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FAMILY-CENTRED, GOAL-DIRECTED MULTIDISCIPLINARY APPROACH FOR LOWER EXTREMITY BOTULINUM TOXIN WITH PHYSICAL THERAPY AND REHABILITATION IN CEREBRAL PALSY

ORIGINAL ARTICLE

ABSTRACT

Purpose: This study aimed to investigate lower extremity botulinum toxin (BT) and physical therapy and rehabilitation (PTR) application scoping "family-centered, goal-directed multidisciplinary approach (FGMA)" in the children with cerebral palsy (CP) and to assess the satisfaction of parents and children from this approach.

Methods: A physician and physiotherapist evaluated 30 children (age=6.33±2.38 years) with ambulatory CP and their parents using the FGMA. Gross Motor Function Classification System (GMFCS), Manual Ability Classification System (MACS), and Communication Function Classification System (CFCS) were used to define the functionality of children. Selectivity was assessed using the Selective Control Assessment of the Lower Extremity (SCALE). Walking was evaluated using the Observational Gait Scale (OGS) and the Gillette Functional Assessment Questionnaire (FAQ). Satisfaction levels marked on the Visual Analogue Scale.

Results: Nineteen (63%) children were GMFCS level III, 16 (53%) children were MACS level I, 19 (63.33%) children were CFCS level I. Half of children had visual problems. While the most preferred muscles were hamstring and gastrocnemius for BT, the most common device was ankle-foot orthosis. The median score of SCALE, OGS, and FAQ, and the satisfaction of parents and children were 8 (4-17), 12 (2-24), 2 (1-10), 9 (7-10), and 7 (6-10) points, respectively. The satisfaction level of parents with the new approach was higher than the previous traditional approach ($p<0.001$).

Conclusions: Both the parents and children may be satisfied with the FGMA for BT with the PTR program. Clinicians should take into account lower extremity selectivity, walking performance, and satisfaction levels as much as muscle tone or range of motion.

Key Words: Botulinum Toxin; Cerebral Palsy; Parent; Physical Therapy.

SEREBRAL PALSİDE ALT EKSTREMİTE BOTULİNUM TOKSİN İLE FİZYOTERAPİ VE REHABİLİTASYON İÇİN AİLE-MERKEZLİ HEDEFE-YÖNELİK MULTİDİSİPLİNER YAKLAŞIM

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bu çalışma alt ekstremite Botulinum Toksin (BT) uygulaması ile fizyoterapi ve rehabilitasyon (FTR) programına alınacak serebral palsi (SP)'li çocukları "aile merkezli ve hedefe yönelik multidisipliner yaklaşım (AHMY)" kapsamında incelemek ve ebeveynler ile çocukların bu yaklaşımdan memnuniyetini değerlendirmek amacıyla yapıldı.

Yöntem: BT uygulaması için başvuran, yürüyebilen 30 SP'li çocuğu (yaş=6,03±2,38 yıl) ve ebeveynlerini, bir fizik tedavi ve rehabilitasyon uzman hekimi ve fizyoterapist AHYM ile değerlendirdi. Kaba Motor Fonksiyon Sınıflandırma Sistemi (KMFSS), El Becerileri Sınıflandırma Sistemi (EBSS), İletişim Fonksiyon Sınıflandırma Sistemi (İFSS) çocuğun fonksiyonelliğini değerlendirmek için kullanıldı. Selektivite, Alt Ekstremitenin Selektif Kontrol Ölçeği (AESKÖ) ile yürüyüş, Gözlemsel Yürüyüş Skalası (GYS) ve Gillette Fonksiyon Değerlendirme Anketi (FDA) ile değerlendirildi. Memnuniyet seviyeleri Görsel Analog Skalası ile ölçüldü.

Sonuçlar: Ondokuz (% 63) çocuk KMFSS seviye III, 16 (% 53) çocuk EBSS seviye I ve 19 (% 63,33) çocuk İFSS seviye I'di. Çocukların yarısının görme problemi vardı. BT için en çok tercih edilen kaslar hamstring ve gastroknemiustu. En yaygın kullanılan cihaz ayak-ayak bileği orteziydi. AESKÖ puanı ortanca değeri 8 (4-17) puan, GYS değeri 12 (2-24) puan, FDA değeri 2 (1-10) puan, ebeveyn ve çocukların memnuniyeti puanı ortanca değerleri 9 (7-10) ve 7 (6-10) puandı. Ebeveynlerin yeni yaklaşımdan memnuniyet değerleri geleneksel yaklaşıma göre yüksekti ($p<0,001$).

