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Dystonia and Rehabilitation in Children

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1. Introduction

Cerebral palsy is defined as a "disorder of movement and posture due to a defect or lesion of the immature brain" (Bax, 1964). The non-progressive brain damage causes a variable impairment of coordination of the muscular action, with the resulting child's inability to maintain proper posture and normal movement. Cerebral palsy (C.P.) is often associated with language, vision and hearing disorders, with different types of alterations of perception and cognition (Fejerman, 2007).

Lesions on the immature brain tend to produce widespread and diffuse damage, with multifocal or generalized dystonia is the third cause of movement disorders, whose most common cause is cerebral palsy (about 15% of them are dystonic dyskinetic). However many of the children with C.P. have spastic dystonia associated (Pascual, 2006).

It is noteworthy that there are dystonias of childhood that are not associated with cerebral palsy and often end up being widespread (Pascual, 2006; Bleton, 2000), so the clinical presentation and treatment lines in the therapeutic management are similar and for purposes of this chapter shall be taken together (Rodríguez-Costelo & Rodríguez- Regal, 2009; Lezcano, 2003).

To evaluate the abnormal movements and patterns of a child with cerebral palsy, we must know what is expected from normal movements. Our central nervous system in relation to motor function gives us the ability to move and perform highly skilled activities, while maintaining posture and balance necessary for proper functional performance. Every movement and postural change causes a variation of the center of gravity over the base of support and this should make a difference and automatic tone fluctuation throughout the body musculature, in order to maintain balance and fluidity of movement. These movements work and / or are learned as dynamic patterns, or chains that involve groups of muscle, determining as a whole, the quality of motion to perform a given task (Rodríguez, 2011).

To ensure that the motor control system is developed and run in harmony, multiple levels of central nervous system (spinal cord, medulla oblongata, pons and midbrain, diencephalon, basal ganglia, cortex and cerebellum) should be involved, since performance of a specific task requires sensory, emotional, and environmental input as well as a context that will determine the motor response needed for a particular task (Afifi, 2006; Gatica, 2005; Machado, 2010; Purves, 2004; Young, 1998).

The functional performance of children with generalized dystonia varies in different stages of development, according to etiology, degree of motor impairment and mental health and socio-cultural context (Machado et. al., 2010; Bleton, 2000). This is why the therapeutic support should be multidisciplinary and continuous throughout the process, to enhance the functional capabilities and prevent complications that may affect occupational performance.

There is some literature available supporting the medical intervention from a pharmacological and surgical approach but there is little to none documents with guidelines or systematization from a rehabilitation team perspective (Bleton, 2000).

The goal of this chapter is to systematize the intervention of children with generalized dystonia from a perspective of their degree of functional difficulties. The systematization is categorized according to the expected performance in different areas according to age of the child, providing a general reference guide for the therapeutic approach in rehabilitation.

Apart from a systematic literature Review on therapy, we incorporated the Clinical experience from a large sample of Children's Rehabilitation Institute of Santiago, Chile. This center, called Teletón, has a patient population base of 30,000 children having musculoskeletal disorders. Cerebral palsy constitutes the majority and serves 20% of the population nationally.

This chapter describes the clinical characteristics of children with cerebral palsy and generalized dystonic. It also provides neuro-rehabilitation plans with emphasis on describing evaluation and treatment processes at different stages of development.

2. Clinical characteristics of children with dystonic cerebral palsy

In order to better understand the movement development of a child with dystonic cerebral palsy it is important to remember that the basal ganglia receives information from the context in which they perform a task. The role of the basal ganglia is to regulate the automatic postural adjustment, facilitating the execution of movements required and block the ones which do not support an action, providing quality depending on the required movement to a given goal (Afifi, 2006; Gatica, 2005; Purves, 2004; Young, 1998).

When basal ganglia circuitry is altered, the control over the axial and proximal muscles is affected as a result of a fluctuating tone. This eventually will affect the fixation and stability of these muscle group (especially shoulder girdle and pelvis), decreasing the chances of dynamics co-contraction and encouraging abnormal patterns or strings that do not allow control of this mechanism through automatic postural reflex (Afifi, 2006; Bleton, 2000; Bobath, 2000; Gatica, 2005; Purves, 2004; Young, 1998). These phenomena ultimately alter the fluidity of movement, and the child in this distorted way, may have difficulties perceiving the sensory input from internal and external sources.

Also the sensory integration as an adaptive precursor response will be affected which in effect, will determine the interaction with the physical and social environment. Much of the exploration is done through vision and hearing as the possibilities to explore through the body and later on of hands as to reach, touch and manipulate objects is limited or distorted by volatile movements especially in the ability to grasp. Thus, the child can not perceive shapes, textures, weights and therefore cannot perceive the relationship of objects with the space (Rodríguez, 2011; Machado et. al., 2010).

The clinic of a child with dystonia is varied and complex given to the cognitive, emotional and motor elements involved. There is literature that relates the basal ganglia with the cognitive functions of the child. Therefore in a clinical observation it is necessary to assess if there is some cognitive impairment. However this is not always the case and there are a large number of children without cognitive difficulties even with a comprehensive level close to normal, being able to understand instructions, be alert, and expressive (Purves, 2004; Young, 1998).

It has also been described that many may have difficulty in controlling impulsivity and low frustration tolerance, which is expressed in behavioral changes such as irritability and emotional lability. The latter varies in each child, according to etiology, age and context, but often in the clinic one can find that this is reinforced by the consistent failure of their relationship with the environment, undermining their self-esteem and motivation to engage with more complex purpose, which results in greater difficulty in controlling voluntary movement, exercise tolerance and maintain the activities.

It is important to understand some key concepts about the mechanism of the generation of normal movement like the automatic postural reflex in order to understand children with generalized dystonia. This can help you identify and point out possible alterations.

The mechanism of generation of normal movement contemplates; normal postural-tone, which refers to the adjustments necessary to maintain a muscular stance and anti-gravity balance, reciprocal innervations, that refers to the simultaneous contraction of opposing muscle groups around the waist and proximal parts denominating co-contraction. This dynamic fixation of the proximal parts allows us to perform distal activity with the skills necessary for a task. We can say that reciprocal innervation is of great importance for the regulation of postural tone in maintaining balance and performing normal movements. It exerts a remarkable stabilizing influence and guiding the developing movement. Finally, it considers the variety of patterns of posture and movement, which refers to the increased complexity and evolutionary patterns of movement as a result of maturation and development. (Bobath, 2000; Bobath 1992).

In generalized dystonia this aspects are alterate and they can be found on clinical examination (Bobath, 2000). In relation to the tone, it's observe hypertonia recognizing the lack of changes in the strength of a muscle group in the entire range of motion, in both cases as to flexion and extension. However, this feature is not maintained consistently, the fluctuation of the tone depends on the severity of symptoms and also on emotional and environmental factors, as well as if you are resting or in motion. Therefore, one can observe that different types of tone in the same child may change over time as the brain matures.

