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Preserved Cognitive and Adaptive Functioning in a Child with Cerebral Palsy: An Intervention-Based Clinical Case Report

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ABSTRACT

Background: Cerebral palsy and spina bifida are neurodevelopmental disorders linked to increased vulnerability to cognitive as well as adaptive limitations. Cognitive results, however, are heterogeneous, and more extreme motor impairments can limit the possibility of standardized cognitive and academic testing. Such situations give clinical meaning to functional and adaptive assessment methods, which provide insights into the actual learning of a child and functioning in the real-world setting.

Case Report: This case study is of a seven-year-old girl with medically proven cerebral palsy and spina bifida who had been referred to undergo a functional assessment and intervention planning. Because of the severe motor impairment and lack of expressive functions, the possibility of using the standardized intelligence and academic success tests was not viewed as possible or ethical. The measurement was hence done using the Child Adaptive Behavior Scale and the Curriculum-Based Assessment that assesses adaptive functioning and functional learning skills.

Intervention and Outcomes: Following the results of assessment and joint consultation with the teacher of the child, the goals of intervention aimed at working on functional academic and daily living skills were developed. The use of evidence-based teaching and behavioral interventions was used to combat numeracy, concepts of time, and self-care skills. Throughout the intervention, the child achieved progressive changes, less dependency on prompts, independence, and classroom functioning as reported by the teachers.

Conclusion: The clinical value of adaptive and curriculum-based methods of assessment is emphasized in this case to inform intervention planning among children with cerebral palsy in cases where their standardized testing cannot be carried out. In the complex neurodevelopmental condition, the functional assessment technique may be essential to determine the retained learning abilities, as well as aid the individual planning of education.

Introduction

Cerebral palsy (CP) is the most prevalent pediatric-onset physical disability caused by developmental brain dysfunction, which affects motor control centers and disrupts lifelong growth, development, and overall health.¹ Whereas, spina bifida refers to a



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group of congenital disorders (e.g., myelomeningocele, myelocoele, and meningocele) caused by insufficient closure of the spinal column, resulting in exposure of the spinal cord or meninges.² Spina bifida affects 300,000 newborns worldwide yearly.³ Meningocele is a type of spina bifida, consisting of the meninges and cerebrospinal fluid that spreads through the spinal cord defect into the subcutaneous tissue. Usually, the skin beneath a meningocele is intact. Meningocele is an asymptomatic spinal cord abnormality not associated with severe neurological disorders. Since a meningocele usually does not involve any nerve processes, it does not affect cognition.⁴

In the present case, a meningocele was accompanied by acquired hydrocephalus at birth, associated with increased cerebrospinal fluid pressure and enlargement of the brain's ventricular system. The result of a study shows that about 15% of children with cerebral palsy (CP) have concomitant hydrocephalus, which can be a cause of cerebral palsy or a consequence of diseases that independently cause cerebral palsy.⁵ Timely treatment of hydrocephalus can lead to better neurodevelopmental outcomes.⁶ It, therefore, reflects that cerebral palsy can be caused by any lesion or defect in the brain that primarily affects motor control centers and muscle coordination. Moreover, according to the available literature, there is an increased risk of cognitive and adaptive impairments in the case of cerebral palsy or spina bifida.⁷ Yet, cognitive performance in such circumstances is heterogeneous, and motor impairments tend to limit the possibility of the standardized cognitive test. Functional assessment strategies can be of great value in such settings where the diagnostic label is replaced by assessing the actual functioning of a child and her ability to complete daily living and academic activities.

There is little literature record on the outcomes of structured interventions using adaptive and curriculum-based testing in children with CP in situations when standardized cognitive testing is not possible. In this regard, the current case study sought to perform a functional evaluation of a child with cerebral palsy and spina bifida to investigate the adaptive functioning and functional learning skills applicable in real-life and educational involvement.

Client Information

The child was a seven-year-old girl. She was admitted to an inclusive special education center in Lahore. She was referred by her teacher for a psychological assessment and intervention to assess her functional learning abilities and adjustment skills, considering her severe motor impairment.

Medical and Developmental History

The history of the child revealed that she was born with meningocele (commonly known as open spina bifida), which led to several initial health issues, including a low Apgar score, a pale skin tone, low birth weight, and overall weakness. The congenital condition of the girl necessitated surgical intervention at only 1.5 months of age to repair the spinal defect. The outcome of the surgery resulted in hydrocephalus, a condition characterized by excessive accumulation of fluid in the brain, due to which the child was unable to control her neck and had trouble holding her head up. To address the condition of hydrocephalus, a ventriculoperitoneal (VP) shunt was implanted at the age of 5 months to divert fluid from her brain to her abdomen. The procedure led to complications, including post-operative fever. Moreover, the surgery did not yield the expected results, and the child subsequently experienced a delay in achieving developmental milestones. Furthermore, when the child was 2 years old, another surgery was needed for her ventriculoperitoneal (VP) shunt. Following this surgery, the child's condition improved,



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and by the age of 3 to 4 years, she had reached the sitting milestone. After that, she experienced a delay in other milestones. Furthermore, at the age of 5, the child had to undergo another VP shunt surgery. Though the last surgery was successful, these repeated surgeries left the child with four distinct scars on her abdomen, two on the right and two on the left, causing a pigeon-shaped chest, a scoliotic posture, stiffness in her leg joints, and a right clubfoot.