Tartışma: Hem ebeveynler hem de çocuklar BT ile FTR programı için AHMY'dan memnun kalabilirler. Bu yaklaşımda klinisyenler; kas tonusu ve eklem hareket açıklığı değişimi kadar alt ekstremite selektivitesi, yürüme performansı ve memnuniyet değerlerini de dikkate almalıdır.

Anahtar Kelimeler: Botulinum Toksin; Serebral Palsi; Ebeveyn; Fizyoterapi.

INTRODUCTION

Cerebral palsy (CP) is a group of permanent posture and movement disorder that causes activity limitation due to non-progressive disorders in the developing brain (1). Spasticity is a common feature of CP. Children with spastic CP have impaired muscle tone, lack of motor control, abnormal postural control, all of which affect functional balance capacity, and daily living activity (1).

Intramuscular Botulinum Toxin (BT) injection is dose-dependent chemical denervation and has often been used as an accepted safe and effective method to reduce spasticity in children with CP (2). BT injection diminishes muscle activity by blocking the release of acetylcholine at the synaptic junction. It is injected in a single muscle or multiple muscles in a session (3).

The BT application is an integral part of the multidisciplinary model of spastic children with CP. Today, the BT application is combined with other treatments such as physical therapy and rehabilitation (PTR), orthotic management, casting, pharmacotherapies, intrathecal baclofen, selective dorsal rhizotomy, and single-event multi-level orthopedic surgery (4). The combination of treatment modalities is more effective than the use of one treatment in the management of muscle spasticity (3). Some authors have found the combined use of BT and PTR to be more effective than BT alone, but other investigators have not confirmed this observation (4,5).

Today, "family-centered, goal-directed multidisciplinary approach (FGMA)" that is a perspective where the family and the child are at the center, preferred in all areas related to child health in clinics (6). Since children with CP are affected by neuromotor, musculoskeletal, somatosensorial, and many other impairments, different disciplines are needed for the evaluation and treatment of children in the multidisciplinary team (7). Children with CP are evaluated holistically, and goals are set with the family and treatment program is formed in line with the goals in the FGMA (8). Conversely, professionals implement their personal goals independent of other disciplines in traditional BT injections or PTR programs. In this routine and traditional process, it can be difficult for the family and the child to adapt to other disciplines in terms of time, place, and material. Notably, the goals and expectations of the family and the child is present in the background most of the time (9).

Considering that the duration of the effect of BT injection is short, it is thought that evaluation together with the core-team of family, child, physician, and physiotherapist would be time efficient and families would be pleased in BT injections plus PTR program. Therefore, this study was aimed to interpret the characteristics of the children with CP who received the multilevel lower extremity BT application and PTR program under the FGMA and assesses satisfaction levels of parents and children about this approach.

METHODS

This study was approved by the clinical ethical committee of Dışkapı Yıldırım Beyazıt Educated and Research Hospital (Approval Number: 57-30). This study was conducted within the scope of Ph.D. dissertation at Dışkapı Yıldırım Beyazıt Education and Research Hospital, Physical Therapy and Rehabilitation Clinic, between May 2018 and March 2019. Written informed consent was obtained and signed by the parents of involved children before participation in the study.

Participants

Participants with ambulatory CP and their parents were recruited from an out-patient clinic. The children and their parents were informed about the study. The inclusion criteria were being 3-12 years of age. Children had spastic bilateral CP, were classified at GMFCS levels from level I to III, had at least one BT application previously, were planned to receive multilevel BT injection for their both their lower extremities. The children who were agitated and had communication problems were excluded from the study.

Procedure

The family, child, physician, and physiotherapist were members of a core team who have come together for the FGMA. Clinical observation and objective evaluation were performed with the core team together for BT injections and PTR program

in a clinical setting (Figure 1).