In relation to the reciprocal innervations, the child with dystonia seems to have, on the one hand, a disturbance of reciprocal innervations given to an excess of co-contraction, where hypertonic muscles oppose equally or more hypertonic muscles (especially in the hip and scapular girdle). On the other hand, when the case is associated with involuntary movements or ataxia it may have an excess of reciprocal inhibition with marked instability of the shoulder and pelvic girdle, varying degrees of commitment to each child. The lack of co-contraction is also responsible for the lack of action in support of synergists, which explains the excessive mobility, lack of fixation and lack of postural control of this group of children. Movements are characterized by lack of control, extreme ranges and poor coordination.

In relation to abnormal patterns, the child learns through exploration and play. The success of these activities sets a learning process of the motor patterns. In children with dystonia occurring movement patterns and erroneous chains are learned by positive feedback, which is provided by the ultimate success of the activity. This positive feedback is recorded even if it means that this child had to stabilize the position from proximal fixation and sometimes distal. This is required in order to compensate for the lack of postural adjustments and synergies that provide proximal stability required to run dissociated and precise movements distally.

Finally what is observed in the clinic of a child with dystonia is the consequence of the three elements above described, in which unstable postural tone, and movements are jerky, uncontrolled and of extreme ranges, with poor control of the middle ranks. As a result, the child cannot maintain a stable position against gravity to fixed posture, in addition to a mobile zone, interfering in the overall functional performance. Therefore, it is important to identify items that are altered and how these interfere with the development of normal movement patterns and functional performance.

Muscle tone, reciprocal innervations and movement patterns are crucial when planning an intervention treatment. Each child will have different clinical characteristic, so the therapist must propose alternatives treatment, considering the child's abilities and motivations, family characteristics, and social context to maximize the autonomy and independence (Crepeac, 2005).

3. Neuro rehabilitation of the child with dystonic cerebral palsy

The therapeutic approach of children with generalized dystonia should be multidisciplinary, since each discipline makes a contribution to improving functional performance.

For purposes of this chapter there will be an overview of the therapeutic management under the foundations of Occupational Therapy, differentiated by degree of commitment and age groups in order to guide treatment and to provide guidelines.

It is important to understand that the occupation is the essence of "doing" in the human being, which determines and identifies the person in a context, set in a social and cultural environment. There must be a promotion of balance in the different areas of performance (basic and instrumental activities of daily living, productive activities as well as leisure and entertainment), maximizing components (cognitive perceptual, sensory, motor, psychological and social) that enable the development and the achievement of each life cycle stage (Crepeac, 2005; Kielhofner, 2004). Occupational therapy approach considers the child as an interacting system and a whole, considering also the environment in which the child develops. This appreciation facilitates a better understanding of the child's problems and contributes to a better approach.

The intrinsic and extrinsic motivation of the child in combination with a properly selected therapeutic activity, close related to the child's abilities, should raise an interesting challenge as a key to successful therapy. The right challenge promotes the child's learning or relearning of the conscious and successful voluntary motor program. With repetition, this successful movement becomes finally as an automatic motor pattern (Csikszentmihayi, 1997).

Children with generalized dystonia are permanently seeking body stability. Therefore the work position must provide axial support to lessen the need to seek stability through postural fixation or abnormal patterns. An unstable position can in the future cause permanent alterations of the posture, inefficient chains of movements, and not functional movement. As for the activity, this should ensure success and avoid frustration; creating an atmosphere that encourages repetition of the voluntary action, encouraging people to learn more stable motor schemes, more functional and appropriate movements (Bleton, 2000; Rodríguez, 2011).

The aim of the therapeutic approach is to achieve a better occupational performance whit the remaining capacity, development potential, according to the age and context of the child (Mulligan, 2006; Rodríguez, 2011).

There is a large literature referring to drug therapies available for children with dystonic cerebral palsy. Regarding intervention approaches performed by non-medical disciplines (Kinesiology, Occupational Therapy, Speech Therapy, etc.) the literature is scars. There are only short articles about overall management and very specific to certain rehabilitation centers. These studies are in general not validated nor statistically significant or representative (Blanco, 2006; Bleton, 2000; Pascual, 2006).

Below are areas and evaluation criteria, methodology of intervention based on characteristics of children in an age group, level of motor impairment and level of understanding. The therapeutic management is discussed according to the criteria of postural control, hand function, movement, activities of daily living and school management. In each of these points is considered the orthotic management, adaptations and furniture recommended (Mulligan, 2006; Rodríguez, 2011).

3.1 Assessment

The generalized dystonia often interfere whit the functional and occupational performance of children. Therefore assessment process must consider a broad range of tools to assess the multiple elements involved in child development.

Regarding the evaluation tools there is a wide range of standardized guidelines, however, most seek to measure the intensity of dystonia in a segmental way and only a few refer to a functional evaluation of performance (Bleton, 2000; Rodríguez, et.al. 2006).

Observing the motor control from the neurodevelopment model (Bobath, 2000; Bobath, 1992), helps to have a reference of the degree of assistance in the activities of daily living using for example the Wee-FIM (Uniform Data System for Médical Rehabilitation, 2005) of International classification of functioning assessment scale (CIF) (Herrera, 2008). These assessments allow us to classify and guide the treatment. Also the Scales evaluating functional compromise and involuntary upper extremity movements in children with extra pyramidal disorders (Rodríguez, et.al., 2006) scale categorizes clinically the level of functional compromise from normal to severe in the areas of sitting posture, basic activities daily living and manual functionality. It is also a good resource to use the Gross Motor (Russel, 2002) assessment to evaluate gross motor control associated with walking. There are psychomotor development test and games, which could be useful in milder cases and in young children. Incorporating quality of life test as KIDSCREEN (Urzúa, et.al., 2009) allows us to know the perception of child welfare and family.

All these tests are feasible to use with children with involuntary movements, or with those who have no oral language difficulties and can communicate through oral language. Tests assessing manual functionality are not always useful, because these tests are very specific and strict about the times and methods of implementation, so it could be used in milder cases in terms of difficulties of upper extremities.

Below you will find a comprehensive way to evaluate the child and family more holistically, using direct observation methods. Some of the items listed above may be evaluated based on standardized tests, leaving to the discretion of the evaluator their implementation (Bleton, 2000; Mulligan, 2006; Rodríguez, 2011).

Direct observation

It is suggested that the initial assessment is done with the mother or primary caregiver, to learn their attitudes, what elements are positively reinforced and what are not, how the caregiver holds the child and moves the child and what are the voice commands used. Following the interview with the caregiver, observe the child in a free and spontaneous play session to see rhythms, patterns, compensation, fixings and surfaces in which the child feels more comfortable and successful for performing the tasks.

Assessment should include an interview to the parents along with an observation of free play of the child. The mother or caregiver can provide information regarding daily routine as well as context in which the activities are performed. It is also important to record the child's interest and participation within and outside the home.

Following the interview, a structure evaluation is recommended, where the environment is prearranged to guide the child's activity to record all aspects needed to detect difficulties in skills and functional performance.

