Case study

Effect of Sensory integration, neurodevelopmental therapy and behavioral therapy on overall development in a child with cerebral palsy: An interesting case report

Abstract:

Cerebral palsy (CP) is a collection of conditions that impact a person's ability to move, balance, and maintain posture.Cerebral palsy is a disorder that affects the motor portion of the brain's outer layer, which controls muscular movement. The cerebral motor cortex hasn't formed normally in some situations throughout fetal development. In certain cases, the impairment is caused by a brain injury that occurred before, during, or after delivery. In either situation, the damage is irreversible, and the resulting disabilities are permanent.The nature and intensity of CP symptoms vary from one person to the next, and they can even alter over time. Depending on whether areas of the brain have been affected, symptoms might vary widely from person to person. Cerebral palsy affects mobility and posture in all persons, and some people may have intellectual disabilities, seizures, odd bodily feelings or perceptions, and other medical issues. People with CP may also have vision or hearing impairments, as well as language and speaking issues. The present case report is of a child of 2.5 years old. She came with complaints of difficulty in sit to stand, standing with maximum assistance, very minimal standing balance, requires total assistance in walking. She was also having some sensory and behavioral issues reported by parents like trying to catch her own shadow, blabbering among herself. She was assessed, treatment including Sensory integration and Neurodevelopmental therapy was given to her for a period of 6 months. Baby improved profoundly well.

Key Words: Cerebral Palsy, Motor impairments, Sensory impairments, sensory integration, neurodevelopmental therapy, physiotherapy, physiotherapy rehabilitation

Introduction:

Cerebral palsy (CP) is a neuromotor condition that impairs movement, muscle tone, and postural development. An damage to the growing brain during the prenatal to neonatal period is the underlying pathogenesis. Although the primary neuropathologic lesion is non-progressive, children with CP may acquire a variety of secondary disorders that damage their functional abilities in different ways throughout time(1)The prevalence of CP in all live births varies between 1.5-3 per 1000 live births in high-income and low-to-middle-income countries, as well as by geographic region(2). CP is classified as Spastic, athetoid, ataxic, hypotonic and mixed types. According to multiple epidemiological researches, half of the children who acquire CP are born at full term with no known risk factors. Although most cases of CP are caused by a fetal or neonatal brain lesion, post-neonatal onset CP has been documented. Post neonatal CP is caused by a brain injury that occurs after the neonatal period but before the age of five. Traumatic brain damage, near-drowning, and meningitis are the most common causes of post neonatal CP(3).When a child fails to meet certain important milestones by the expected age, a diagnosis of CP is suspected(4).Spasticity, dyskinesia, hypotonia, and ataxia are the most common neurologic motor system impairments in children with cerebral palsy. It's not rare to see mixed presentations. Hypotonia with or without spasticity is also present, with truncal hypotonia with spasticity of the limbs being the most common. CP is characterized as spastic, dyskinetic, hypotonic, or mixed based on clinical findings(5).Based on their comprehensive analysis, Novak et al. [2017] stressed the necessity of early diagnosis so that CP-specific therapies can be started as soon as possible to maximize their impact on the growing brain's neuroplasticity. The use of constraint-induced movement therapy in hemiplegic CP, as well as early, intense, enriched, task-specific training-based therapies at home, are examples of CP-specific early interventions that have been demonstrated to be successful in improving neuromotor function(6). Neurodevelopmental therapy (NDT) was developed in the 1940s by Dr Karel and Berta Bobath (a neuropsychiatrist and a physical therapist) and, since then, it has been used by therapists worldwide. NDT focuses on abnormal posture

and movement. The present case report is of a 2.5-year-old child with various sensory, behavioral and motor impairments. She was diagnosed as cerebral palsy child. She was given intense sensory integration, NDT and behavioral therapy for a period of 6 months. At the end of 6 months there was tremendous improvement in child's behavior and motor impairments. Sensory symptoms were improved to a level of mild to moderate.

Aim:

To evaluate the effectiveness of Sensory integration, neurodevelopmental therapy and behavioral therapy on overall development of child with cerebral palsy.

Patient characteristics:

A 2.5-year-old child is the subject of this case study. She complained of difficulties sitting to standing, standing with maximal assistance, having extremely poor standing balance, and needing whole aid walking. Parents stated that she was having sensory and behavioral concerns, such as attempting to capture her own shadow and blabbering among herself.

Patient history:

The child was born at full term and weighed 2.5 kg. She cried shortly after birth and was held in the ICU for two hours for oxygen support. When the parents saw that their child was missing milestones, they went to the doctor. Neck control at 8 months, 10 months – rolling, 1 year 6 months – sitting, 1 year 10 months – standing with support. She was under medical management alone without any physiotherapy. Her physiotherapy was started in our institute 6 months back.

Treatment offered: We offered Sensory integration, neurodevelopmental therapy and behavioral therapy one hour per day, 5 days a week for 6 months (table 1)

Problem identified	**Cause of the problem**	**Goal**	**Treatment strategy**	**Equipment used**

Hypotonia in bilateral upper and lower limbs	Perinatal insult	To normalize tone	Strengthening by facilitatory techniques of NDT	Bolsters, physioballs, Lap therapy
Tactile and vestibular sensory issues	Sensory processing issues	To improve sensory processing	Sensory integrative techniques mainly tactile and vestibular stimulation	Direct handling, swings, bolsters
Behavioral issues like talking to self and trying to catch own shadow	Sensory processing issues	To decrease behavioral issues	Behavioral therapy by constant feedback and task appropriate behavior training	Behavioral modification by cues and commands
Difficulty in transitions	Weakness of muscles	To strengthen muscles	Strengthening by stabilization training.	Bolsters, wedges and physioball.

Table 1: Depicting problems and their treatment strategies.

Treatment outcome:

Gross Motor Function Measure (GMFM 88)(7) and Sensory Profile Care giver questionnaire by Winnie dunn(8)was taken for the case study. The changes in score are given in table 2**.**

Outcome measure	**Pretest score**	**Post test score**

GMFM 88		
Lying and rolling	**23**	**43**
Sitting	**24**	**55**
Crawling and kneeling	**15**	**38**
Standing	**12**	**22**
Walking running and jumping	**22**	**35**
Sensory profile		
Tactile component	**55**	**15**
Vestibular component	**35**	**10**

Table 2: Depicting GMFM 88 and Sensory profile pre and post treatment scoring

Results and discussion:

Motor development of the child was quite commendable as child was with hypotonia. Specifically the goal areas lying, crawling and sitting improved tremendously but standing and walking mild improvement is noticed. She will definitely improve in future with the management. Sensory integration played a significant role in reducing sensory and behavioral symptoms this was in line with a previous study by shamsoddinietal(9). Commitment and sequential training were the key factors in child's development as stated by previous study by Whittingham etal(10). Sensory integration specifically tactile and vestibular components added valuable contribution while treating the child. As the child was at his young toddler age group NDT with goals helped in his recovery. If proper sensory components are addressed in the management of CP child recovery can be expected earlier.

Conclusion:

Thus, we would like to conclude thatSensory integration, neurodevelopmental therapy and behavioral therapy proved successful when given in combination for overall development of child with cerebral palsy. We recommend high quality trials to prove their efficacy when given in a combined manner.

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