A 20-year experienced physical medicine and rehabilitation specialist and a 10-year experienced pediatric physiotherapist evaluated the children with the participation of their parents in a clinical setting. Demographic data, complaints, difficulties, and expectations of the children and their parents were investigated. The physician and the physiotherapist observed together and assessed body structures (muscle tone, range of motion, selectivity), activity (functional levels, mobility, walking ability), and participation status of children with special clinical assessments for multilevel BT injection and PTR program. After holistic evaluation, the physician decided on the lower extremity multilevel BT injections according to "key muscle concept" (10) and also decided some aspects such as muscles and levels should be injected, orthotics and adaptive devices should be suggested with taking the views of the physiotherapist and goals of the child and parents. The essential muscles process and orthosis had determined. The physiotherapist explained to the child and parent the concept of FGMA that consisted of activity-based training with a physiotherapist (4 times per week, one hour per day), family education, home program, and follow up of treatment (Figure 1). The program applied considering the goals of the family and the child (11). The physiotherapist gave family education about details of using orthosis and assistive devices and treatment follow up (three-month intervals) after the multilevel BT injections to the child and their parents (Figure 1). Family education included motivation of the parent and the child, the responsibility of the family in treatment, and its importance for the use of orthosis and assistive devices. Individual home program and exercises were shown to the child and the family. It was stated that the follow-up of the home program would be done over the phone application every week, and general checks would be done at three-month intervals.

In the traditional approach consisted of separate evaluation of children with CP and their parents by physician and physiotherapist. In this approach, first of all, physician evaluates children with CP without the presence of their physiotherapists in hospital, perform multilevel BT injection and then refer family and children to receive PTR sessions. The children undergo traditional PTR sessions applied by physiotherapists in special education and rehabilitation centers. In traditional PTR approach, physiotherapist evaluates children with CP and their parents independently of physician. Unstructured stretching training, active range of motion, electrical stimulation, and functional strength training are usually applied to children one hour per day, 2-4 times per week at least three months (3,12).

Assessments

Demographic data (age, gender, clinical diagnosis) and previous BT injection history of children with CP were recorded from their medical records. Specialized classification systems were used to determine the functional status of children with CP. Gross Motor Function Classification System Expanded and Revised (GMFCS&ER) describes the locomotor abilities of children with CP in five levels. Level I walks without limitations, and level II walks with limitations, and level III walks using a hand-held mobility device, level IV; self-mobility with limitations and level V; may use powered mobility, transported in a manual wheelchair. The Turkish version of GMFCS&ER was used for this study (13).

Manual Ability Classification System (MACS) is a five-level classification system that describes the use of hands in handling objects. It classifies the hand skills of children with CP based on the need for self-help or adaptation into five levels. Level I handles objected efficiently and successfully. Level II handles most objects but with somewhat reduced quality and speed of achievement. Level III handles objects with difficulty, needs help to prepare and modify activities. Level IV handles a limited selection of easily managed objects in adapted situations. Level V does not handle objects and has severely limited ability to perform even simple actions. The Turkish version of the MACS was used for the current study (14).

Communication Function Classification System (CFCS) classifies the communication of children with CP into five levels. As the level increases, the communication ability decreases. While level I describes that a person independently and effectively alternates between being a sender and

receiver of information with most people in most environments, level V describes that a person is seldom able to communicate effectively even with familiar people. The researcher used the Turkish version of the CFCS for classifying the children (15, 16).

Modified Tardieu Scale (MTS) measures the muscle tone with a five-level scale which ranged from 0; no resistance throughout the passive movement to 4; in fatigable clonus (>10 s when maintaining pressure) occurring at a precise angle (17). Bilateral hamstrings and gastrocnemius muscles measured using MTS by the physician. Two velocities were chosen to determine the quality of muscle reaction, such as slow as possible (V1) and as fast as possible (V3). Two resulting joint angles were measured by goniometer including the R1 angle which is the 'angle of catch' after a fast velocity stretch (V3) and the R2 angle defined as the passive joint range of following a slow velocity stretch (V1). The passive range of movement at different two-movement velocities (fast and slow velocity stretch) was determined for the dynamic component of the hamstrings and gastrocnemius muscles (17).

Selective Control Assessment of the Lower Extremity (SCALE) is used to quantify the selective motor control in children with CP. The physiotherapist assessed the isolated joint movements of hip, knee, ankle, subtalar, and toe joints bilaterally. Selective Voluntary Movement Control was graded at each joint as "Normal" (2 points), "Impaired" (1 point), or "Unable" (0 points). The SCALE score for each limb was obtained by summing the points. A grade of "Normal" was given when the desired movement sequence was completed within the verbal count without movement of untested ipsilateral or contralateral lower extremity joints. A grade of "Unable" was given when the requested movement sequence was not initiated or when it was performed using a synergistic mass flexor or extensor pattern (18).