3.1.1 Cognitive aspects

Frequently, children with dystonic cerebral palsy have a comprehensive level enough to follow simple commands and even have a comprehensive level close to normal. Measuring the cognitive ability of children with generalized dystonia is very challenging, given that standardized psychometric tests include verbal and motor tests to assess a score. Generally these children have many difficulties to successfully complete such tests which often results in scores that do not reflect the actual learning abilities of children with dystonic cerebral palsy (Ramirez, 2005).

3.1.2 Sensory aspects

It is important to know that the basal ganglia participate as environmental regulators. Therefore it is important to assess how the child is receiving the internal and external sensory information, which is observed through the adaptive response against a variety of sensory input (Ayres, 2006).

Consider that these children have insufficient or altered vestibular and proprioceptive experiences generated by difficulties presented to move against gravity in different planes. This alters the sensory processing and reduces the possibility for organizing the body in

relation to self and the space, affecting the proximal stability, righting reactions, balance and accuracy of movements.

3.1.3 Neurological aspects

It is important to determine the different types of tones that the child presents. Determine which tone is the one present when the child is resting and not moving and which one is the tone during action. It is also important to determine the intensity and form of presentation when the dystonic pattern appears and how this pattern interferes with the function. Observe if the child has a primitive reflex present and if these reflexes begin to be used as a functional resource to be able to move.

3.1.4 Postural development

The assessment of the postural development has to follow the neurodevelopmental approach which observes and assesses (sagittal, frontal and transverse). Assessing postural development from a normal developmental sequence would allow you the early identification of disorders that could hinder the acquisition of normal patterns (Bobath, 2000; Bobath, 1992).

To facilitate the process, it is recommended to evaluate the child in different positions according to what is expected to be normal motor development (prone, supine, transition to sitting, sitting, transition points and four intermediate positions, crawling, transition to bipedal, bipedal, and assisted start up independent). After this, the evaluator should identify how the child is gradually moving against gravity as well as which are the normal or abnormal patterns used to successfully move against gravity. It is also important to identify what postural fixation and involuntary movements appear when the child is activating the movement. Note the range, speed and rhythm presented during the movement in order to identify the way and how much these patterns interfere in the achievement of postural control and functional performance.

3.1.5 Active mobility of upper extremities

It is important to observe the mobility of upper extremities at different levels. It is suggested to observe the quality of the child active movement that can be performed in space or in relation to their own bodies and what strategy is being used to compensate for the lack of axial stability. One must distinguish the pattern and rhythm of movements used in relation to speed and amplitude and whether this is appropriate for the target in order to determine the functional level in relation to energy consumption and execution time (Rodríguez, 2011).

3.1.6 Manual function

It is frequently observed in children with dystonia movement patterns of total flexion-extension of the wrist and fingers. This pattern is due to the lack of reciprocal innervations caused by the excessive co-contraction. Wrist extension with fingers in fist and wrist in flexion with fingers extended prevents the flow of movement in intermediate ranges which makes more difficult to perform a voluntary control of the grasp. It is rare to observe dissociation of fingers and fine grasps and usually the children tend to use the grip type of rake.

Assessment is made with single-handed and bimanual activities going from the simple to the complex. It is necessary evaluate the active mobility of the wrist and fingers, digital dissociation and the ability to perform gross and fine grips on functional activities. Consider the pace or chain movement used to perform a successful grasp. This information is crucial when choosing the necessary aids and orthotics for the child (Rodríguez, 2011). When assessing the manual function it is important to register if the observation was done using orthotic or any accommodations. In case some external accommodations were used, register what type of external elements and what is the indication of use they had as well as the functional benefit that these elements are offering to the child.

3.1.7 Play

It is important to provide different types of play activities, challenging both cognitive and motor abilities to demonstrate skills, abilities and interests, in addition to handling emotional and social response to success and failure. All these aspects will establish the level of autonomy and ultimately determine the quality of occupational performance of the child.

The frustration tolerance in children with dystonia is usually very low which often promotes caregivers and parents to supply children with toys that are easier to handle to avoid frustration. This particular situation diminishes the challenge to explore more complex type of toys and most of the times these “easier toys” end up not being adequate for the child’s cognitive or emotional age.

The context in which the child is developing and the toys and elements that the child uses frequently to play can provide important information to determine if adequate stimulation is being provided to promote the potential development.

3.1.8 Routine and daily life activities

The evaluation includes a direct interview with the mother or caregiver about the child's daily routine to check if it is balanced and healthy. Also evaluate the basic and instrumental activities of daily living considering the level of independence, autonomy and degree of assistance. The way how they are performing the tasks and how much power this implies for the caregiver are also important to be considered (Rodríguez, 2011).

3.1.9 Orthotics, furniture, technical aids, adaptations and architectural barriers

In general, they have a low postural control and low function and will require assistance from third parties and adaptations to facilitate the tasks. It is important to register the type of furniture, adaptations and orthotics used in terms of functional goals, frequency and tolerance. It is also important to assess whether the use of these elements are creating a postural or functional benefit to the child. These elements must be permanently checked because of the possible occurrence of postural compensations.

In the case of children who use wheelchairs it is important to assess whether the posture is appropriate, if it provides stability, head and trunk alignment, position and symmetry of the pelvis, lower extremities posture and alignment, restraint or postural support (Fife, et. al., 1991). In appropriate cases it is required to evaluate the potential self-propelled option with either rings or electrical control.

In relation to architectural barriers, it should be evaluated whether or not there are barriers present in the environment where they are and how the family deals with these situations.

3.1.10 Family and school context

It is necessary to assess the family and school context in terms of integration, monitoring the therapeutic indications and how to facilitate the independence, autonomy and socialization.

In relation to the familiar context, it is important to assess who are the primary and secondary caregiver of the child, the type of link they have and if they are facilitating integration, independence and autonomy of the child in the family or in the community contexts.

In relation to the school, it is important to highlight the type of link with the authority and with peers, level of attendance and participation. In addition to registering if you have some kind of specialist support from other professionals or rating systems adapted to a formal integration plan.

It is essential to know what furniture you use and the ease or difficulty about this in relation to the sitting posture and upper extremity function, considering always recording the specific adaptations necessary for the implementation of homework. It is very important to consider the level of accessibility offered by the educational establishment as well.

3.2 Treatment

The treatment of children diagnosed with generalized dystonia is based on terms of greater functionality by a better voluntary control of movement (Blanco, 2006). For this it is necessary to work with different sensory and motor skills that promote learning, relearning and improving motor patterns, achieving a better postural adjustment, a more appropriate speed, better directionality and fluidity of movement in relation to the body and different levels in space (Bobath, 2000; Gracies, 1997; Rannie, 2000; Rodríguez, 2011; Rodríguez, et.al., 2006).

The lines of treatment can be projected after having clarity about the degree of functional compromise and also knowing the family and social context, which is achieved after a comprehensive evaluation and in conjunction and together with the child and family.

