

“A Pilot Case Study On The Recommendations For The Use Of BOTULINUM TOXIN TYPE A In Gait Habilitation & Functional Improvement In A 6 Year Female Diplegic Cerebral Palsy child”

Mohd. Irshad Qureshi^a, Ashish W. Bele^b

^aAssociate Professor, Ravi Nair Physiotherapy College, Sawangi (Meghe), Wardha-442004, MS, India

^bAssociate Professor, Ravi Nair Physiotherapy College, Sawangi (Meghe), Wardha-442004, MS, India

Abstract

Introduction: Cerebral palsy (CP) is a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain. Spasticity is a major challenge for patients with neurological problems. Children with CP always encounter different degrees of movement disorder in the presence of spasticity. Although there are many possible causes of spasticity, most of whom have diagnoses of cerebral palsy; approximately two thirds of all cerebral palsy patients suffer from spasticity. In an analysis of **1000** cases of CP from India, it was found that spastic quadriplegia constituted **61%** of cases followed by **diplegia 22%**. More than 80% of children with cerebral palsy in Hong Kong belong to the spastic type. Spasticity prevents or limits the development of motor function. Chemo-denervation such as using botulinum toxin type A, has proved easier, more effective, and less painful for patients having spasticity. Some results suggest that botulinum toxin type A can be effective in reducing muscle tone over a longer period, but not in preventing development of contractures in spastic muscles. **Aim:** To find the efficacy of BOTULINUM TOXIN TYPE A in Gait Habilitation & Functional Improvement in spastic Diplegic Cerebral Palsy. **Case study:** A 6 year female child was brought to the department diagnosed Spastic diplegic Cerebral palsy with complains of inability to stand & walk and inability to perform activity of daily living independently. Brief history included administration of Botox injection recently followed by above knee plaster cast for 3 weeks. **Method:** After signing informed assent, from patient's parents she was assessed using Gross Motor Function Measure-88 (GMFM-88) and Short Sensory Profile. She received physiotherapy treatment for six months which included Stretching, Swiss ball activity, strengthening of muscles, balance board activities, various activities in sitting & standing and assisted gait training. **Result:** After six months of vigorous physiotherapy she showed significant improvement in assisted walking and ADLs. **Conclusion:** This pilot study helped to conclude that post botulinum toxin type A injection Physiotherapy is beneficial for children with spastic diplegic Cerebral Palsy with long term benefits, hence it is recommended. **KEYWORDS:** Spastic Diplegic Cerebral Palsy, Botulinum Toxin Type A, Gait Habilitation, GMFM

INTRODUCTION:

Cerebral palsy (CP) is a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain. The

motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, by epilepsy, and by secondary musculoskeletal problems. (1)

Cerebral palsy is a term used to describe a broad spectrum of motor disability which is non-progressive and is caused by damage to brain at or around birth. It is a disorder which develops due to damage to CNS and this damage can take place before, during, or immediately after the birth of the child. The damage won't worsen but remains constant.

Understanding the medical and anatomic problems in individuals with CP is important; however, always keeping in mind the greater long-term goal, which is similar to that for all normal children, is important as well. The goal for these children, their families, medical care, education, and society at large is for them to grow and develop to their maximum capabilities so that they may succeed as contributing members of society. Spasticity is a major challenge for patients with neurological problems. Children with cerebral palsy (CP) always encounter different degrees of movement disorder in the presence of spasticity. However, spasticity is not all evil for those with neurological deficits. (2)

Although there are many possible causes of spasticity, most of whom have diagnoses of cerebral palsy; approximately two thirds of all cerebral palsy patients suffer from spasticity (3).

More than 80% of children with cerebral palsy in Hong Kong belong to the spastic type. Spasticity prevents or limits the development of motor function. Management of spasticity for children with CP aims at improving the biomechanical alignment of the body and in turn improves functions. (4)

Intervention with Botulinum Toxin

Chemo-denervation such as using botulinum toxin type A, has proved easier, more effective, and less painful for patients. First clinically introduced in the United States in the early 1980s, botulinum toxin is a potent neurotoxin derived from the anaerobic bacteria *Clostridium botulinum*, but when used in treatment, no serious systemic toxin effects have been reported (5).

Botulinum toxin is available in serotypes A and B, which have different unit potencies, side effect profiles, and dilution schedules. Both have been used in children with cerebral palsy, although serotype A has been used more extensively. Dosing guidelines have been suggested for botulinum toxin A for adult and pediatric patients. Adult recommendations are available for botulinum toxin B, but studies are ongoing for pediatric patients (6).

Some results suggest that botulinum toxin type A can be effective in reducing muscle tone over a longer period, but not in preventing development of contractures in spastic muscles. Mechanical and functional alterations can arise from the muscle tissue itself even though the nervous system is the site of the primary lesion. The gross mechanical changes occur in skeletal muscle secondary to spasticity and during development of contracture. Muscle stiffness can change for a variety of structural reasons, only one of which is altered fiber length. There is currently no evidence in the literature that muscle fiber length is shortened in contracture or in spastic skeletal muscle. Contracture formation results from inappropriate architectural adaptation of extremity muscles in response to upper motor neuron lesion (7).