Observational Gait Scale (OGS) is a quantitative gait scale (19) consisting of eight sections, with a maximum score of 22 for each leg indicating normal gait. The child walked along a 10-meter walkway barefooted, with or without the use of a walking aid. The physician rated the frontal and sagittal plane observations for each child, both at average and slow speed.

Gillette Functional Assessment Questionnaire (FAQ) is a valid, reliable, a ten-level, parent-reported questionnaire that classifies the functional walking performance of children with CP in daily life. While "level 1" defines children who do not walk, "level 10" defines children running and climbing on different grounds without difficulty. Permission of the Turkish FAQ was obtained from Seyhan et al. The physiotherapist interviewed the parents about the walking performance of their children with CP in daily life by the Turkish version of the FAQ (20). The permissions for all the questionnaires were taken via e-mail.

All children previously had at least one BT injection experience. After evaluating the children scoping FGMA, the satisfaction levels of the parents and children were questioned between 0 and 10 using the Visual Analogue Scale. The physiotherapist asked whether the children or their parents had been satisfied with their previous traditional evaluation and current FGMA evaluation for the BT injection plus the PTR program (21).

Statistical Analysis

The number of participants to be included in the study with 80% power with alpha error margin 0.05 and beta 0.20 was determined to be at least thirty participants. In case of any inconvenience in getting sample statistics, the number of participants was raised to thirty-seven. Statistical analysis was performed using the Statistical Package for the Social Sciences version 23.0 program (IBM SPSS Statistics for Windows, IBM Corp, Armonk, NY, USA). The descriptive statistical analysis (mean, standard deviation, median, minimum, maximum range, frequency) was used to determine the characteristics of the children with CP (22). Age, height, weight, and body mass index were presented as mean±standard deviation (SD). The categorical data including sex, GMFCS, MACS, CFCS levels, additional problems, use of orthotics or adaptive device, and data about the multilevel BT application (key muscles, previous repeats) were expressed as frequency and percentages. The median, minimum, and maximum values of MTS,

SCALE, OGS, FAQ, and satisfaction levels of the parents and the children were calculated. Mann-Whitney u test was used to compare between the parental and child's satisfaction levels of the previous traditional approach applied and current family-centered, goal-directed approach. A p-value <0.05 was considered as statistically significant (22).

RESULTS

Thirty-seven children with CP were evaluated for this study. Three children could not continue the treatment, and two children had communication problems. Two children were excluded because of planned BT injections in upper extremity muscles. As a result, 30 children were included in this study. Their mean age was 6.03±2.38 years (3-11 years). Eighteen (60%) were females, and 12 (40%) were males. Half of the children had visual problem, 11 children (36%) had speech problem, and four children (13%) had epilepsy (Table 1).

According to GMFCS, one child (3%) was level I, 10 children (33%) were level II, and 19 children (63%) were level III. The MACS levels of children were level I (53%) and level II (46%). Nineteen children (63%) were in level I, eight children (26%) were in level II, and three children (10%) were in level III, according to the CFCS.

Ten children (33%) used AFO and KAFO, 10 children (33%) used the combination of AFO, KAFO, and standing frame, and seven children (23%) used only AFO. While two children (6%) had AFO, KAFO, hand splint, and knee immobilizer, and one child (3%) used AFO, KAFO, standing frame, and hand splint (Table 1).

All of the children went to special education and rehabilitation center. While six children (20%) took the PTR session once a week, 24 children (80%) took twice a week. In addition, 26 children (86%) took PTR sessions in hospitals. While 20 children (66%) received twice a week, six children (20%) received three times a week. The four of them (13%) did not receive a session from hospitals because of distance or transportation.

The median scores of iliopsoas muscles were 1 point, according to the MTS (0-2) bilaterally. The median scores of hip adductors were 1 point on the MTS (0-3). The median score of hamstring muscles was 2 points (ranged from 1 to 3 points) on the MTS (Table 2). The gastrocnemius muscle tone differed from 1 to 3 (median=2 points) on the MTS.

Table 1: Characteristics of Children with Spastic Diplegic Serebral Palsy for the Botulinum Toxin Injections plus Physical Therapy and Rehabilitation Program.