This treatment information is projected mainly through frameworks that include sensory stimulation (tactile, proprioceptive and vestibular) (Ayres, 2006), neuro-developmental (Bobath, 2000) framework (facilitation based on sequences and normal movement patterns) and rehabilitation framework (to facilitate posture, functionality and independence through activities and elements such as therapeutic aids, orthotics and adjustments) (Creapeac, 2005).

Below you can find a description of the therapeutic management used according to the age of the children, the degree of motor impairment and comprehensive level. These descriptions include some suggestions and considerations.

Children with severe generalized dystonia present difficulties in establishing contact with the environment and/or have cognitive impairments obstruct the understanding of simple instructions. These children will be addressed as multi deficit where the emphasis of the therapeutic management will be placed in relation to family child care.

The cases of dystonia that have mild intellectual disability will have a major alteration of their functional performance primarily from cognitive impairment, so it will not be described under the guidelines of this chapter since these areas are generally handled properly in special schools.

Children with generalized dystonia with moderate motor impairment present a comprehensive level enough to follow simple instructions; this group of children will be described by two distinct age groups, involving them as active participants in the rehabilitation process, with emphasis on motor control and overall functional performance. The more detailed description will be in this group, as we understand that is requiring more therapeutic intervention, highlighting the potential gains to obtain from the functional performance.

Children with mild motor impairment and a high level of understanding will be addressed in two separate age groups. This is because the therapeutic action contemplates an intervention plan focused on facilitating normal development and functional performance appropriate to the age and context of the child.

Children with a severe motor impairment with a good understanding will also be addressed in two age groups. There are no major changes expected in terms of functional capacity and postural control in short periods of time for this group of children, being important for these cases to enhance the function and prevent complications.

It should be considered across the board that in children with a good understanding, the treatment should emphasize the identification of aspects that contribute to optimize the function of the child. It is also important to suggest to the family the self management of aspects that can facilitate the improvement of the child's performance, such as furniture, or adaptations that optimizes the child's performance.

3.2.1 Children with mild motor impairment level and good understanding. Ages 0 to 6 year

This group of children will benefit from models such as neurodevelopmental and sensory integration, cognitive and behavioral rehabilitation.

The intervention aims to normalize psychomotor development facilitating movement sequences and patterns in a more organized, automatic, economical way with a better voluntary control. In this range of age, gross and fine motor demands become more complex and therefore require more postural control to prevent and reduce functional bindings and decrease involuntary movements.

Along with this, the sensory aspect is reinforced to provide better input to these stimuli, facilitating the integration and maturation of the systems involved, promoting a favorable adaptive response. Activities are conducted using vestibular and proprioceptive sensations and promoting the development of righting and equilibrium reactions, with synergies to promote the organization of movement in relation to body and space (Ayres, 2006).

It is also important to generate patterns of controlled and rhythmic breathing, as this has great impact on the voluntary control of movements and spoken language. Initially, it is

suggested putting the child to work on the mother's breast, to feel the respiratory patterns to later do so voluntarily.

At this stage, play is the main occupation of the child, which develops through social, emotional, cognitive, sensory, and motor functions. From this, it is essential that play is constantly referred to within the therapeutic activity and according to the therapy goals. Games should also be selected according to the abilities and interests of children, looking to present interesting challenges in order to promote the interest necessary to generate action. The relevance is focused in one punctual aspect: learning will occur to the extent that the activity has both significance and success for the child (Maturana, 2007).

Some children will require external support such as furniture, orthotic or adaptation, but these are mostly transitory.

In relation to postural control: The child that has interest and contact with the environment initiates movements to go out against gravity spontaneously, developing near-normal patterns. Progressively the child should be dominating higher positions and perform activities according to age. The therapist must accompany this process based on the sequences of normal development, safeguarding that the child does not use fixed resources by setting in abnormal postural patterns learned as functional. Treatment should be focused on correct and facilitate normal motor chain repetition reinforced by activities that bring success in a functional way. From a sensory point of view, treatment should include proprioceptive and vestibular elements in order to stimulate the harmonious development of the movements.

It is important to address the sitting posture as this is often used for play and influence the stability of hand function. If the child is seated early you may have the need for proximal postural fixation to stabilize the pelvis and trunk, making the transfer of weight and the degrees of freedom more difficult, limiting the possibility of developing movements in different planes which establish harmonic synergy for space exploration.

In relation to the role of hands: The function of the hands is largely determined by a stable axial and proximal control, reason why it should be offered a work setting that provide adequate support for the position and sensory registration.

In relation to the development of grips you can see a greater mastery of the gross grips, making it difficult or delayed acquisition of fine grips and digital dissociation. To promote the sound development, the child should experience tactile and proprioceptive sensation in different games in two motor ways, globally and manipulative. This provides information on weight, texture, shape and size, which determines the progressive development of manual skills necessary for a variety of grasps, dissociated intermediate ranges and movements that will facilitate the execution of increasingly complex tasks according to age of development.

The need of proximal fixation to reach stability and distal control needs to be avoided. This fixation reduces the degree of freedom of movement in space of upper extremities. Therefore, it is recommended that activities involving the use of hands are performed in a sitting position. The sitting position should include a stable chair with a rigid seat base and a table with cutout appropriate to the child's size in order to provide stability to the forearms.

For this age group and level it is suggested to postpone the use of orthotics in order to facilitate normal development.

In relation to the movement: This group of children often succeeds crawling, but with a pattern of increased pelvic instability as in jumping rabbit, being useful assisted systems for crawling or walking. Be mindful not to encourage postural proximal fixation, but provide stability and assistance with some element of temporary external support.

In most cases walking is acquired close to six years old. Therapeutic support should be cautious and towards a proper gait pattern. In some cases it will require a transitional element of external support. It is not uncommon to use a gait trainer or wheelchair for long transfers.

In relation to the activities of daily living: To carry out these tasks it should be considered to place the child in a stable position that allows him to have better resources to perform these activities.

It is important that the family favors the development of activities as self-feeding, hygiene and clothing according to their age and thereafter provide environmental support with elements or adaptations to facilitate appropriate and successful implementation. Do not lose of sight that the difficulties in proximal stability and involuntary movements require to modify the pattern and sequence of execution to accomplish the task, since most of the movements' performed to do these tasks require to go out against gravity which increases involuntary movements.

It is suggested that during feeding, forearms are flat on a surface permanently; preventing that the elbow loses contact with the surface, thereby decreasing the involuntary movements. Along with this, if necessary, provide a thickened spoon and always give an indication of moving the head toward the spoon. In these activities the child may need adult assistance or elements that give stability to the plate like an antiskid or an adapted tray.

As for hygiene and clothing the child must be an active participant in this routine, to internalize and reinforce appropriate sequences and energy efficiency. It is important to remember the age appropriate tasks watching runtimes to support achievement in the everyday as functional. Also you need to consider the necessary changes in terms of access, items available in the space, utensils and/or some element of temporary or permanent support or adaptation to facilitate the task.

