

# THE RELATIONSHIP OF VISION AND POSTURAL SUPPORTS FOR CHILDREN WITH CEREBRAL PALSY

## Introduction

The seating and positioning considerations of individuals with complex physical and medical needs such as cerebral palsy (CP) can be complicated, ongoing and variable. The complexity is not only in the client's medical presentation and care, but also in the functional consideration that will provide the highest level of participation. It is important to understand a client's individual challenges and ways in which they have learned to adapt. The long term nature of this diagnosis indicates the evolving needs and challenges for the medical team. For the therapist, postural supports and vision are critical areas of intervention for a child with CP. A child who is diagnosed with spastic or dystonic quadriplegia CP will likely have impairments with vision, communication and posture affecting how that child interacts in their environment. Understanding the relationship of vision and postural control can help guide the therapist in making critical decisions regarding seating and positioning supports.

types of abnormal tone for a child with CP include spastic (hypertonic) and dystonia. Spastic patterns of movement present as increased muscle tone in flexion or extension postures, often resulting in very stiff limbs. Damage to the neural-motor pathways in the central nervous system results in increased tightness of the muscle. This results in reduced capacity of the muscle to stretch. Dystonia differs as the muscles contract involuntarily, causing uncontrollable repetitive or twisting movements and posturing. For the purposes of this article, we will focus on the dystonic tone patterns since this type of tone is often the most challenging.

## Posture

The goal of any seating system is to provide external supports that align joint structures and impact function and participation. External postural supports are critical for a child with CP. The abnormal tone affecting motor control and posture is a result of damage to the brain in the motor cortex. This is non-progressive and permanent damage to the brain. Medications are available for tone management that decrease the impact on the

neuromuscular system, but seating and positioning's role is to assist with the functional outcomes of a child. It is not uncommon for a child to have significant postural needs and yet lack good postural supports in his/her seating system. Determining how to make improvements is often a very involved process with many factors to consider. It is even more challenging to understand any underlying cause of posture and postural movements. Considering the child's visual needs may help to give additional information about their postural and functional needs.

Understanding how tone patterns impact the musculoskeletal system is necessary when selecting the appropriate postural supports. The two

## Relationship of Vision and Posture

With the exception of power mobility, vision is not always evaluated when considering a new seating system or mobility base. CVI impacts postural patterns and head positions since the child will often move dynamically in their seating system simply to gain their visual field or preferred area of vision which may not be midline. It is common for individuals with CVI to use one eye at a time or to use binocular vision (both eyes together), and therefore it is difficult to view materials at midline. The child may flex forward, lean side to side and then back to midline. It is important to separate weakness or abnormal tone from visual issues. A child with dystonic patterns of movement is often able to move in and out of a position (see picture 1) compared to a child with spastic tone which may prevent

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PICTURE 1



PICTURE 2



PICTURE 3



PICTURE 4



PICTURE 5



PICTURE 6

PICTURE 1 - CHILD WITH DYSTONIC TONE

PICTURE 2 - SPASTIC POSITION

PICTURE 3 - STABILIZING IN PREFERRED VISUAL FIELD

PICTURE 4 - PREFERRED VISUAL FIELD WITH NOTED HEAD POSITION

PICTURE 5 - USING A TRAY WITH BLACK FELT

PICTURE 6 - TRAY WITH A STABILIZING BAR

them from coming back to a neutral position (see picture 2). Traditionally, a child is expected to hold his/her head up in midline and use central vision to visually attend to presented objects. For CVI, midline may only be the client's resting position.

As therapists, we may consider stability to address tonal patterns. However for a child with CVI and CP, a static system that provides stability may not allow the client to alter their position for visual attention. A dynamic seating system will provide opportunities for the child to move in and out of the preferred visual area better than a static seating system. A static system may offer more stability, but less

opportunity for the child to control his or her own movement. This is an important consideration so that the therapist does not block the child from accessing their preferred visual area.

Similar to tonal patterns where blocking a movement such as arm extension may decrease a functional outcome such as hitting a switch, blocking a child's head position or general movement will affect how a child is able to receive visual information. Be aware that atypical head movement or posture may be a strategy to allow for preferred visual field use.

Here is another example. A child looking at a computer screen will lock into their preferred visual field and stabilize their upper extremities and trunk by holding onto a tray or some type of firm surface. The eyes will track the information on the computer and then the child will move dynamically to hit a switch or provide a response. It is important to observe and document these patterns in order to best determine the overall seating system (see picture 3).

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**Components to consider for a child with dystonic CP and CVI**

- Dynamic systems will allow the child with dystonic movement patterns and CVI to move in and out of their position to locate their preferred visual field. This can be accomplished either through the hardware of the wheelchair or on the seating system. Many manufacturers of seating and mobility equipment now provide dynamic products.
- Head control is often associated with decreased strength, reflexes or abnormal tone. It is very likely that a child with dystonic or spastic CP will have CVI and present with head movement patterns that may contribute to a certain head position or pattern of head movement. To allow for the head patterns associated with CVI, it will be important to have a dynamic head support system. A static system that is attempting to maintain a certain position is not recommended. The child with dystonia is often able to move his or her head in and out of positions better than a child with spastic tone where a position may be more fixed and difficult to manage. The frequency of head and upper extremity movement should not be limited (see picture 4).
- Pelvic and trunk support are critical for providing stability. A child with dystonia will most likely move dynamically and learn how to stabilize with his or her upper extremities, as needed. Recommending a seat cushion that provides pelvic stability such as a multiple layered foam cushion with contour will be the foundation. Lateral supports will provide a range of cues so that a child with dystonic movement does not go beyond their base of support.
- Flip up armrests decrease the stability of a tray for a child with dystonic movement. Typically the child will grab the tray in an attempt to stabilize and, if the armrests are not secure, the tray will move upward. This movement will not allow the child to stabilize and control movements. Secure armrests are recommended.
- Lap trays provide upper extremity support and a stabilization bar can be attached, as needed (see picture 6). This is often helpful for a child with dystonia. Additionally, covering the tray with black material will decrease visual clutter which is common with CVI (see picture 5).

A child with CP dystonic movement, and CVI should be considered for a dynamic seating system that will allow the child to move in and out of position to locate the preferred visual field. It is not uncommon for a child to have a specific visual location where he or she will posture, stabilize and gather visual information. Consider using a dynamic seating system that helps to stabilize the pelvis, but allow for dynamic movement of the head and upper extremities. Although it may take some time to observe the child's movement patterns and preferred visual field, the outcome will be significant for functional participation and learning.

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*References*

1. Lantz-Roman, Chris (2010). *Cortical Visual Impairment*, AFB Press.

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