The previous medical diagnoses were set by one of the tertiary care institutions and were not re-evaluated in the current case.

Assessment Methods

The standardized intelligence and academic achievement tests that involve the use of motor responses were deemed impossible and unethical because the child had a severe impairment of motor abilities and had limited expressive functions. These limitations of the assessment prompted the use of a functional assessment methodology to determine adaptive functioning and practical learning skills in daily life and educational engagement.

They were measured with the Child Adaptive Behavior Scale (CABS) that is used to measure the main areas such as language development, socialization, performance of family roles, independent functioning, and economic vocational activity. The scale was used by giving a teacher report, and domain-wise scores were determined with respect to age equivalent functioning. The outcome showed rather intact adaptive capabilities in domains in comparison to being expected of the medical and motor state of the child. The domain scores with detailed information and their age equivalent are shown in Table II.

Table II

DOMAINS, SCORE, AND AGE EQUIVALENT ON CHILD'S ADAPTIVE BEHAVIOR SCALE

Domains	Score	Age Equivalent
Language Development	38	10 years
Socialization	38	10 years
Family Role	35	10 years
Performance	35	10 years
Independent Functioning		
Economic Vocational Activity	29	9 years
	27	9 years
	27	9 years

Besides the adaptive behavior assessment, a Curriculum-Based Assessment (CBA) was also carried out to inform the education planning process and assess the functional learning skills. The domains evaluated were basic numeracy, conceptualization of time, and self-care, in the form of tying of shoelaces. Practical academic readiness was ascertained using the CBA as a measure of intervention planning, rather than as a way of making formal academic achievement or diagnostic judgments.

Diagnostic Considerations

A tertiary care medical institute had already diagnosed cerebral palsy with motor impairment before the current examination. This case did not show any intellectual disability, as there was a lack of objective evidence to prove the same. Recording intellectual functioning through formal means based on standardized intelligence



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measures was limited to the motor limitations, which were severe, and could not effectively administer tests that required motor response.

Goal Setting and Intervention Planning

The goals of intervention were developed depending on the results of the Child Adaptive Behavior Scale, Curriculum-Based Assessment, and consultation with the child's teachers. The desired objectives centered on functional academic and daily life skills, such as addition of two digits, subtraction of one digit, knowledge of the concept of hour and self-sufficient shoe tying.

Intervention Techniques

Evidence-based behavioral intervention and instruction were used depending on the functional needs of the child and her motor limitations. Methods applied were systematic prompting, positive reinforcement, shaping, task analysis, and discrete trial training to aid acquisition of skills in academic and daily living spheres. Activities were also separated into small, manageable steps to fit the motor difficulties of the child, and prompts were slowly eliminated to encourage independence. Consolidation of learning was achieved through rehearsal and repeated practice and reinforcement was given based on accomplishment of the task and effort. The intervention strategies were implemented flexibly and changed according to the responsiveness of the child and functional skills growth and generalization in the educational environment were focused on.

Intervention Outcome and Functional Gains

Throughout the intervention, the child showed a progressive improvement in specific skills, as the degree of prompting to complete tasks had decreased. This was coupled with greater autonomy in activities and performance of functions. Teacher reports also showed that there were clear improvements regarding the child's engagement in the academic context as well as the overall functioning within the classroom.

Discussion

The current case demonstrates the importance of functional and adaptive levels of assessment in determining learning and daily living skills of a child with cerebral palsy and related motor deficit. Although important physical limitations have been noted, the results indicate intact functional learning abilities as measured by adaptive behavior levels and curriculum-based appraisal.⁸ The individualized and goal-oriented intervention strategies yielded significant functional improvements, which is why it is necessary to emphasize the significance of assessment methods that are not limited to the diagnostic classification but aim at the real-world functioning of children with complex neurodevelopmental conditions.⁹

Limitations

There are a few shortcomings to be considered. The lack of standardized intelligence testing decreased the possibility of objectively measuring the level of intellectual functioning, and the lack of formal academic achievement batteries decreased diagnostic conclusions on learning disorders. Also, the single-case design limits the applicability of the results. These are the limitations that must be considered in the interpretation of the results and demonstrate the necessity to be careful in inference.



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Clinical Implications

The case highlights how functional assessment techniques play a crucial clinical role with children with cerebral palsy when the standardized test is not always possible. Group goal formulation between teachers and parents enabled the inclusion of both meaningful and developmentally relevant targets of intervention. Also, the results note the importance of individualized educational planning in facilitating functional learning and developing adaptive skills among cerebral palsy children.

Conclusion

This case highlights the importance of adaptive and curriculum-based assessment in informing intervention planning in children with cerebral palsy, where standardized cognitive testing is not possible.

Informed Consent

Before starting the treatment process, ethical considerations were followed, including obtaining consent from the administration to apply the therapeutic interventions and ensuring the child's autonomy.

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Disclaimer

Chatgpt and Grammarly were used only to improve the sentence structure and quality.

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