A Vision Lift: Use of Prisms for Treatment of a Right Homonymous Paracentral Visual field Defect

Case History
A 52-year-old avid adventurer suffered a significant traumatic brain injury (TBI) after a hang-gliding accident. He presented for a vision therapy evaluation 3 months after the accident. Friends who observed the accident noted that he landed on the right side of his head, which was protected by a helmet. The patient did not remember either the accident or approximately a 2-week period surrounding the event. The history at the first exam was given mostly by his wife. He had trouble accurately describing his symptoms and at times finding the correct words to say. He stated that he was having difficulty reading, was noticing that objects would seem to disappear randomly and reappear as he moved his head. Prior to the accident he was an engineer who designed medical equipment for surgeons; he was very particular about any changes that he noticed. He was also being treated for glaucoma in his head. Prior to the accident he was an engineer who designed medical equipment for surgeons; he was very particular about any changes that he noticed. He was also being treated for glaucoma in his head.

Clinical Testing
- **Trouble reading efficiently:**
- **Difficulty learning and remembering:**
- **Memory problems?**
- **Trouble recalling words?**
- **Visual symptoms?**

**TEST FINDINGS**

- **Paracentral Visual field Defect**
- **A Vision Lift: Use of Prisms for Treatment of a Right Homonymous Paracentral Visual field Defect**
- **Visual field testings:**
- **Reading:**
- **Comprehension problems:**

**Localizing the Injury**

Humphrey 30-2 Visual field testing was performed. Results showed a Right Homonymous Paracentral defect.

**Additional Testing**

- **Neuro-Controlled testing:**
- **Dizziness:**
- **Light sensitivity:**
- **Visual-spatial distortions:**

**References**

3. Harvey, L., Suter, P. Vision Rehabilitation Multidisciplinary care of the Patient Following Brain Injury 2011

Next Steps: Yoked Prisms

- Three prism deterrents of yoked base inwards prisms was fitted for 2 weeks over his reading Rx.
- He claimed that he could see further to the right while reading and his reading speed improved.
- Three prism deterrents were enough to shift what he was seeing away from the scotoma allowing him to read more efficiently and return to his job.

Conclusions

- **Throughout assessment of visual fields is essential for all brain injury patients. CVF are not always sufficient and automated fields may be required.**
- **Do not rush treatment. Pay close attention to the patient’s comments and observations during initial testing.**
- **Think about the quality of life of your patients, how you can help them return to their normal activities, and what their functional goals are.**
- **Think outside of the box: patients can have multiple uses, not just for homonymous field defects but for any field that may be causing problems.**
- **Effective communication is important to help improve the patient’s quality of life and to help them achieve their functional goals. By carefully listening to the patient’s complaints, and with the assistance of clinical and functional testing, we are able to determine the cause of the patient’s symptoms and initiate a proper course of therapy.**

**Visual field:**

- **ROST: Rost, 80°, 45°, 90°, 135°, 180°**

**Ocular Symptoms of TIVS**

- **Convergence insufficiency**
- **Accommodation dysfunction**
- **Strabismus (most likely case)**
- **Low Hert rate**
- **Ocular motor deficits**

**Visual symptoms?**

- **Right side:**
- **Left side:**

**Post-Trauma Vision Syndrome (PTVS)**

- **Results from damage to the midbrain–superior colliculus which work to organize and integrate visual sensory information**

**Locizing the Injury**

Humphrey 30-2 Visual field testing was performed. Results showed a Right Homonymous Paracentral defect.

**- By knowing where the damage has occurred, we can better manage the patient and their visual systems.**
- **For example, the patient may be having trouble with spontaneous and impulse control, which would indicate that the frontal lobe has been damaged.**
- **We can conclude that the patient will likely also have trouble with successes, which are initiated in the frontal lobes in the frontal lobe. Damage to the parietal lobe and occipital lobes can have significant visual consequences as well. If symptoms and signs correlate to right-sided brain damage, it is important to look for visual spatial inattention as the patient may not be aware of this.**

**Our Patient**

He was wearing a helmet when he crashed and was told by friends who observed the incident that he landed on the right side of his head. Most symptoms and signs demonstrated brainstem injury, indicating a contralateral injury.

- **Visual field defect correlates to damage at the left tip of the occipital lobe:**
- **His appearance showed a right side droop (seen in shoulder posture and the downward slanting of the right side of his mouth) which is consistent with left motor cortex injury.**
- **Trouble with verbal retrieval and some procedural memory indicate left frontal brain impairment.**
- **The patient’s wife stated that he does not seem to filter what he says as he used to, indicating frontal brain deficits.**
- **Hand strength was assessed and was equal on both sides. Motor and gait also seemed to be intact.**

**Treatment**

First Steps: Vision Therapy Program

Directed vision therapy is initiated to address his binocular dysfunctions, which included convergence insufficiency and ocular motility dysfunction. Scanning activities were also incorporated into the therapy program to facilitate them in compensating for the field loss. He came for 4 weeks sessions. Throughout his visit progress was made. His eye movements and convergence abilities began to improve. Home maintenance therapy was given as he could not keep weekly sessions. His clarity of mind and communication skills were also improving as his brain continued to heal.

**Problems: He wanted to return to work but was still having trouble reading efficiently.**

A study looking at reading eye movements postulated that the parietal region, along with the peripheral retina, guide a reader’s eye movements to the upcoming words and sentences. These areas are readable by integrating information across separate fixations. This patient’s parietal cortex disrupted his ability to look ahead while reading, causing slow, difficult reading.

**References**

- **http://www.rch.org.au/kidsinfo/fact_sheets/Brain_injury_Eyes_and_vision/**
- **Taylor and Francis Group.**
- **http://www.padulainstitute.com/Neuro_Optometric_evaluation.htm**
- **3. Harvey, L., Suter, P.**
- **5. Pambakian, Alidz, Currie, Jon, et al. Rehabilitation Strategies for Patients With Homonymous Visual Field Defects.**
- **Vision Therapy Multidisciplinary care of the Patient Following Brain Injury 2011**