In this age self-care activities take on greater relevance with the gain of progressive independence in regards to the activities of basic daily life (Mulligan, 2006).

In relation to school activities: It is recommended that this group of children start their schooling in regular school system of selection. Sometimes you need professional support to adapt specific elements related to specific subjects and tasks that require more accuracy or quality of execution. It may also be useful to assess if the furniture provides suitable positions favoring a proper execution of tasks, offering suggestions when necessary.

3.2.2 Children with mild motor impairment level and good understanding. Ages 6 and older

Treatment in this group has a profile of progressively making a difference in the development of autonomy, independence and community involvement. After 12 years of age, the self-management of elements of support that foster a better occupational performance are well established.

In relation to the position: At this point it is important to constantly reassess all aspects of the postural adjustment because as growth implies a reorganization of motor schemes, were compensations or patterns may appear abnormal but, in most cases these are temporary. It must be safeguarded that these are not made permanent, damaging in a long-term the postural control and functional performance.

In relation to hand function: Insofar as the child progresses through the school system, increasing demands will require greater demands on the quality and speed of execution, which could lead to a decrease in occupational performance, “both given” by the more demanding task and the stress.

Assess and define strategies to optimize performance and in some cases it might be required the use of accommodations, furniture and technical assistance.

In children over twelve years old, manual abilities are largely developed. The possible difficulties that might occur should be evaluated and corrected to avoid a significant detriment to the functional performance that has already being achieved.

In relation to movement: At this stage, most will walk independently. In periods of high growth they may become unstable, so it is recommended to reevaluate constants gait pattern to intervene therapeutically if the case requires so. Some children retain the use of a wheelchair for long transfers.

In relation to activities of daily living: A child this age should increase the autonomy and independence according to age levels in activities of basic daily life, expanding progressively toward the instrumental activities. It must be constantly evaluated to decrease the third-party assistance, providing accommodations or modifications conducive to the attainment of independence.

In the instrumental activities daily living it is suggested to increase tasks and responsibilities of intra domiciliary in addition to provide spaces for an active community participation, including documents management, money use, transportation and occupational activities, all age appropriate. In some cases these activities require therapeutic support and training to habituation, as well as to provide strategies, social skills and safety for a satisfactory performance.

In relation to school activities: At this point they may demonstrate difficulties in relation to the time of execution, specifically in terms of writing. It is suggested to check if the furniture and tools are providing stability to optimize performance. In many cases, it is required to use support systems or alternative technologies that facilitate the execution of the task.

Children older than twelve years should be identifying skills and interests to focus on alternative vocational and employment preferences that must be consistent with the real possibilities of the young.

3.2.3 Children with moderate motor impairment level and good understanding. Ages 0 to 6 year

This group of children presents clinical signs that can be seen early by a professional in the area. Treatment should be approached from models such as neurodevelopmental, sensory integration, behavioral and cognitive rehabilitation.

The intervention must accompany psychomotor development facilitating movement sequences and patterns in a more organized way and with a better voluntary control. From early stages when the child tries out against gravity, compensation and abnormal patterns emerge in response to the lack of control and axial synergies. In some cases we observe prolonged primitive reflexes that can be used as a functional resource, transforming it into a learned pattern that is pathological.

It becomes important that the development of low postures should take special care and attention as it is on this stage when they begin to strengthen postural and proximal fixation.

Managing the child that is less than one year old provides a postural control with elements or implements that help the organization in space, is important to achieve synergies and midline line which are precursors of visual monitoring and of the use of hands.

In children over one year, in addition to the above, it begins to favor the functional activity of higher positions such as sitting and bipedal. Parallel to this, it is important to provide vestibular and proprioceptive sensory input to enhance and promote afferential information to organize properly a functional motor and adaptive response.

Efforts must be placed on patterns of controlled and rhythmic breathing to organize movements to facilitate and promote oral language. In the early stages this work is suggested by the mother who provides rhythmic breathing patterns, after this, the child should work this voluntarily or therapy could help to increase the quality of movement.

In children older than three years, gross and fine motor demands become more complex, so the chances of feeling frustration or anxiety increases, making even more difficult the control of movement. This requires special attention when treating and choosing the activity and postural control support which needs to be both static and dynamic.

Play and school activities are the main occupation of the child, which develops through social, emotional, cognitive, sensory and motor functions. It becomes relevant the child preferences and interests. The therapist must reconcile this with the selected therapeutic activity, not to mention that an activity generates significant and successful learning. Also at this stage the child enters a school system, which sometimes requires guidance or counseling in handling furniture and specific elements of technical assistance.

In relation to postural control: In the early stages environmental elements must be conducive to proper posture and the ability to explore spontaneously.

Supine flexion should be favored, using elements of containment that provide slight bend of the head and pelvis in order to provide a midline upper extremities, visual and abdominal activity.

In prone, use a wedge to allow the right use of forearms or arm support on the surface to weight bearing and allow synergies of shoulder girdle, neck and head. Avoid a pattern of abnormal extension or hyperextension of the neck to be a precursor to every action.

Often when turning there is a tendency to one side only and initiated from the head in hyperextension. In this case it will be necessary to facilitate synergies and dissociation in lateral planes.

In managing the sitting posture observe if the overall patterns are initiated from the head and/or pelvis, as this will be a critical control point to consider for the functional use of this position.

In the case that the movement originates at the head, descending tactile and proprioceptive information must be submitted in the sterna, to stimulate flexor muscles. In the event of involuntary movement generated in the pelvis, hip flexion facilitated greater than 90 degrees is required, in order to shift the weight to this area and reduce the chances of making an involuntary extensor pattern.

In children less than one year sitting posture will be fully assisted given that the head and trunk control are still developing. The righting reactions and support do not offer enough control.

Until the extent that the child is about three years old the control of head and trunk stability improves, but still continues to require assistance. There is instability due to weak righting reactions, slow or nonexistent, in addition to the predominance of the sagittal plane flexion and extension patterns in total ranges. This makes more difficult the postural automatic control and intermediate ranges needed to maintain a stable sitting posture.

It is important to consider providing a strong support level to promote sciatic proprioceptive information at various levels to facilitate the automatic postural control. The use of postural seating made for each child ensures good posture avoiding that the child resort to fixation to stabilize posture against gravity. Along with this, the feet should also be in contact with a surface to provide support and control.

On the other hand, although sometimes the child can sit independently at times on a bench, the child will lose stability when needed to go out and try different planes of motion or when using upper extremities for functional activity. This happened because these items require more automatic adjustments of posture. However as a therapeutic target it will be beneficial to consider, because it is related to the axial control and it can provide lower assistance in postural and lower demand from the upper extremities function, or conversely if the goal is to increase functionality, further assist hands posture will be required.

As for four points' posture, crawling and transition to bipedal, the child will require great assistance as these positions involve transitions and intermediate ranges which should be assisted or facilitated by the therapist. For this, you can use external support elements to organize the space both physically and visually. Subsequently, the bipedal posture becomes important and can make an assisted start with some gait trainer with brachial support adaptation.

