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Case Report

The application of oral-motor learning principle in a patient with severe communication disabilities: a case study experience

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ABSTRACT

This study explores the use of oral-motor learning principles in the rehabilitation of a 7 years 7 months-old male patient with severe intellectual disability secondary to spastic cerebral palsy, seizure disorder and visual impairment. The objective was to assess the effectiveness of these principles in improving communication abilities in patients with severe communication disabilities. The patient underwent 20 therapy sessions, each lasting 45 minutes, with the goal of achieving functional communication skills up to the single-word level (5-10 words) in clinical settings. Non-speech oral motor exercises were implemented using oral-motor sensory integration toolkits to improve vegetative functions and reduce sialorrhea and enhanced speech and language skills. Both tactile and speech kits were used concurrently. The study concludes that oral-motor sensory integration toolkits may serve as standardized tools for effectively addressing oral motor deficits in patients with similar conditions.

Keywords: Oral-motor learning, Vegetative functions, Drooling, Cerebral palsy, Sensory integration tools

INTRODUCTION

The change in the capability of a person to perform a skill which is inferred from a relatively permanent improvement in performance as a result of practice or performance is known as motor learning. Motor learning is measured by analysing performance in three distinct ways: acquisition, retention and transfer of skills. Acquisition is the initial performance of a new skill (or newly control aspect of the previously learned motor skill). Retention is that particular ability to improvement in some aspects, follow a short or long-time delay in the task which is not practiced. Transfer needs the performance of a task similar in movement but different from the original task that was practiced in the acquisition phase.[1]

Bottom- up and Top–down principle refers to learning implicit and explicit knowledge respectively. A bottom-up process that is characterized by an absence of high-level direction in sensory processing, which a top-down process is characterized by a high-level direction of sensory processing by more cognition, such as goals and targets. Fast reactions or quick visual identification, which are considered bottom–up processes because that will be rely primarily on sensory information, that processes such as motor control and directed attention which are considered top–down principle because they are goal or target directed.[2]

Oral-motor exercises (OMEs) are nonspeech activities which involves sensory stimulation to actions of the lips, jaw, tongue, soft palate, larynx, and respiratory muscles these are intended to influence the physiologic

underpinnings of the oropharyngeal mechanism and improve its functions. They include active muscle exercises, muscle stretching, passive exercises, and sensory stimulation of oral structures.[3]

Multiple disabilities, including deaf-blindness, is a condition in which a person may be having a combination of hard of hearing, visual impairments and severe communication, developmental, and educational problems. An abnormal brain development or damage to the developing brain affects a person's ability to control his or her movement and posture in a condition known as cerebral palsy (CP). Many also have related conditions such as intellectual disability, seizures, visual problem, hearing or speech and language problems.

Due to decrease in normal control of oral sensation and motor function this often leads to excessive saliva flow, this condition is known as "sialorrhea" or "hypersalivation". Drooling is common in normally developed babies but subsides between the ages 15 to 36 months and considered abnormal after age 4.[4] Pathologic sialorrhea can be an isolated phenomenon due to hypersalivation or occur in conjunction with several neurologic disorders such as amyotrophic lateral sclerosis (ALS), cerebral palsy (CP), Parkinson's disease (PD).

In children, the most common cause of sialorrhea is Cerebral palsy, which persists in 10%–38% of individuals.[5] Neuromuscular activity of swallowing involves efficient coordination of several structures including the oral cavity, pharynx, larynx, and oesophagus. These structures coordinate to form three phases; an oral phase which is under voluntary control, followed by the pharyngeal and oesophageal phases which are under involuntary control.[6] In children with neurologic disorders, drooling appears to be an effect of inefficient tongue and bulbar control, rather than increased salivary secretion.[7-8]

All the tools were used separately in oral motor sensory facilitation which strengthens the oral facial muscles and improves oral mechanism in the present case study. The kit includes items such as a "Uni-Tip" and "Pointed-Tip, used for sensory stimulation and tactile input along with a "Tongue-Steer" for tongue strengthening exercises. The "V-Pen" and "TT-UD" (Tongue Tip-Up & Down) and "TT-LR" (Tongue Tip-Left & Right) used for proper tongue movement and co-ordination. The "Oro-Tube" and "Talk-Tip" helped in oral strengthening and speech facilitation and "Sensory-Bite" improved the jaw strengthening and control.

Additionally, the "Hickey" tool helped in chewing process and battery is included, possibly for power certain device in the kit ("V-Pen").

Need of the study

There is no existing significant study regarding the efficacy of strengthening Oral motor activities in severe communication disabilities. Thus, there is a need to establish efficacy of Oral motor sensory integration tool kits to make it a standardized tool in treating Oral motor deficits in severe communication disability such as Cerebral palsy.

