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## Post Trauma Vision Syndrome

adapted by Kate Moss from text by Millie Smith and Nancy Levack

*Editor's Note: In the preceding article by Marnee Loftin, she gives a firsthand account of the effects of Traumatic Brain Injury and talks about the problems she experienced in her vision, cognitive and emotional functioning. I thought that it would be good to share some more information about the visual issues related to TBI with you. What follows is adapted from Teaching Students with Visual and Multiple Impairments: A Resource Guide, by Millie Smith and Nancy Levack.*

Sensory problems are common after traumatic brain injury. The problems these children have with their vision is referred to as Post Trauma Vision Syndrome or PTVS. Over half of the children who have experienced brain injury have vision problems, such as blurred or double vision and visual field defects. Blurred or double vision may improve during the first six months after the trauma event, but the field abnormalities are more likely to persist (Mira, Tucker, & Tyler, 1992).

Binocular vision is what allows us to blend the two images seen by each of the eyes into only one perceived image. Long-term difficulties with binocular vision are common. These include:

- strabismus (*misalignment of the eye caused by muscle imbalance*),
- ocular motor dysfunction (*difficulty with eye movement*),
- convergence (*simultaneous movement of both eyes toward each other usually made in an effort to maintain a single image as an object approaches*),
- accommodative abnormalities (*problems in the focusing of the lens to produce a clear image as objects move closer*),
- and double vision (*perceiving two images of a single object*).

When these conditions are present from birth, the brain adapts by suppressing the vision in one eye. In post trauma vision syndrome the condition occurs abruptly. The brain does not have a chance to adapt gradually and abnormal vision persists. It is important that any child who suffers traumatic brain injury receive a comprehensive ophthalmologic exam (Mira, Tucker, & Tyler, 1992). Double vision in particular interferes with depth perception, locating objects, and the ability to match visual information with kinesthetic, proprioceptive, and vestibular experiences. These terms are explained below:

- kinesthetic- *This has to do with the conscious sensation of joint position, movement, weight, and position in space.*
- proprioceptive - *This has to do with knowing the location or relationship of parts of the body in stationary positions without the need to, for example, look at your arm, or touch your arm.*
- and vestibular - *This has to do with the brain's reflex system that coordinates eye movements with head movements so that a person can keep their eyes on a fixed object as they move their head. The vestibular system helps us to maintain balance.*

Because of double vision which occurs with PTVS, balance, coordination, and movement become impaired (Padula, Shapiro, & Jasin, 1988).

Many individuals with a post trauma brain injury experience a variety of visual-perceptual abnormalities. Students with post trauma vision syndrome (PTVS) have a difficult time transferring the visual information they learned prior to injury to present situations. Problems with spatial organization are common. They may also develop abnormal head posture along with high tone in muscle tissues in other parts of the body, particularly about the head, neck, and shoulder areas. This happens because the child will try to correct or improve his visual functioning by tilting or holding his head in an unnatural position (Padula, Shapiro, & Jasin, 1988).

Children with traumatic brain injury may also have damage to their ears. Mira, Tucker, and Tyler (1992) also describe the types of ear damage that frequently occurs with a traumatic brain injury. There may be damage to the middle ear which can cause a conductive type of hearing loss. There may be damage to the inner ear or the auditory pathways into the brain which can cause a sensorineural hearing loss. Children with visual impairments generally rely on their hearing to compensate for the loss of visual functioning. For this reason, it is critical that children with PTVS have a complete audiological evaluation.

## **Characteristics of PTVS**

The characteristics of post trauma vision syndrome include:

- Difficulty with binocular vision function
- Difficulties with accommodation
- Low blink rate
- Inability to perceive spatial relationships between and among objects
- Difficulty fixating on an object and pursuing the object visually when it moves
- Abnormal posture
- Double vision
- Clumsiness
- Objects appear to move when they are not actually moving

- Poor concentration and attention
- Poor visual memory
- Inability to perceive the entire picture or to integrate its parts
- Inability to read despite the ability to write
- Failure to attend to objects presented in a particular place
- Inability to recognize objects with their vision alone
- Inability to distinguish colors
- Inability to visually guide their arms, legs, hands, and feet
- Visual field loss

(Adapted from Padula, Shaprio, & Jasin, 1988)

## **Suggestions and Interventions**

The following is a list of suggestions and interventions that can be tried with students who have PTVS. Some of the items are interventions which should be prescribed by eye specialists or require input from motor specialists.