In upper body it is recommended the support in the forearm on a surface as a tray or table with cutout in order to provide information at the proximal and shoulder girdle to stimulate axial and head control. This provides visual information regarding body position in space and promotes greater organization and global control. At the level of the pelvis it is helpful to use a cushion of sand to provide weight and more stability information to the seat bones, reducing the involuntary movements at this level.

The use of compressive clothing must be evaluated for treatment and in some children may be useful regulating the tone and decreasing the degrees of freedom giving stability to the pelvic girdle, providing axial and proximal control (Rannie, 2005; Allen, 1997).

In relation to the role of hands: As for the function of hands, the tasks become more complex progressively looking for a greater coordination, dissociation and accuracy, which require proximal stability and motion control to distal for a successful performance. It must be anticipated and address early the proximal fixations made by the child when looking for proximal stability and distal control. Surge the dichotomy between stabilize the trunk or use their hands to play. Subsequently this generates that the child will choose the upper extremity with less difficulties to perform the tasks, and the other extremity will be used as a postural fixation, which in the long term, will reduce the function and generate an asymmetry in the trunk and shoulder girdle producing postural scoliosis as a result of maintaining this position.

Given the above, to facilitate the manual functionality it should be considered to provide axial stability to the pelvic girdle as a basis for proximal control. The greater functional requirement involving upper extremities movements in space at a proximal level and distal level as well as manual dexterity will require more support or postural control. This is why, efforts should consider pelvic and trunk stability by providing a stable sitting posture as a basis to support the role of hands in different planes in space. The use of tray or table with cutout helps control the movement of upper limbs when supporting the forearm.

The upper extremity presents a pattern to the action of co-contraction with internal rotation of shoulder, elbow in extension, forearm in pronation and wrist in flexion or extension, thumb included, with difficulty in opening and closing the hand on a voluntary way. Therefore they prefer to work in extension, distal to the body, having trouble with proximal tasks. Gross grasps are performed using a functional tenodesis to facilitate grasp, using mechanically a maximum flexion and maximum extension of the wrist as a resource, not being able to perform intermediate ranges. This abnormal pattern allows the opening and closing of the hand but significantly limits the ability to grasp.

To facilitate the manual function it is suggested to use games and therapeutic activities adequate for the comprehensive level but easy to handle, considering the challenge versus the child's ability to ensure the success of the activity. There are alternative therapies such as compression bandaging and abduction bandage that provides tactile and proprioceptive information to agonist and antagonist groups helping the tone regulation, providing a mechanical effect of a reverse pattern favoring the dominant one. This element must be used therapeutically as training for re learning a normal pattern.

To facilitate the grasp use a wrist stabilizing orthotic and thumb positioning, considering that the wrist should be neutral or in slight flexion to ensure the start of the string or pattern learned. To this orthotics, adaptations can be attached such as pencil, to expand activities in order to increase significance. It is not recommended the use of weight in the upper extremities.

Often these children prefer to use the extremity with less difficulties of movement, assigning the contra lateral fixing element in either extension or flexion, for which an adequate remedies to position the extremity, is a stick attached to the table or tray to provide symmetry and closed string promoting the role of the dominant limb.

To encourage the voluntary control of movement, improving the quality in terms of amplitude and speed, and decreasing the involuntary movements, it is recommended to

provide verbal cue to regulate these aspects, so that the child displays improved performance and energy economic movement. The therapist or caregiver must establish a climate of trust, giving timeouts and pauses to self-regulate using breathing as a relaxation tool.

In relation to the activities of daily living: At this stage, it is important that the caregiver engages in the activities in a stable posture, encouraging the collaboration of the child in parts of the activity, facilitating normal movement sequences. At this age and level of commitment of basic activities daily living, in most tasks assistance should be given by a third party.

Self-care activities provide progressive independence in regards to the activities of basic daily life, but the low postural control hinders the attainment of independence and also the functional result in terms of execution time and physical effort. Do not forget the required holding for seated posture for these activities.

The family must provide the space and time to develop or encourage participation in activities of feeding, hygiene and clothing, according to functional conditions of the child, bearing in mind that in most cases they will be able to implement some part of the tasks and will require specific adaptations and training.

In relation to self-feeding, proper posture should consider supporting the pelvis and a table with cutout to provide support to avoid leaving forearms permanently against gravity. Also consider adjustments in the spoon to ensure a good grip, the plate which must not be too high to have to raise your arm, should be fixed to the table with an anti slip. Indication remains ideally to lead head to the spoon.

As for the dressing, facilitate the child performance during the initiation or by the end of the activity providing a proper posture. Usually this activity will not be functional in daily life.

In hygiene, if it can grant the appropriate posture and environmental conditions this may help the child to participate in parts of the activity like washing hands and face, but brushing teeth will be difficult by the possibility of self injury. Regardless, it will require assistance from a third party to complete the task.

In relation to the movement: This group of children usually does not achieve the transition to crawling or bipedal, being useful assisted systems for standing or running. Keep in mind not to encourage postural proximal fixation, when providing stability and assistance with some element of external support.

The walking will not be functional; it will require a gait trainer with forearm support and adaptations with pelvis support, separating lower extremities, and trunk and head support to prevent the extension discharge, to diminish to the maximum fixation resources and abnormal patterns. Thus, the child may make an intra domiciliary assisted walk to start favoring independence and sense of accomplishment. This activity must be accompanied by stretching to maintain flexibility and range of motion and bipedal to protect bone development and provide proprioceptive information.

Regarding the movement it is recommended if possible a wheelchair with 5 degrees of reclining, watching the same premises described in sitting posture, which means, support the postural control with accessories and fastening systems that provide alignment and stability to the pelvis and trunk. At least it should be encouraged intra domiciliary self-propulsion.

In relation to school activities: Regarding the school system it is suggested to evaluate whether the child has conditions to enter a regular school with integration program. There will be a need for professional support to bring environmental elements related to the furniture and access. It will also be required the support in making various adjustments to facilitate implementation of the tasks, the implementation of mechanisms or alternative technology that facilitates learning and communication. Differentiated evaluation is suggested in relation to the methodology used, to ensure that children have the opportunity to express their knowledge.

3.2.4 Children with moderate motor impairment level and good understanding. Ages 6 and more

This group maintains the treatment scheme of the previous section in all areas. In children older than twelve it becomes important the development of autonomy and community involvement. Self-management must be a condition that favors the young to reach a better occupational performance according to their age and abilities.

In relation to the position: The reassessment will be dominant because of the possibility of generating postural scoliosis due to rapid growth typical of this stage. The child cannot adapt quickly enough and being against gravity will be a difficult effort to maintain over time, especially increasing the residence time of the sitting posture. It is recommended medical evaluation of the spine and hip to prevent complications, and thereby provide early support to external elements of containment and alignment and stimulate within your daily routine the changes in posture as well as passive and active mobilization to maintain a proper balance in this area.

