language |
| Social Interaction | No social interaction |

| | |
|---|---|
| Reading | No reading ability |
| Writing | No writing ability |
| Numbers | Can't recognise numbers |
| Time | |
| Money | No recognition of money |
| Domestic activities | No domestic activities |
| Community orientation | No community orientation |
| Recreation, leisure time | No recreational or leisure time activity |
| Vocational activities | No |

# ASSESSMENT

## Provisional diagnosis:

Based on the above subjective and objective evaluation, a possible diagnosis for this 12-year-old male child could be:

**Spastic diplegic Cerebral palsy with intellectual disability, apraxia, and with features of Autism Spectrum Disorder (ASD).**

## Differential diagnosis:

- **Spastic quadriplegia:** Although the tone is normal in the upper limbs, the presence of hypertonicity in the lower limbs and increased reflexes suggests a possibility of spastic quadriplegia.
- **Rett syndrome:** The repetitive trunk movement and limited social interaction may also be seen in Rett syndrome, a genetic disorder that affects brain development.
- **Static encephalopathy:** Given the history of pneumonia and NICU admission, this could be a contributing factor to the child's condition.
- **Global Developmental Delay (GDD):** This diagnosis is considered when there are significant delays in multiple areas of development, including motor, language, and cognitive skills.

A breakdown of the diagnostic clues:

1. **Intellectual Disability**: The child has intellectual disability, which is a common comorbidity with CP.
2. **Delayed Motor Milestones**: The child has delayed motor milestones, including inability to walk, which suggests a motor disorder.

3. **Hypertonicity in Bilateral Lower Limbs:** The presence of hypertonicity (increased muscle tone) in the lower limbs, with normal tone in the upper limbs, is consistent with spastic diplegia, a subtype of CP.
4. **Increased Deep Tendon Reflexes and Babinski Sign:** The increased deep tendon reflexes and presence of Babinski sign in the left lower limb indicate upper motor neuron involvement, which is consistent with CP.
5. **Clonus:** The presence of clonus (a rhythmic, involuntary muscle contraction) in the left ankle further supports the diagnosis of CP.
6. **Normal Upper Limb Tone but No Fine Motor Control:** The absence of fine motor control in the hands, despite normal tone, suggests apraxia, a disorder of motor planning and coordination.
7. **Repetitive Trunk Movement:** The repetitive trunk movement may indicate a movement disorder or stereotypy, which is sometimes seen in children with CP and ASD.
8. **Limited Social Interaction and eye contact:** The child's limited social interaction and repetitive behaviors suggest features of Autism Spectrum Disorder (ASD).
9. **History of pneumonia and NICU admission:** Possible insult or infection contributing to CP.

# PLAN OF CARE

## Goals

| SHORT-TERM GOALS (6-12 months) | LONG-TERM GOALS (1-2 years) |
|---|---|
| Increase strength in core and lower limb muscles by 15%. | Achieve independent standing for 30 seconds. |
| Achieve assisted standing with support for 30 seconds. | Take 5-10 steps with support. |
| Enhance fine motor control in hands by 10%. | Improve fine motor control in hands to perform simple activities (e.g., grasping, releasing). |
| Reduce repetitive trunk movements by 20%. | Increase social interaction to initiate and maintain interaction 50% of the session. |
| Increase social interaction by initiating interaction 2-3 times per session. | Reduce hypertonicity in lower limbs by 30%. |
| | Improve overall mobility and ambulation skills. |

# PHYSICAL THERAPY INTERVENTIONS

- ❑ **Passive Range of Motion exercises for lower limbs**– To maintain full range and prevent contractures.

- ❑ **To reduce spasticity in the lower limbs –**

1. **Stretching and ROM ex:**
   - Gentle, sustained stretching of Tendo-achilles, Hamstring muscle, and Rectus-femoris muscle.
   - Passive ROM exercises of lower limb for hip joint range of motion, knee joint range of motion and ankle joint range of motion.
2. **Bracing and Orthotics:**

- Knee-ankle-foot orthoses to support and stabilize the limbs, reducing spasticity and improving mobility.