Variables	CP (n=30)	
	n	%
Sex (Females/Males)	18/12	60/40
Age (years)	6.03±2.38[δ]	(3-11)
Height (cm)	93.06±13.10[δ]	(70-120)
Weight (kg)	18.86±5.58[δ]	(11-35)
Body Mass Index (kg/m²)	21.63±3.52[δ]	(14-29)
Additional Problems	**n**	**%**
Visual	15	50
Hearing	1	3
Speech	11	36
Epilepsy	4	13
Orthosis and Adaptive Devices	**n**	**%**
AFO	7	23
AFO+KAFO	10	33
AFO+KAFO+Standing Frame	10	33
AFO+KAFO+Hand Splint+Immobilizer	2	6
AFO+KAFO+Standing Frame+Hand Splint	1	3

[δ]Mean±SD. CP: Cerebral Palsy, AFO: Ankle Foot Orthosis, KAFO: Knee Ankle Foot Orthosis.

Table 2: Muscles Tone, Selectivity and Walking Ability of Children with Spastic Ambulatory Cerebral Palsy.

Scales		CP (n= 30)	
		Right Median (min-max)	Left Median (min-max)
Muscle Tones-Modified Tardieu Scale (0-5)			
Iliopsoas		1 (0-2)	1 (0-2)
Hip Adductors		1 (0-3)	1 (0-3)
Hamstring		2 (1-3)	2 (1-3)
Gastrocnemius		2 (1-3)	2 (1-3)
Soleus		2 (1-3)	2 (1-3)
Tibialis Posterior		1 (0-2)	1 (0-2)
Lower Extremity Impairment	**Total Median (min-max)**	**Right Median (min-max)**	**Left Median (min-max)**
Selective Control Assessment of Lower Extremity	8 (4-17)	3 (2-9)	3 (2-8)
Observational Gait Scale	12 (2-24)	5 (1-15)	6 (1-15)
Walking Ability			**Median (min-max)**
Gilette Functional Assessment Questionnaire			2 (1-10)

CP: Cerebral Palsy.

The minimum and maximum scores of the soleus muscles were 1 and 3 points, and the median scores were 2 points on the MTS bilaterally. The median scores of right and left tibialis posterior muscles were 1 point on the MTS, and scores ranged between 0 and 2 points bilaterally (Table 2).

The total SCALE differed from 4 to 17 points, and the median score was 8 points. The median of the total OGS scores was 12 points, and minimum and maximum scores were 2 and 24 points, respectively. The FAQ levels varied from 1 to 10, and the median score was 2 points (Table 2).

The number of previous BT injection repeats ranged from one time to 10 times, and the median value was 2. The estimated critical muscles thought for BT injections were as indicated in Table 3. The gastrocnemius, soleus, tibialis posterior, medial hamstring, adductor longus, gracilis, and iliopsoas muscles were the estimated key muscles for BT applications. The combination of the gastrocnemius, medial hamstring and tibialis posterior (20%), and the combination of muscles of hamstrings, adductor longus, and gracilis (20%) were the most preferred ones (Table 3).

While the satisfaction level of parents with the previous traditional approach was 7 (5-9) on the Visual Analogue Scale, the satisfaction level with

Table 3: Information About the Estimated Key Muscles Prescribed for the Botulinum Toxin Injections.

Variable	CP (n=30)	
	Median	**Min-Max**
Previous Botulinum Toxin Applications (n)	2	1-10
Estimated Key Muscles	**n**	**%**
Gastrocnemius+Soleus	3	10
Gastrocnemius+Tibialis Posterior	6	20
Gastrosoleus+Medial Hamstring	3	10
Gastrocnemius+Medial Hamstring+Tibialis Posterior	6	20
Gastrocnemius+Medial Hamstring+Adductor Longus	4	13.33
Gastrosoleus+Medial Hamstring+Iliopsoas	1	3.33
Medial Hamstring+Gracilis/Adductor Longus	6	20
Hamsting+Iliopsoas	1	3.33

CP: Cerebral Palsy.

Table 4: Satisfaction of the Children and Their Parents with the Traditional Approach or the Family-centered, Goal-directed Multidisciplinary Approach.

