



Comprehensive Physical Therapy Intervention for a 5-Year-Old Girl with Left Hemiplegic Cerebral Palsy: A Case Study

Sneha Hiren Bhalala

Assistant Professor, SPB Physiotherapy College, Surat

Introduction:

This case study focuses on Kiya, a 5-year-old girl diagnosed with left hemiplegic-pattern cerebral palsy (CP). Kiya's parents have sought outpatient physical therapy due to concerns regarding her decreased left lower extremity (LE) flexibility, increased gait dysfunction, and poor balance, particularly in preparation for her transition to kindergarten. Kiya's medical history reveals a complex developmental trajectory, including a grade IV intraventricular hemorrhage at birth, congenital hydrocephalus requiring shunt placement, cortical visual impairment, and a diagnosis of left hemiplegia. Developmentally, Kiya has received early intervention services, including occupational therapy, physical therapy, and speech and language therapy, addressing concerns related to her motor and functional abilities. Physical therapy examination highlights impairments in Kiya's left LE strength, range of motion (ROM), tone, sensation, and functional mobility, as well as gait abnormalities and balance deficits. The assessment indicates a favorable prognosis with continued intervention. The intervention plan involves stretching, strength training, therapeutic handling, bracing, gait training, and patient/parent education. With comprehensive therapy, Kiya demonstrates improvements in gait, balance, and functional mobility, highlighting the importance of early and ongoing intervention in optimizing outcomes for children with CP.

Case Description:

Kiya is a 5-year-old girl with a diagnosis of left hemiplegic-pattern CP referred to outpatient physical therapy owing to decreased left LE flexibility, increased gait dysfunction, and poor overall balance. Kiya's parents express concern about Kiya's safety at school and on the school playground, as she will enter kindergarten in the fall. Past Medical History Kiya is a bright and happy 5-year-old girl who was diagnosed with left hemiplegia at 3 years of age. She was born full term at 38 weeks' gestation. During the birthing process, a fetal monitor showed frequent fluctuations in Kiya's heart rate, indicating distress. For this reason, immediately following her birth, she underwent an MRI to determine whether any cerebral insult occurred. This neuroimaging showed a grade IV intraventricular hemorrhage, enlarged lateral ventricles with the right ventricle larger than the left, increased head circumference, and bulging fontanels. At this time, she also presented with nystagmus. She underwent a shunt placement at 3 months of age owing to congenital hydrocephalus. She was evaluated at 6 months of age by an ophthalmologist who diagnosed her with cortical visual impairment, optic atrophy, and severe visual impairment. An orthopedic surgeon, who gave Kiya the diagnosis of left hemiplegia after her third birthday, has also followed her from infancy. Developmental History Kiya participated in occupational therapy, physical therapy, and speech and language therapy from birth owing to concerns related to overall developmental delay. She was provided all of these services in her home through an early intervention program to address functional concerns that arose from her left hemiplegia, decreased mobility, and decreased vocalizations. At 5 months, Kiya was able to roll from supine to prone and vice versa, initiating both transitions by arching through her back and neck. She was able to sit independently at 11 months, but preferred a "W" position. At 18 months, she began creeping with an asymmetrical "bunny hop" pattern. At 21 months, Kiya was able to stand independently with right UE support at the family couch and cruise in both directions; however, she preferred to cruise to the right. At 24 months, Kiya took her first independent steps, and was walking consistently without an assistive device at 30 months.

Physical Therapy Examination

Precautions:

Ventriculoperitoneal (VP) shunt

Pain:

According to the Wong Backer Faces Pain Scale, Kiya reported a 0/10 pain level related to activities of tasks.

ROM:

Right hip, knee, and ankle: within normal limits (WNL); left hip flexion: 100 degrees, left hip extension: 10 degrees, left knee extension: WNL, left popliteal angle: 35 degrees, left ankle dorsiflexion (DF) with knee extension: 2 degrees, left ankle DF with knee flexed: 10 degrees; right shoulder, elbow, and wrist: WNL; left shoulder flexion: 100 degrees, left elbow flexion: WNL, left elbow extension: 10 degrees, left wrist flexion: WNL, left wrist extension: 15 degrees.

