

## Improving swallowing function in a child with cerebral palsy: A single case study on the efficacy of intervention strategies

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### ABSTRACT

The study explored the efficacy of Oromotor exercises and proprioceptive neuromuscular facilitation (PNF) to improve swallowing abilities pre- and post-behavioral intervention in a child with cerebral palsy (CP). A 4-year-old female child diagnosed with global developmental delay secondary to spastic quadriplegic CP and poor feeding skills was taken up for study. Oro-motor stimulation and PNF with taste, temperature, and texture were used. Therapy was given twice a week for 30 min. Pre- and post-intervention, a detailed Oro motor and feeding evaluation was performed. Post-therapy evaluation revealed significant increase in body weight, oromotor movements, International Dysphagia Diet Standardization Initiative, Eating Drinking Ability Classification System level, frequency of water, and meal intake. The intense application of oromotor and PNF stimulation seemed to have effected significant improvements in feeding and swallowing abilities which translated to increased weight and positive parental feedback. This might have been responsible for positive outcomes seen in the present study as well.

**Key words:** Oromotor stimulation, Proprioceptive neuromuscular facilitation, Cerebral palsy, feeding

Disorders of feeding and swallowing are common in children with cerebral palsy (CP). According to research, feeding issues are more prevalent in children with CP and around 21 to 58% of children with CP experience some level of feeding difficulty [1-6]. It is reported that most frequent cause of motor impairment in young children is CP and children with spastic quadriplegia are likely to experience greater swallowing deficits than those with mild motor impairments like diplegia, but oropharyngeal dysphagia is prevalent even in children with mild CP [7-9]. Dysphagia and other feeding issues which are common in CP are reduced lip closure, poor tongue function, tongue thrust, exaggerated bite reflex, tactile hypersensitivity, delayed swallow initiation, reduced pharyngeal motility, and impaired oral sensory motor function which results in drooling and affects the muscles of swallowing and chewing [10-12]. Meal times longer than 30 min, on a regular basis, may indicate feeding and swallowing problem [2].

Children with significant motor impairment are most impacted and this might cause children to “gag,” drool excessively, or aspirate food [2,5,6,13]. The increased morbidity of children with these deficits is typically due to respiratory issues brought on by recurrent food or fluid aspirations. It is acknowledged that feeding

issues and mealtimes can be stressful for parents of children with CP and can cause under nutrition in children with CP [1]. There are evidences to support the claim that feeding intervention, such as oral motor and oral sensory therapy, may improve children with neurodevelopmental disorders growth while also improving their ability to feed themselves. Improvements in swallow physiology have been observed as a result of thermal tactile stimulation techniques, such as icing the facial arches in an attempt to increase sensitivity to this area.


The objective of the case report was to study efficacy of oromotor exercises and proprioceptive neuromuscular facilitation (PNF) to improve swallowing abilities pre- and post-behavioral intervention in a child with CP.

### CASE REPORT

A 4-year-old female child diagnosed with Spastic Quadriplegic CP reported to Bharati Vidyapeeth (Deemed to be University) School of Audiology and Speech Language Pathology with the complaint of inadequate speech and language skills and feeding difficulties. On examination, it was found that child had global developmental delay with delayed birth cry and Neonatal Intensive Care Unit (NICU) stay for 10 days. Child also had a history of recurrent cold and cough at the age of 7 months for which mother was counseled

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to change the child’s posture during feeding. Hearing and Vision acuity was normal; however, eye tracking in both vertical and horizontal planes was emerging.

On language evaluation, a significant delay was found in both receptive and expressive language. Pragmatic abilities were also affected. Oro motor examination revealed child had tongue tie and tongue movements were restricted. Hard and soft palate were normal in appearance and in function. There were missing teeth and dental carries present. Lips were wet at all times. On drooling scale child was at level 3, that is, had severe drooling. Jaw movements were restricted.

Feeding assessment findings revealed poor sucking skills. The child was a dependent feeder and was fed on only semisolids, International Dysphagia Diet Standardization Initiative (IDDSI) Framework was at level 0, that is, used to take thin liquids. Duration of feeding was approximately 45 min with limited intake of food. Anterior spillage of food was present. Frequent episodes of coughing present on water through cup feeding. The child had wheezing sound when fed in a reclined position. Frequency of meals was 4 times in a day. Biting was present and munching was absent. On Eating Drinking Ability Classification System (EDACS) child was at level 4 which states eating and drinking present with significant limitations to safety. Constipation was present. The child’s weight was 9 kg.