Visual Analogue Scale	Traditional Approach (n=30) Median (min-max)	FGMA (n=3) Median (min-max)	p$^{\phi}$
Satisfaction of Parents with Approach	7 (5-9)	9 (7-10)	**<0.001***
Satisfaction of Parents with Family Education	6 (4-9)	8 (7-10)	**<0.001***
Satisfaction of Children with Approach	7 (5-9)	7 (6-10)	0.135

*p<0.05. $^{\phi}$Mann-Whitney U test, FGMA: Family-centered, Goal-directed Multidisciplinary Approach.

current FGMA was 9 (7-10), and there was a significant difference between values (p<0.001). The median value of satisfaction with family education in the previous traditional approach was 6 (4-9), and the median value was 8 (7-10) in the current FGMA (p<0.001, Table 4). There was not any significant difference between the satisfaction levels of children in traditional or current approach (p=0.135, Table 4).

DISCUSSION

In this study comparing two different approaches, traditional and FGMA, for determining BT injections and PTR program in children with CP, it was stated that the FGMA perspective was more satisfying to parents and children and also reported that family education at FGMA was more pleasing for parents of children with CP.

In traditional PTR approaches, physiotherapists focus on impairments and limitations of children with CP (23). The FGMA approach is a crucial concept in the treatment of children with CP and their families, with partnership and collaboration being the principal aspects of rehabilitation (24,25). Darrah et al. (25) showed that the lack of formal processes of FGMA could result in inequitable

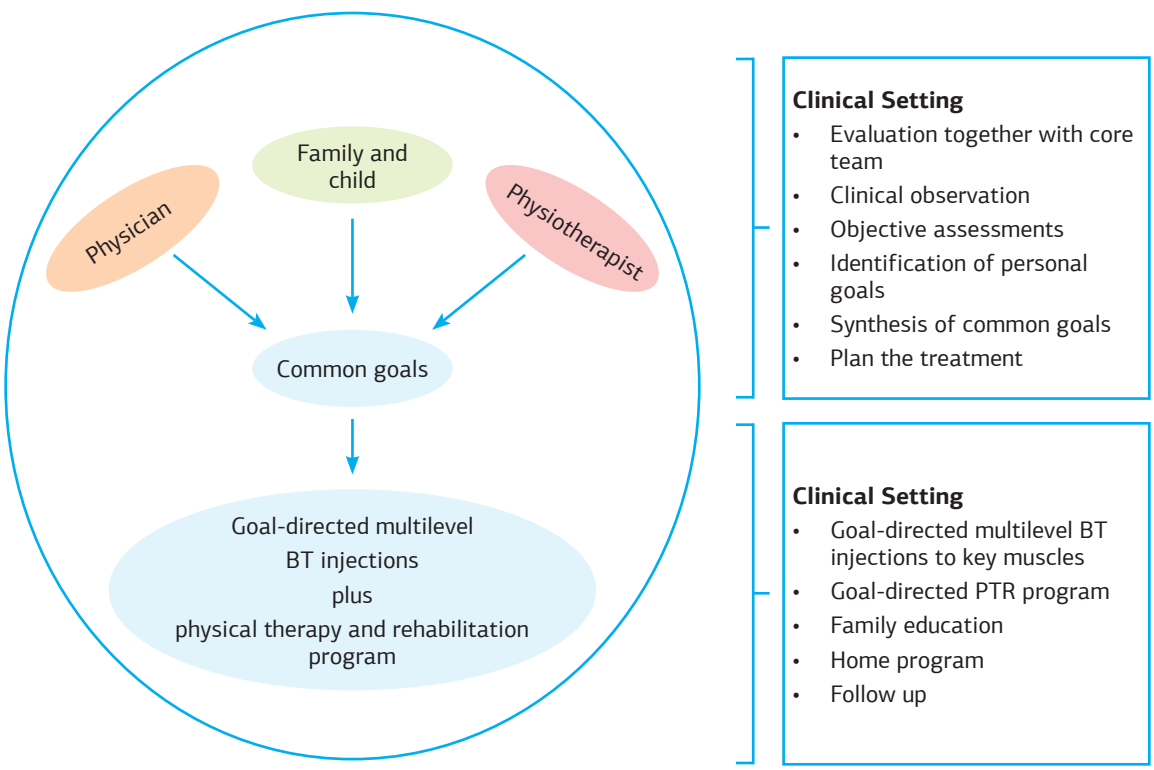

Figure 1: Family-centered, Goal-directed Multidisciplinary Approach diagram for Botulinum Toxin Injections plus Physical Therapy and Rehabilitation Program. BT: Botulinum Toxin, PTR: Physical Therapy and Rehabilitation Approach.

opportunities for families to participate in their children's rehabilitation. There is a need for a study about standardized approaches to increase the participation of the family in rehabilitation. To the best of our knowledge, the current study was the first study that employed a standardized FGMA approach for the combined program of both BT and PTR program.

