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Case Report

Physiotherapy Rehabilitation in a 7-Year-old Male with Gait Impairment and Developmental Regression: A Case Report

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Abstract

This case report describes a 7-year-old male with gait impairment, frequent falls, and gross motor regression since age 4, despite normal early developmental milestones. Clinical findings included scissoring gait, bilateral lower limb hypotonia, proximal weakness, dystonic right-hand movements, and upgoing plantar reflexes, with normal neuroimaging. Differential diagnoses included cerebral palsy, hereditary spastic paraplegia, dopa-responsive dystonia, and proximal myopathy. Physiotherapy interventions focused on balance, strengthening, gait re-education, and functional independence. After a structured program (45 minutes per session, 5 days/week for 12 weeks), the child demonstrated measurable improvements in GMFM (71.78%), functional independence (FIM: 88), and gait stability, with reduced falls and improved ADL participation. This case highlights diagnostic challenges in pediatric motor disorders and underscores the essential role of physiotherapy in optimizing function despite diagnostic uncertainty.

Introduction

Pediatric gait abnormalities and developmental regression pose significant diagnostic and therapeutic challenges [1]. They may indicate underlying neurological or neuromuscular disorders such as cerebral palsy (CP), hereditary spastic paraplegia (HSP), dopa-responsive dystonia (DRD), or muscular dystrophy. Early physiotherapy is critical for maintaining and restoring function, particularly when diagnosis remains uncertain [2,3].

This case report details the clinical presentation, management, and diagnostic considerations of a 7-year-old male with progressive gait difficulties and motor regression, emphasizing the impact of physiotherapy rehabilitation in improving functional outcomes.

Case presentation

A 7-year-old male from East Sikkim, India, presented to a tertiary rehabilitation center on May 7, 2025, with a one-year history of difficulty walking independently and frequent falls. His mother reported that he achieved independent walking at 15 months and could run and climb stairs by age 4. However, regression began at age 4 with frequent falls and inability to walk without support.

Medical History

- Term birth by elective cesarean (birth weight: 2.7 kg).
- Delayed birth cry (5–7 minutes), NICU stay for 1 day.
- Hyperbilirubinemia at 10 days (2-day admission).
- No family history of neurological disorders.
- Previous physiotherapy from age 4.5 to 6 years improved gait, but symptoms recurred after therapy cessation.

Clinical Examination

- **Gait:** Scissoring pattern with toe-first contact, requiring one-hand support.

- **Posture:** Narrow base of support, anterior pelvic tilt, poor trunk control, postural instability.
- **Neurological:** Hypotonia in bilateral lower limbs; exaggerated knee reflexes (+++); upgoing plantar reflex; slow dystonic right-hand movements.
- **Oro-motor:** Drooling, messy eating, mild dysarthria.

Functional Assessment:

- GMFCS: Level III
- MACS: Level I
- GMFM: 71.78%
- FIM: 88 (moderate dependence)

Investigations

- Brain MRI and X-rays: Normal.
- Further genetic/metabolic testing: Not yet performed.

Problem List

1. Bilateral lower limb hypotonia with proximal weakness.
2. Scissoring gait and toe-initial contact.
3. Postural instability and poor balance.
4. Right upper limb dystonia affecting hand function.
5. Drooling and mild articulation difficulty.
6. Moderate dependence in ADLs.
7. Restricted participation in school activities.

Physiotherapy Interventions

A structured physiotherapy program was implemented (45 minutes/session, 5 days/week, for 12 weeks):

- **Balance & Postural Control:** Parallel bar standing, trunk activation with NDT techniques, therapy ball sitting, static/dynamic balance on varied surfaces, mirror feedback.
- **Strengthening:** Bridging, mini-squats, resisted hip/knee extension, core stabilization.
- **Gait Training:** Treadmill and overground walking with progressive reduction of support, step-through pattern training, heel strike facilitation, obstacle walking.
- **Upper Limb:** Purposeful reaching, bimanual activities, weighted hand tasks.
- **Functional Training:** Sit-to-stand practice, supervised self-feeding, dressing/toileting training, ADL-focused therapy.
- **Oro-motor Therapy:** Cueing for swallowing, speech articulation exercises.
- **Home Program:** Caregiver-assisted exercises, ADL stimulation, and environmental modifications (non-slip flooring).