Strength:

Manual muscle testing (MMT) bilaterally: right hip, knee, and ankle: 5/5; left hip flexion: 3/5; left hip abduction: 2/5; left hip adduction: 2/5; left knee extension: 3/5; left prone knee flexion: 21/5; left ankle DF: trace. Tone: MAS: left quadriceps: 1/5; left hamstrings: 2/5; three-beat clonus in left ankle.

Sensation:

Intact to light touch, hot and cold, sharp and dull.

Functional mobility:

Kiya is able to transition from sit-to-stand with increased weight shift to the left. She is able to transition from floor to standing through half-kneel leading with right LE and pulling up on an object using right UE. She is unable to hop on the left foot, but can hop three times in a row on the right. She fatigues quickly and is not able to keep up with her peers on the playground.

Gait/steps:

Kiya is able to ambulate independently with an asymmetrical gait pattern. She presents with decreased stance time and weight shift on the left in stance phase, has a shortened step length on the left, a retracted pelvis on the left, stiff knee on the left during swing, and initial contact with her forefoot on the left. She is noted to have inconsistent mild knee recurvatum during midstance on the left as well. She is able to ascend standard steps with a step-two pattern holding a railing with her right hand leading with her right foot. When descending steps, she leads with her left foot while holding the railing with her right hand.

Balance:

Single-limb stance on the right for 5 to 8 seconds; left less than 1 second.

Equipment:

Kiya has a solid AFO for her left LE, but parents report that she has not worn them in the past 9 months owing to skin irritation and Kiya complaining of pain whenever she wore it.

Physical Therapy Assessment/Prognosis-

Kiya is a 5-year-old girl with a diagnosis of left hemiplegia. She presented with left LE weakness, decreased ROM, decreased endurance, gait deficits, and difficulty keeping up with her peers. Overall, her prognosis was favorable. She would be able to safely attend her local public elementary school with some necessary accommodations. She would benefit from continued school based services as well as medical-model therapies to support her following a change in status or other medical interventions. She is also involved in a community dance class, which allows her to interact with her peers as well as work on balance and strengthening in a fun and social setting.

INTERVENTION (Physical therapy one to two times a week)

Stretching:

Stretching left hip extensors, left hamstring, left gastrocnemius, and soleus, three repetitions with a 30-second hold for each stretch.

Strength training:

Strengthening of left and right LEs was addressed through play skills, as a formal strengthening program was not appropriate due to Kiya's age. Activities included side stepping, transitions on and off the floor and from sit-to-stand, and forward and lateral step-ups.

Therapeutic handling:

Therapeutic ball work to address core strengthening, postural control, and left LE strengthening and stretching; facilitation of agonist/antagonist muscle groups during transitions to promote postural alignment and equal weight shifting.

Bracing:

After Kiya achieved 2 degrees of knee-extended dorsiflexion PROM with regular stretching, an articulating, thin-plastic, total-contact design AFO (Cascade DAFO 2) was recommended for use 6 to 8 hours per day. With her new AFO, Kiya almost immediately demonstrated consistent left heel strike, no genu recurvatum, and improved weight shift to the left during stance phase.

Gait training:

Gait training focused on improving heel strike at initial contact on the left, weight shifting to the left during stance phase, stride length on the left, and pelvic–femoral mobility due to pelvic retraction on the left.

Patient/parent education:

Home program consisted of stretching and strengthening activities associated with the goals that were being addressed during treatment.

Discharge/continuum of care:

Kiya 's parents have been intimately involved in all intervention decisions and have been excellent advocates for all her needs. She has benefited from a variety of interventions at home, in the medical model, and now in school, and within the community. Kiya will most likely continue to make progress toward a productive, full life with her family and friends, given the therapeutic and external supports necessary.

References:

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