The child will require supportive care, and in some cases external aid elements of temporary or permanent use to provide axial support and postural alignment.

In relation to hand function: The role of hands should not be affected in relation to that achieved in previous stages. It is necessary to assess whether the support elements and adaptations are sufficient and whether they are facilitating the function according to the requirements for the type of activities typical of the age.

According to the assessment and skills it is suggested to facilitate necessary resources that support performance based on abilities and interests. It can be incorporated for example, pointers, adapted scissors, pencils and thickening brushes; orthotics (with the same considerations of the previous group), among others.

In relation to the movement: As the child grows taller, they have greater possibility of muscle imbalance, so it should be permanently reassessed if the walker offers stability and sufficient alignment and what musculoskeletal functional benefits and which function are promoted.

In relation to the movement in a wheelchair, which may be electrical or mechanical, should be supported with postural control accessories and restraint systems to provide alignment and stability to the pelvis and trunk. Self-propulsion should be considered only when the position is adequate and does not involve excessive energy expenditure; it is important new elements of postural restraint if necessary.

In relation to activities of daily living: At this age it should be important encourage the child to achieve greater autonomy in their daily activities, understanding that they must be

progressively making the right decisions about how to choose and which tasks to be performed considering the help of others, and custody that the activities are executed properly.

Children over twelve years that are independent or partially independent should continue to be independent, with the exception of architectural barriers that restrict their access. As for activities where the patient is dependent, it will be leading the autonomy as a fundamental self-management and social integration.

In relation to school activities: We suggest adding elements of assistive technology that promotes communication and access to search information, global literacy and learning, providing speed and efficiency.

In the age of twelve skills and interests of the young can be assessed more clearly. It is important to provide guidance that considers the pre vocational skills, motivations and social context that allow objectify professional development options.

3.2.5 Children with severe motor serious commitment and a good level understanding. Ages 0 to 6 year

This group presented a severe motor or serious condition will have no major changes from the postural and functional over time. The emphasis will be given in preventing deformities and finding activities that provide purpose and a sense of accomplishment with a healthy routine.

In relation to the position: In children younger than 2 years old, it will be vital to perform therapeutic activities that tend to decrease the extensor pattern and normalize the tone, promoting voluntary movements. For this we suggest considering working with neurodevelopmental framework, learning normal patterns at different levels. This should be complemented with activities and age-appropriate games that are possible to implement in order to ensure success in the task and thus achieve the repetition and learning. Accessories and furniture will be required to provide symmetrical positions conducive to reducing overall patterns of flexion and extension.

The position should include the head avoiding abnormal extension; the arms tending to the midline, and the pelvis in flexion and abduction. It is suggested the use of straps or cushion of sand to facilitate posture. It is intended to perform the movements not in a total and repetitive pattern, but rather try to dissociate and promote variability.

Special attention should be placed to the management with the family. The family should keep the child posture, avoiding abnormal postures to play in order to avoid give a positive feedback to these patterns.

In regards to furniture is suggested that the sitting posture contains adapted seating surface or shaped to give alignment of head and trunk flexion and hip abduction at least 90 degrees to move the center of gravity backwards, favoring the reduction of extensor discharges. The inclination in this position depends on the condition of each child and must always make sure that the hips remain in the position described above. The weight pad on the pelvis favors stability. The use of trays with cut will be a great support for the position, manual function and cephalic control from the visual record.

Regarding the lateral position it should maintain the alignment conditions mentioned in the sitting posture considering the use of furniture and adapted cushions for this purpose.

In regards to the prone position be aware that the child does NOT make a total extensor reaction and facilitate conditions for the arms forward with support in the forearm, the trunk should be neutral and have a half bent pelvis. For this, use a roll and therapeutic wedge as elements to position while the child is on the lap of a caregiver.

As for the biped this position will have greater relevance starting at the age of one as a therapeutic action for development and joints nutrition.

In relation to hand function: The mobility of upper extremities and hands is severely affected by the presence of dystonic discharges. Often permanence of primitive reflexes exists and becomes pathological functional resource, limiting the proper development of movement in space and manual functionality.

Considering adequate postural support, the child should develop the full potential for the use of the hands. Central to the therapeutic approach is to provide sufficient postural support to provide stability and reduce the intensity of the shock, facilitating the movement of upper extremities. But this movement is not functional and it will be very difficult to address accurately enough to achieve the reach and grasping capacity.

Orthotics primarily target to correct or maintain healthy joints and muscles to prevent deformities and improve capabilities that support remaining function, even if it is assisted (Gajardo & Rodríguez).

The tray or table with cutout and the use of stick fixed to the table provides stability and symmetry.

In relation to movement: The movements are dependent on a third party, usually the child moves with an adapted gait trainer or wheelchair without the possibility of self-propelled. It is advisable to consider for sitting the described above options, using seats made for the child or adapted that can be considered as an accessory to the chair or gait trainer. The trunk usually requires a four point vest to maintain alignment and facilitate bending.

In relation to activities of daily living: This area is totally dependent; the intervention plan should look to fully develop the child's autonomy as managing his routine of self care. The therapist must evaluate, guide and train the family in healthy strategies to accomplish these tasks, in order not to further enhance abnormal patterns in the child and not harm the health of the primary caregiver.

In relation to school activities: These children should be educated with therapeutic care in terms of permanent aids and adaptations, both in general management, and assessment systems. This favors a level appropriate to support general motor and postural control to facilitate autonomy, the level of access to information, communication and integration.

3.2.6 Children with severe motor serious commitment and a good level understanding. Ages 6 and more

In relation to the position: These children have severe dystonic discharges affecting global posture and therefore severely interferes the function and communication. Treatment should include the management of postural control by promoting normal patterns in

order to keep the remaining capacity favoring achievements and possible to develop. While the daily postural change should be maintained, the sitting posture becomes important, as it is the one that offers greater functionality, so you have to pay special attention on supporting the axial and proximal body to decrease abnormal patterns and encourage the functionality. The use of soft corset with rigid frame or bivalve type can be helpful for activities in chair. The considerations for proper sitting posture and furnishings are similar to those described in the previous age group. Added to this it should be considered the choice of activities possible to be performed by them with purpose and according to their interests, as part of treatment and considering the adjustments necessary for a successful outcome.

Some of the suggested furniture to maintain postural changes at home can be a side table, wedges, standing tables and custom made seats.

In relation to hand function: The hands could or is severely affected by dystonic discharges observed globally both distal and axial, which increases with the intention to move and execution of some task or activity. Postural support is still relevant; adjustments and orthotics provide control and function, which should also be considered as preventive of any deformities. Activities that generate excessive emotional involvement and energetic cost should be restricted.

In relation to movements: Like the previous group, the child will be dependent on a third party. In most cases the movement will be in wheelchairs with no possibility of self-propelled. It is important to use brackets and fasteners at the pelvis and trunk level and other accessories and modifications needed to maintain symmetry such as, for example, wedges and molded side bumpers and seats.