Kuo et al. (6) emphasized that the family-centered approach may increase not only the general understanding among the family members but also the family's respect for and willingness to participate in the decision-making process with the medical team. Family centeredness moved beyond patient-clinician interaction by considering the needs of all family members, not just the child, and emphasized that more research was needed to ensure that is it being implemented correctly (6). Today, studies indicate that goal-directed therapy is beneficial (26). Considering a holistic approach to the PTR program with the BT injections, the expectations and goals of the parents and the children are as important as the clinicians. Other research, however, shows that the family-centered approach is problematic because professionals create a "therapeutic imperative" for mothers, expecting them to do therapeutic work that usually exceeds the amount of work that professionals do with their children (27). In this study, parents were more satisfied with the FGMA perspective comparing with the previous traditional approach. Furthermore, they are also satisfied with family education for using assistive devices, positioning the child, home exercise program, and the follow-up of the treatment.

Previous studies on the effects of BT injections focused on assessing only muscle tone, range of motion, and gross motor function. However, the researchers also took into account the daily activity evaluations were in time (3,28). Recent assessment of selective voluntary control indicates that family satisfaction has been added to the evaluation parameters of lower extremity BT application (11). Although the selective movement of the ankle joint was assessed in most of the recent studies about BT injections, selective motor control of the other joints in lower extremity should also be assessed. Therefore, the SCALE total score was obtained by evaluating the hip, knee, ankle, and subtalar joints, and fingers were used for selectivity of the lower extremity in the current study. Even though the most reliable gait assessment is a three-dimensional gait analysis system, it is unlikely to be applied in all the clinical setting (29). The FAQ and the OGS were used to assess the children walking performance in daily life and walking quality because both of them are easier to use. It was emphasized that lower extremity selectivity, walking ability, and walking performance of the children with ambulatory CP were low in the current study.

In previous studies, while gastrocnemius and soleus muscles were the most preferred muscles in children with spastic bilateral CP with GMFCS level I-III, hamstrings, and adductor muscles were the most preferred muscles in children with CP in level IV-V (30,31). In this study, the most estimated key muscles were hamstring and gastrocnemius muscles of children in level I to III, probably because most of the children walked with knee flexion and talipes equinus position.

In a French observational study, Visual Analogue Scale was used for assessing the therapeutic goals of BT use in the management of children with CP. The results are in favor of the use of as conservative safe and efficient treatment of spasticity in children, which enabled functional improvement as well as pain relief. However, there is no data about the satisfaction level of children and parents separately (30). In this study, we found the parents were a little more satisfied with their children, although both the satisfaction levels of parents and their children were high.

There were some limitations to this study. Inclusion of the experiences of only one sample group limited the quality of the study. As children's age ranges were broad and understanding levels of questions would be different, the satisfaction levels of all children were recorded by asking their parents. If children over the age of five had rated their satisfaction levels, the value of children's satisfaction could have been different. There was a lack of valid and reliable specific parent or child-reported questionnaires related to BT application, parent education, or PTR program; therefore, the Visual Analogue Scale was used for satisfaction in

this study.

As a result of this study, lower extremity selectivity, daily walking performance, parents and child satisfaction would be taken into consideration as much as muscle tone or range of motion by the clinicians for the FGMA concept. Parents and children may be satisfied with the FGMA for BT injections with the PTR program. In future studies, randomized controlled trials should be conducted comparing the traditional approach, and the FGMA. The long-term satisfaction levels of the parents and the children with CP may also be compared with the traditional approach. Furthermore, there is also a need for assessment methods to question the satisfaction of children and parents of all ages in relation to BT and the PTR program.

Sources of Support: None.

Conflict of Interest: There is no conflict of interest.

Ethical Approval: The ethical approval of the study was gathered from the Clinical Research Ethics Committee of the Dışkapı Yıldırım Beyazıt Education and Research Hospital (Approval Date: 18.01.2019, Approval Number: 57-30).

Informed Consent: Informed consent was obtained from all children and their parents.

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