3. **Modalities:**

- Slow-icing to relax muscles.

❑ **Strengthening exercises for core and lower limb muscles -**

- Strengthening of glutei through pelvis bridging.
- Strengthening of back extensors by lying the patient prone on swiss ball with support.
- Strengthening of abdominals by making the patient sit on the swiss ball with hands kept at side over the ball supported.
- Strengthening of hip abductors by positioning the patient in side lying and asking him to side lift the above lower limb and making the progression by hanging a weight cuff at the ankle.
- Strengthening of quadriceps by making the patient sit in high sitting at the edge of the bed, then asking the patient to lift the leg and making the progression by hanging a weight cuff at the ankle.
- Strengthening of lower limbs by running static bicycle.

❑ **Mat activities for improving overall strength, reducing spasticity and practicing of activities-**

- Quadruped weight shifting
- Kneel standing
- Half-kneeling
- Kneel sitting to kneel standing

- Sit to stand.

❑ **Functional stretching of tight muscles to increase neuromuscular control – stretching of hip flexors, hip extensors, short abductors of hip, tendo-achilles.**

- Stretching of hip extensor (Hamstring) and gastro-soleus – patient in long sitting with feet placed against a wall and knees pushed down towards couch.
- Stretching of hip flexor (Rectus femoris) – prone lying.
- Stretching of short adductors of hip – making the child sit in cross sitting and discouraging W-sitting.

❑ **Sensory integration techniques to reduce repetitive movements –**

- **Deep pressure proprioception:** Provide deep pressure input to the trunk and joints to help regulate the sensory system and reduce repetitive movements. –

✓ Joint compressions

✓ Deep squeezes

✓ Using a weighted vest or blanket

- **Tactile integration:** Provide tactile input to the trunk to help integrate sensory information and reduce repetitive movements. –

✓ Brushing or stroking the skin.

✓ Using different textures and fabrics.

✓ Applying gentle vibrations.

- **Vestibular stimulation:** Provide vestibular input to help regulate sensory system and reduce repetitive movements. –

✓ Gentle rocking or swaying.

✓ Sitting on a trampoline.

- **Sensory diet:** Includes a variety of sensory experiences, such as:

✓ Heavy work activities: e.g., pushing or pulling

✓ Fine motor activities: e.g., playdough, puzzles

- **Trunk organizing activities:** Engaging the child in activities that promote trunk stability and organization, such as –

✓ Trunk curls and extensions

✓ Bridging

✓ Animal walk (crawling)

❑ **Fine motor training for hands –**

✓ Finger bends and straightens: Gentle exercises to improve finger flexion and extension.

✓ Finger spreads and closes: Exercises to enhance finger abduction and adduction.

✓ Finger circles: Rotational movements to improve finger dexterity.

✓ Finger walks: Moving fingers one by one, like walking, to enhance finger independence.

✓ Playdough or putty exercises: Manipulating playdough or putty to strengthen fingers and improve dexterity.

✓ Finger opposition: Exercises to improve thumb-finger opposition, essential for grasping and manipulating objects.

- ✓ Tactile integration: Using different textures, temperatures, and vibrations to stimulate sensory receptors in the hand.
- ✓ Sensory-motor integration: Combining sensory input with motor activities to enhance hand function.
- ✓ Hand-eye coordination exercises: Activities that require simultaneous hand and eye movement, like catching or tossing small objects.
- ✓ Fine motor skill activities: Engaging in activities that require precise finger movements, such as: - Puzzles - Buttoning or zipping

- Using small tools (e.g., tweezers, screwdrivers) - Playing musical instruments

- ✓ Mirror box therapy: Using a mirror box to create a reflection of the unaffected hand, tricking the brain into thinking the affected hand is moving.
- ✓ Constraint-induced movement therapy (CIMT): Restricting the unaffected hand to encourage use of the affected hand. These techniques should be tailored to the individual's specific needs and goals, and implemented under the guidance of a physical therapist.