CASE STUDY

AIM:To find out the efficacy of BOTULINUM TOXIN TYPE A in Gait Habilitation & Functional Improvement in spastic Diplegic Cerebral Palsy.

MATERIAL & METHODS:

Material:

- a) Paediatric Neurological Examination
- b) Gross Motor Function Measure-88 (GMFM-88)

Methods: After signing informed assent, from patient's parents she was assessed using Paediatric Neurological assessment proforma, Gross Motor Function Measure - 88 (GMFM-88) .

Paediatric Neurological Examination: included subjective information, prenatal, perinatal and postnatal history, history of previous illnesses, developmental assessment, anthropometry, higher functions, superficial and deep reflexes, muscle tone evaluation developmental reflexes,

Gross Motor Function Measure-88 (GMFM-88):The Gross Motor Function Measure is standardized for children with cerebral palsy or Down syndrome, aged 5 months to 16 years. It is used internationally and has become the gold standard evaluative measure of motor function designed for quantifying change in the gross motor abilities of children with cerebral palsy. It is widely respected and used in both clinical and research settings. The full version of the GMFM has 88 items in Five dimensions (A,B,C,D & E). A shortened 66 item version (GMFM-66) is specific to cerebral palsy.The GMFM is criterion referenced; each gross motor skill is scored to note its presence or absence (or emergence). Activities are assigned a score of 0 to 3, (Generally: 0 unable, 1 attempted, 2 partially accomplished, 3 completed).

Intervention:

She received Physiotherapy treatment of 45 to 60 minutes daily, five days a week for six months which included:

- a) *Stretching:* hamstrings, hip flexors and TA
- b) *Swiss ball activity:* abdominal and back extensor activities in supine and prone position, sitting activities like forward backward, sideways movements and bounces.
- c) *Strengthening:* Isolated strengthening of Quadriceps, hamstring and ankle dorsiflexors
- d) *Balance board activities:* forward backward and sideways activities in standing
- e) *Activities in sitting & standing:* various reach out activities like forward, sideways, diagonal activities in chair sitting, high sitting and standing.
- f) *Assisted gait training:* included parallel bar and crutch training,

Outcome measure

Gross Motor Function Measure-88 (GMFM-88)

RESULT:

Result of this case study showed that there was improvement in standing and supported walking. In the beginning of this study patient could accomplish all task in dimension A(Lying &Rolling) and B (Sitting) where as she had difficulty in performing complex task in dimension C (Crawling and kneeling) and D (Standing) in GMFM. Problem area for her was dimension D (Walking, running and jumping) which was part of chief complain of her informant. After a well structured physiotherapy program of six month she showed improvement in complex activities of dimension C and D which ultimately helped her to walk with the help of support.

CONCLUSION:

Spasticity is most bothersome issue while dealing children with Cerebral Palsy which ultimately leads to various degrees of movement problem and compensations.

Some studies suggested that botulinum toxin type A can be beneficial in reducing muscle tone over a longer period. As botulinum toxin type A injection helps in reduction of muscle tone but does not prevent contractures in spastic muscles. Physiotherapy plays vital role in preventing development of contractures in spastic muscles. With this study we can conclude that post botulinum toxin type A injection Physiotherapy is beneficial for children with spastic diplegic Cerebral Palsy with long term benefits, hence it is recommended.

Limitation: This study was pilot study hence leaves wider scope for further recommendations and functional outcomes were not measured after mobility activity improvement.

REFERENCES:

- 1) Glinac, A; Tahirovic, H. & Delalac, A. (2013) Family socioeconomic status and health related quality of life in children with cerebral palsy: assessing differences between clinical and healthy samples. *Paediatrics Today*; 9(2):183-191. DOI 10.5457/p2005-114.74
- 2) Boyd, R. N. and Graham, H. K. (1999), Objective measurement of clinical findings in the use of botulinum toxin type A for the management of children with cerebral palsy. *European Journal of Neurology*, 6: s23–s35.
- 3) Albright, AL. (1996) Spasticity and movement disorders in cerebral palsy. *J ChildNeurol*;11(suppl 1):S1-4.
- 4) Yam, KL and Chan, HS (2006), Prevalence study in Cerebral Palsy in HK Children. *Hong Kong Medical Journal*, 12:3:180-184
- 5) Francisco, GE. & Ivanhoe, CB. (1997) Pharmacologic management of spasticity in adults with brain Injury. In: Kraft GH, Horn LJ, editors. *Physical medicine and rehabilitation* 8:4. Philadelphia: WB Saunders Company: 707-31.
- 6) Tilton, AH. (2003) Injectable neuromuscular blockade in the treatment of spasticity and movement disorders. *J Child Neurol*; 18:S50-66.
- 7) Mikov, A; Dimitrijevic, L; Sekulic, S; Demesi-Drljan, C; Mikov, I; Svraka, E. & Knezevic-Pogancev M. (2011) Use of Botulinum toxin type a in children with Spastic Cerebral Palsy. *Health MED, Journal of Society for development of teaching and business processes in new net environment in B&H*. Published by DRUNPP, Sarajevo. Vol.5,No 4, p. 922-928 ISSN 1840-2291