### Spatial disorganization

- Reduce clutter.
- Increase spacing.
- Add environmental cues (e.g., outlines of objects to indicate placement, color and light enhancement to draw attention to certain places).
- Use a paper clip or eraser to mark a place on the page.
- Establish a routine for tasks and ensure that it is set up the same way every time.
- Place a ruler under the line of print.
- Cut a window in a piece of paper that can be moved from word to word, from line to line, or picture to picture.

### Abnormal posture

- Prism lenses or patching may alleviate this problem if it is due to ocular abnormalities (Padula, Shapiro, & Jasin, 1988).

### Double vision

- Prism lenses or patching may alleviate this problem (Padula, Shapiro, & Jasin, 1988).

### Poor fixations and pursuits (*difficulty scanning for a specific object or following a progression*)

- Practice visual scanning skills (Roberts, 1992).
- Highlight every other line of text.

### Poor concentration and attention

- Give step-by-step instructions.
- Use various cueing systems (e.g., color coding, underlining, windows).
- Use preferential seating.
- Use consistent structure.
- Develop an organizational system.
- Pace work.
- Reduce environmental distractions.

### Poor visual memory

- Augment visual with tactual and auditory stimuli when possible.
- Attach labels.
- Pair language with visual cues.

### Movement abnormalities---Objects/words appear to move around the page

- Use a yellow acetate cover to cut down on the strobing effect of black print on white paper.

### Inability to take in all but a fragment of a visual scene or the disappearance of visual objects due to abnormal perception

- Allow simultaneous touching of visual material.
- Attach labels.
- Pair language with visual cues.

### Inability to read despite the ability to write

- Use recorded materials.
- Assess tactual spatial ability. If intact, consider tactual literacy media such as braille,
- Fishburne Symbols, Moon Symbols.

### Failure to attend to objects in affected hemisphere

- Increase student's awareness of area of inattention with verbal cues, direct lighting, etc.

### Inability to distinguish colors

- Eliminate curriculum content related to color (e.g., learning color names, sorting by color).

### Inability to visually guide limbs

- Most students spontaneously look away when reaching. Do not discourage this strategy.

### Field abnormalities

- Prism lenses may help.
- Practice scanning and localization.

*Editor's Note: Children with Traumatic Brain Injury typically face additional problems in the areas of communication, acquiring new information, spatial orientation, attention and concentration, task completion, impulse control, dealing with anger, social integration, and social conversation. For information and suggestions to address these concerns the following resources are suggested:*

Blosser, J. L. & de Pompei, R., (1994). *Pediatric traumatic brain injury: proactive intervention*, Singular Publishing Group, San Diego, CA.

Mira, M.P., Tucker, B.F., & Tyler, J.S. (1992). *Traumatic brain injury in children and adolescents: sourcebook for teachers and other school personnel*, Pro•Ed, Austin, TX.

Smith, Millie and Levack, Nancy, (1996). *Teaching students with visual and multiple impairments: resource guide*, Texas School for the Blind and Visually Impaired, Austin, TX, p. 215-238.

### **Brain Injury Association**

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Washington, D.C. 20036-1904  
(800)444-6443 - toll free or (202)296-6443

Contact for newsletter, information, referrals, national conferences and advocacy efforts.

### **REFERENCES**

Mira, M.P., Tucker, B.F., & Tyler, J.S. (1992). *Traumatic brain injury in children and adolescents: sourcebook for teachers and other school personnel*, Pro•Ed, Austin, TX.

Padula, W.V., Shapiro, J. B., & Jasin, P. (1988). Head injury causing post trauma vision syndrome. *New England Journal of Optometry*, 41(2), 16-20.

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