Progress and Outcomes

After 12 weeks of therapy:

- Improved gait stability, reduced falls, independent walking short distances with minimal support.
- Better trunk control and postural alignment.
- Improved self-feeding and participation in play activities.
- GMFM score increased from baseline to 71.78%, FIM improved to 88 (moderate dependence but better ADL initiation).

Discussion

Pediatric gait impairment and developmental regression present complex diagnostic and therapeutic challenges due to overlapping clinical features of neurological and neuromuscular disorders. In this case, the child exhibited a scissoring gait, proximal weakness, dystonia, and upper motor neuron signs. These features supported cerebral palsy as a primary consideration; however, hereditary spastic paraplegia, dopa-responsive dystonia, and muscular dystrophy were also relevant differentials. Similar diagnostic dilemmas have been reported, as early phenotypic overlap is common across these conditions [1,2,5–7].

The role of physiotherapy in such uncertain diagnostic contexts is critical. Evidence consistently demonstrates that physiotherapy interventions, including task-oriented training, strength exercises, and neurodevelopmental techniques, can enhance motor outcomes and functional independence in children with cerebral palsy and related disorders [3,8,9]. In this case, structured physiotherapy delivered over 12 weeks led to improvements in gait stability, trunk control, and activities of daily living. These outcomes are consistent with studies reporting positive impacts of intensive, play-based, and repetitive therapy programs in pediatric neurorehabilitation [3,8].

Of particular note is the improvement in GMFM and FIM scores, which highlight the functional significance of sustained therapy. Previous systematic reviews also support that physiotherapy can enhance mobility and participation even when the underlying diagnosis remains unclear [8,9]. This underscores the importance of prioritizing rehabilitation strategies alongside ongoing diagnostic evaluation.

The diagnostic uncertainty remains a limitation in this case. While cerebral palsy and hereditary spastic paraplegia share

overlapping features, genetic and metabolic testing—which could provide definitive insights—were not performed. Long-term follow-up and pharmacological trials (e.g., levodopa in suspected dopa-responsive dystonia) are also warranted [6]. Despite these limitations, the current case highlights that rehabilitation can deliver meaningful functional recovery irrespective of diagnostic ambiguity.

Finally, this report emphasizes the need for a multidisciplinary approach involving pediatric neurologists, physiotherapists, occupational therapists, and caregivers to ensure comprehensive management. The integration of family-assisted home programs further reinforces gains made in structured therapy sessions.

This case illustrates the complex diagnostic landscape of pediatric gait impairment and regression. Differential considerations included:

- **Cerebral Palsy (spastic diplegia/mixed):** Supported by scissoring gait, UMN signs, perinatal history.
- **Hereditary Spastic Paraplegia:** Progressive gait impairment but less consistent with hypotonia/dystonia.
- **Dopa-Responsive Dystonia:** Dystonia present, levodopa trial warranted.
- **Proximal Myopathy (Muscular Dystrophy):** Proximal weakness and hypotonia align, but UMN signs make pure myopathy less likely.

Despite diagnostic uncertainty, physiotherapy demonstrated clear benefits, consistent with evidence supporting task-oriented training, NDT, and strengthening in improving motor function in children with neurological conditions. Early, consistent, and play-based rehabilitation was key to progress.

Conclusion

This case underscores the diagnostic challenges in children with gait impairment and developmental regression. Physiotherapy played an instrumental role in improving gait, balance, posture, and ADL independence, even in the absence of a definitive diagnosis. Sustained rehabilitation, caregiver involvement, and multidisciplinary collaboration remain critical for optimizing functional outcomes in pediatric neurorehabilitation.

Consent

Informed consent was obtained from the patient's guardian for publication, with all identifying details anonymized.

Acknowledgment

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