In relation to activities of daily living: As for these activities they should further enhance the child's autonomy, but being mindful that the child will remain dependent. The therapist must include the training of the family in terms of everyday activities, using healthy strategies for both the child and the caregiver. The child must have the space to express needs and preferences.

In relation to school activities: It is important to integrate these children into the school system, where supportive and therapeutic care is essential in order to attend the requirements specific to this area. Assistive technology can be a great facilitator of learning and integration. In young people with possibilities for higher education it is required orienting with respect to interests that are commensurate with their abilities and career possibilities.

3.2.7 Children with severe motor impairment and low serious understanding

Although these groups of patients have a profound dystonia, the cognitive impairment makes the therapeutic management be addressed as a child with multi deficit, this means that the emphasis on treatment will be given in the area of postural management described above, also focusing on strategies and routines and health care of the caregiver.

3.2.8 Children with mild motor impairment and low understanding

Like the previous group we will not describe the management of these patients from the perspective of dystonia. In these cases the most affected area is their occupational

performance and social integration given the mental commitment and therefore it must be addressed primarily through management guidelines specific to this area.

3.2.9 General information about orthotics and adjustments used in children with generalized dystonia

As mentioned in the description of each age group, there are some orthotics and adjustments frequently used in children with generalized dystonia, however it will depend on the condition of each child which model will be used and the material indicated. This must be previously assessed by the therapist.

Below are described some general considerations.

3.2.9.1 Orthotics

Orthotics in children with dystonia meet the objective of correcting the position of the hand in order to facilitate the function and prevent deformity. The model chosen will depend upon the pattern used, the dystonic discharge and the muscle tone manifested when performing an active movement.

Because the movement is generated for a functional objective based on a pattern or muscle string, when manufacturing the orthotic the therapist should consider the position and angulations of the wrist in order to facilitate the initiation of the chain movement (neutral or minimal flexion). It is important to mention that in many cases this does not correspond to established biomechanically functional positions. For material it is suggested to use thin thermoplastic (1.6-2.0) and allow a minimum degree of freedom of motion, while the thicker provides rigidity but blocks the function, which prevents the beginning of the chain created as a functional pattern. As for soft materials and combined materials, it depends on muscle tone when performing a movement and the extent of the maximum ranges of flexion and wrist extension. If muscle tone is too high it is not recommended soft brace or semi-rigid thermoplastic neoprene with thermoplastic. If the pitch is lower the soft brace helps the functional position during movement, containing the joint and giving proprioceptive information.

In some cases, long orthotics as long resting hand orthotic (figure 1) for use during the night and sometimes during the day is the best option, in order to position and stretch the muscles in children with increased muscle tone. To position the thumb a soft or rigid abductor splint made of thin material (figure 1) is a good option. In case also need to align wrist, a semi-rigid cock-up or a long abductor of thin material (figure 1 and 1) is a good option. It can facilitate the direction of the movement the use of a derotation bandage for therapeutic purposes (Fig. 1).



Fig. 1. From left to right: Resting splint, Soft thumb abduction, soft orthotics to stabilize the thumb and the wrist, thumb abductor long version, derotating band with shoulder strap.

3.2.9.2 Furniture and accessories

Chairs should provide sufficient stability and symmetry in the pelvis. The seat model depends on how much axial support needed, in moderate to severe cases we recommend the use of adapted or shaped sitting (figure 2, 3, 4) as they provide containment of the pelvis and trunk, facilitating the use of upper extremities in different planes, without the need for proximal fixation in the extremities (Alvarez, et. al., 2003; Fife, 1991; Rodríguez, 2011).

For wheelchair and sitting it is a priority to give abduction and flexion at an angle less than 90 degrees to the pelvis to make sure the center of gravity is back and avoid the extensor pattern. It also recommended increasing the lateral restraint of the trunk to help the symmetry and stability. These can be supplemented with different types of pelvis and torso straps whose design depends on the needs of each child (Rodríguez, 2011).

The table or tray with cutout with or without containment caps (figure 2) is an important addition as it provides support to stabilize the upper girdle, the trunk alignment from the visual and manual functionality point of view and to allow more fluidity and freedom of movement. The use of a stem fixed to the table (figure 3) is a good contribution to the less functional extremity, and also to promote symmetry and closed chains.

As for adapted gait (figure 5), it is important the alignment and containment of the pelvis as well as the back support to prevent extensor discharges and forearm support with or without stem to facilitate the alignment of upper body.



Fig. 2. Table with cutout and lateral borders; table with cutout and chair with inclination, molded sitting, sitting and dining table with cutout molding and rear bumpers forearm



Fig. 3. Molded sitting with leg extension; Stems in prone and neutral



Fig. 4. Wheelchair with adapted set of cushions; wheelchair with molded sitting, wheelchair without molded sitting, molded sitting, wheelchair with molded sitting



Fig. 5. Walking gait with forearm support and adaptations

4. Conclusion

Children with cerebral palsy who have generalized dystonia require therapeutic management throughout their development process. Due to the varied clinical presentation and evolution, it is difficult to find significant documentation regarding treatment lines to guide the rehabilitation team to address these.

This chapter describes some aspects of assessment and treatment based on bibliographic information and the experience of the program for children with dystonic cerebral palsy of the Occupational Therapy Unit from the Child Rehabilitation Institute of Chile Teletón.

The purpose is to systematize and provide baseline information that will provide general guidelines regarding treatment options, differentiated by degree of functional compromise and age groups, addressing both elements of assessment and intervention on postural control, hand function, activities of daily living, movements and school activities.

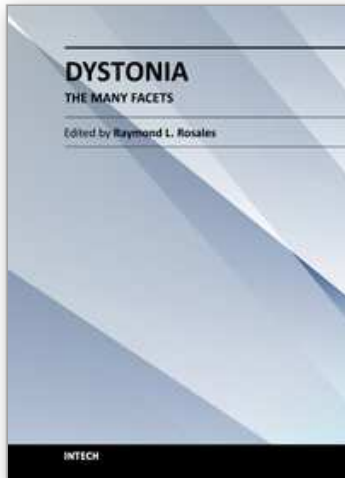
External elements mentioned, complement the therapeutic action such as furniture, adaptations, orthotics and accessories that facilitate the positioning, function and occupational performance, enhancing the development, wellbeing and preventing complications.

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Dystonia has many facets, and among those, this book commences with the increasingly associated genes identified, including a construct on how biology interacts with the dystonia genesis. The clinical phenomenology of dystonia as approached in the book is interesting because, not only were the cervical, oromandibular/lingual/laryngeal, task-specific and secondary dystonias dealt with individually, but that the associated features such as parkinsonism, tremors and spasticity were also separately presented. Advances in dystonia management followed, and they ranged from dopaminergic therapy, chemodeneration, surgical approaches and rehabilitation, effectively complementing the approach in dystonia at the clinics. A timely critical pathophysiologic review, including the muscle spindle involvement in dystonia, is highlighted at the book's end.

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