❑ **Postural control and balance training -**

- Sitting balance on swiss ball.
- Standing balance on trampoline.

❑ **Gait training with support -**

**Play-based therapy to encourage social interaction**

# PHYSICAL THERAPY COMPARISON OF RESULTS AFTER ONE YEAR OF THERAPY.

- Documentation of reassessment after 6 months of intervention not available.
- Progress report after 1 year of physical therapy intervention -

| | AUGUST 2023 (FIRST VISIT) | JULY 2024 | REMARKS |
|---|---|---|---|
| Lower limb muscle strength | 2/5 (B/L) | 3/5 (B/L) | 20% increase in lower limb strength. |
| Upper limb muscle strength | 3/5 (B/L) | 4/5 (B/L) | 20% increase in upper limb strength. |
| Core strength | 2/5 (B/L) | 4/5 (B/L) | 40 increase in core strength. |
| Tone in upper limbs | Normal | Normal | - |
| Tone in lower limbs | Hypertonia (MMAS Score = 3) | Hypertonia (MMAS Score = 2) | 20% reduction in tone. |
| Reflexes | 3+ in B/L lower limbs<br>Babinski sign present in left side. | 3+ in B/L lower limbs<br>Babinski sign present in left side. | - |
| Gait | Jump knee gait | Jump knee gait | - |

| | AUGUST 2023 (FIRST VISIT) | JULY 2024 | REMARKS |
|---|---|---|---|
| Gross motor control | Stands with support for 10 seconds.<br><br>Couldn't walk more than 4 steps even with assistance. | Stands with support for more than 30 seconds.<br>Stands without support for 20 seconds.<br>Can walk with assistance.<br>Can walk 2-3 steps without assistance. | Both the long term goals are achieved – (Achieve independent standing for 30 seconds.<br>Take 5-10 steps with support.) |
| Fine motor control | Didn't use hands at all. | Does clapping, holds hands, pushes things, arranges paper pieces. | Yet to achieve good grasping and releasing. |

# Special education progress report

| MONTH | PLAN OF INTERVENTION | DETAILS OF INTERVENTION MADE IN CURRENT MONTH | PROGRESS MADE IN THE CURRENT MONTH | FURTHER INTERVENTION PLAN FOR COMING MONTH |
|---|---|---|---|---|
| AUGUST | Puts beads in needle | Holds beads in right hand & needle in left hand to put the beads in the needle. | 40% progress in this skill | Coloring the mango picture |
| SEPTEMBER | Coloring the mango picture | Picks up crayon by right hand, then starts coloring the picture by covering the periphery first then filling up the whole picture. | 40% progress in the skill | Matching numbers |
| OCTOBER | Matching numbers 1,2,3 | Matches the numbers 1,2 and 3 from abacus and picture box. | 50% progress in this skill. | Identifying animals |
| NOVEMBER | Identifying animals | Identifies animals from flashcard and charts. | 50% progress in this skill | Put beads on keyboard. |
| DECEMBER | Put beads on keyboard. | Puts the beads and keys on the keyboard. | 75% progress in the skill | Make a circle |

| | | | | |
|---|---|---|---|---|
| JANUARY | Make a circle | Draws a circle using crayon. | 50% progress in this skill. | Coloring an apple picture. |
| FEBRUARY | Coloring an apple picture | Colors the apple picture using crayon. | 50% progress in this skill | Identify birds (crow, parrot, owl) |
| MARCH | Identify birds (crow, parrot, owl) | Identifies birds from pictorial charts. | 65% progress in the skill | Matching numbers 4, 5 & 6. |

| | | | | |
|---|---|---|---|---|
| APRIL | Matching numbers 4, 5 & 6. | Matches 4,5 and 6 from flashcard and picture box. | 50% progress in this skill. | Identifying fruits. |
| MAY | Identifying fruits. | Identifies fruits from flashcards and pictorial charts. | 60% progress in this skill | Tracing on A. |
| JUNE | Tracing on A. | Traces over letter A with pencil and crayons. | 65% progress in the skill | Identify numbers 4, 5 & 6. |