Informed consent was obtained from parent who participated in the case report. The case report was conducted in the region of Maharashtra in India, and the city of Pune and was approved by the Ethical Committee of the Departmental Committee of Bharati Vidyapeeth (Deemed to be University) School of Audiology and Speech Language Pathology. Parents were informed about the procedure and written consent from parents was taken and it was clarified that their participation in the study was voluntary and that information was to be kept confidential and it was assured that their participation will not cause any harm or damage to caregivers and their children.

The primary caregiver provided background information on the history of the feeding difficulty. Assessment procedures included a standard oral peripheral examination, feeding, and language assessment conducted by the speech-language pathologist. For oromotor peripheral examination assessment of symmetry, range of motion, appearance of oral structures was done using COMMDEALL Oro motor checklist. Detailed language evaluation was done using Receptive Expressive Emergent Language Scale (REELS), Misha Test of Communication Development in Marathi (MTCMD) test and the Communication DEALL Developmental Checklist. EDACS, IDDSI Framework and The drooling rating scale was used to assess feeding skills and drooling frequency and severity.

Intensive oromotor stimulation and PNF were given to the child. The child attended 10 sessions. Therapy sessions were scheduled twice a week and lasted 45 min each. Instructions were given to the caregiver on how to perform these exercises at home for at least 3 times a day. Feeding skills were evaluated across 12 variables, that is, weight, oral musculature movements, drooling frequency and severity, food consistency on IDDSI Framework, meal frequency, spoon feeding, post-swallowing behavior, feeding position, water intake per day, and on EDACS. The assessment results are computed and compared based on 12 variables pre- and post-intervention. There were remarkable improvements seen in 12 variables which is depicted in Table 1.

**DISCUSSION**

CP is defined as a development and posture disorder caused by an immature brain defect or lesion. The injury does not progress and weakens muscular coordination in a variety of ways, resulting in a child’s inability to maintain posture and perform normal movements. CP-related motor disorders can cause dysphagia because they alter the preparatory, oral, pharyngeal, and esophageal phases. Normal primitive reflexes such as bite, suck,

**Table 1: Pre and post intervention across different variables**

Variables	Pre intervention	Post intervention
Weight	9 KG	11.5 KG
Oral musculature movements	Restricted tongue movements Poor lip seal Jaw movements are restricted	Improved tongue movements in terms of lateralization. Elevation, tongue protrusion Lip seal present Improved Jaw opening and closure
Drooling scale from “Crysdale and White” (1989)	Severe - Level 3	Moderate – Level 2, currently on medication for drooling
Food consistency on IDDSI framework	Level 4	Level 6
Eating and Drinking Ability Classification System	Level 4	Level 2 but requires assistance during feeds
Constipation	Present	Absent
Meal frequency	4	6
Spoon feeding	Absent (poor lip closure)	Present (adequate lip closure)
Signs of discomfort	Coughing	No signs of discomfort
Post swallowing behavior	Delayed oropharyngeal swallowing Anterior food spillage Wheezing sound	Normal swallow without food spillage and wheezing sound
Feeding position	Reclined position	Upright position
Water intake per day	Half glass (i.e. ~125 mL)	1.5 glass (i.e. ~ 375 mL)

swallow, and the lack of tongue lateralization, among others, alter and interfere with other responses such as chewing, oral control, and bolus swallowing [1].

The aim of the present was to study the efficacy of oromotor exercises and PNF to improve swallowing abilities pre- and post-behavioral intervention in a child with CP. PNF has been known to increase the contraction of swallowing muscles and oral stimulation improves feeding performance, weight gain rate which might have been responsible for positive outcomes seen in the present study as well [14,15]. It is clearly evident from the results that intense application of oromotor and PNF stimulation seemed to have effected significant improvements in feeding and swallowing abilities which translated to increased weight and positive parental feedback.

In addition, the current research emphasizes the need of comprehensive and case specific assessment and intervention for children with CP. One drawback of this study is the sample size, which is too small to generalize the findings.

## CONCLUSION

Despite the constant increase in the CP population due to technological advances in medical treatments for pre-, peri-, and neonatal care, few studies include these children's (re) habilitation in relation to treatment of oro-pharyngeal dysphagia. According to our findings, oromotor stimulation and PNF are effective in enhancing swallowing ability. The utility of the approach could be further affirmed in future research using cohort or case-control studies.

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