Aim

To assess the application of oral motor learning principle using Oral motor sensory integration tool kits during speech and language therapy sessions in a patient with severe communication disabilities such as cerebral palsy with other related conditions.

CASE REPORT

A case of age 7 years 7 months /male was diagnosed with severe intellectual disability secondary to spastic cerebral palsy with seizure disorder and visual impairment and was advised to NIHH, Kolkata for speech and language therapy. They came to the institute with complaint of speech and language problem and the child used crying to express his needs. There was no history of consanguinity and the problem showed since after birth. He had history of several seizures 3 days after birth.

ABR report showed bilateral hearing sensitivity within normal limits. Psychological assessment showed severe intellectual disability.

In pre-therapy assessments developmental history, social and cognitive development and language development was delayed. Babbling was absent at 3-8 months of age and first word was yet to be develop. Oral peripheral examination revealed all the structures were normal in appearance and all the vegetative functions are affected like chewing, biting, sucking, blowing, tongue, lip and jaw movements, only swallowing is adequate, but making of bolus was not adequate. Drooling was present. The gross motor skills and fine motor skills were highly affected. Language assessment revealed significant delay in all language domains like phonology, syntax, semantics and pragmatics. Phonology showed 2-4 months (cooing, laughing sounds), syntax was yet to develop (less than Brown stage I), pragmatics was 0-8 months, semantics was less than 8-12 months, according to speech and language developmental milestones.

In pre-therapy standardised assessments showed significant delay in every aspect. Receptive language age and expressive language age were 0-1 month and 1-2 months respectively (REELS), 3-D LAT revealed comprehension, expression and cognition was less than 9-11 months. Cognitive pre-requisite skills were inadequate in all the domains. Communication DEALL showed significant delay in all developmental aspects. Play

assessment showed level 1 or exploratory play and attention level was level 1(0-1year). Assessment of Oral motor skills in Toddlers revealed the child was having oral-motor deficits, showed difficulty in jaw, lip, tongue movements and speech.

In primitive reflexes sucking and pharyngeal gag reflexes were present. Cranial nerve assessment revealed trigeminal nerve, facial nerve, glossopharyngeal nerve, hypoglossal nerve, and vagus nerve were affected.

Drooling severity scale (obtain severity of drooling) was administered where constantly drooling was observed and also the cloth was getting wet which inferred severe drooling. During feeding assessment, it was observed that the child had difficulty in bolus formation due to affected vegetative mechanisms and revealed feeding difficulty.

Results

In Post therapy results, the REELS scores including receptive and expressive language skills were seen to be slightly improved. The child was able to respond to verbal stimulus and music and also could express verbally the |a|, |i|, |o| vowels.

Comm-DEALL showed slight improvement in all the developmental skills. The Assessment of Oro motor skills revealed slight improvement in the vegetative functions of tongue, lips and jaw movements. The cranial nerve assessment revealed slightly changes in functions.

Drooling severity scale showed mild drooling. All the targets chosen had showed improvement of variable degrees.

DISCUSSION

The study was aimed to establish the application of motor learning principle in severe communication disorder patient in their rehabilitation procedure. The goal of the therapy was to achieve functional communication skills up to single word level (5-10 words) in day-to-day clinical situations.

Non speech oral- motor exercises using oral motor sensory integration tool kits were used to improve vegetative functions and to reduce sialorrhea. Both the tactile kit and speech kit were used simultaneously. The Sensory bite, Hickey, Oro tube-pen (Uni-tip and Pointed-tip), Tongue-steer (TT-LR&TT-UD) were used to facilitate jaw and tongue movements and also improving oral stimulating.

After 20 sessions the vegetative functions slightly improved and drooling was significantly reduced which helped the child in formation of bolus. The child recognized the friendly familiar voices and pays some attention to music or conversation between others and expressed vocal expression of pleasure and making sounds that could start a way to build up the communication with his familiar persons. Regular therapy sessions are required and advised to the patient for better improvements.[1]

CONCLUSION

Treating communication disorders in individuals with cerebral palsy and multiple disabilities- there is no "one-size-fits-all" approach; Both top-down and bottom-up models have their merits and can be used in combination, depending on the specific needs of the individual. Motor learning principles applied through Oral- motor stimulation can serve as an effective bottom-up model to manage communication disorders in individuals with cerebral palsy. By utilizing task-specific practice, repetition and practice, feedback and reinforcement, gradual progression, and individualized treatment plans, therapists can help individuals with cerebral palsy improve their Oral-motor skills, drooling difficulties and enhance their communication abilities. Oral- motor sensory integration tool kits have proved to bring about a significant improvement in all the vegetative functions affected in the child. Thus, we can say that Oral- motor sensory integration tool kits can be a standardized tool in treating Oral -motor deficits effectively.

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