Resolution of Visual Symptoms in a Post-concussion Syndrome Patient After Optometric Vision Therapy

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BACKGROUND

Traumatic brain injury (TBI) is an important public health issue. According to the Centers for Disease Control and Prevention, at least 1.7 million American civilians per year sustain a TBI[1]. Over 5.3 million Americans are living with a disability from TBI, and at least 3.2 million Americans need long-term services to perform activities of daily living. Healthcare costs (medical expenses and loss of productivity) estimate to be $76.5 billion or more[2].

A brain injury can range from a mild concussion to long-term disability to death. The quality of life can be adversely impacted. Individuals with TBI require a variety of services, including occupational, physical, and cognitive rehabilitation; speech and language therapy, in addition to optometric rehabilitation[2]. Optometrists play an essential role in improving these individuals' quality of life by treating the visual symptoms resulting from TBI[3]. In addition to other professional services, optometric intervention can provide rehabilitative success.

CASE REPORT

A 45-year-old Caucasian female (MR) suffered a concussion due to a motor vehicle accident on January 20, 2012. Her main concern was the decreased ability to concentrate and focus especially in busy environments. MR reported vision problems including occasional cloudiness, worsened vision with fatigue, and severe headaches during near work. She also noted other common post-concussive symptoms: memory problems, depression, and decreased concentration.

Optometric examination revealed reduced near point convergence and reduced base-out ranges, indicating convergence insufficiency. ReadAlyzer results also revealed increased fixations and decreased reading rate, suggesting oculomotor dysfunction. Prior to the concussion, she did not experience headaches or fatigue with near work; therefore we conclude that her diagnoses of Convergence Insufficiency and Oculomotor Dysfunction were results of the TBI.

In-office vision therapy (VT) was recommended. Following ten visits of VT, MR's exam findings greatly improved. Re-evaluation showed normal NPC, BO ranges are greater than 45 prism diopters, and ReadAlyzer results improved and normalized. Home Therapy System (HTS) and Dynamic Reader programs were prescribed for home maintenance therapy. MR's visual symptoms and quality of life improved, reading and near work were easier, and she also planned to take a test to begin driving again. MR also attended speech-language therapy to help with cognitive processes and thought organization and attended physical therapy to ease her back into her normal physical activities.

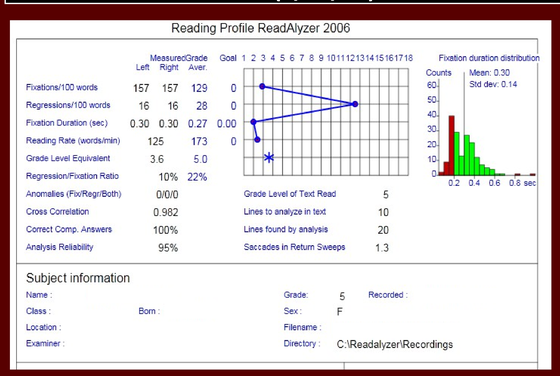
At the 3 months post-VT follow-up, optometric examination findings and symptoms were shown to be stable.

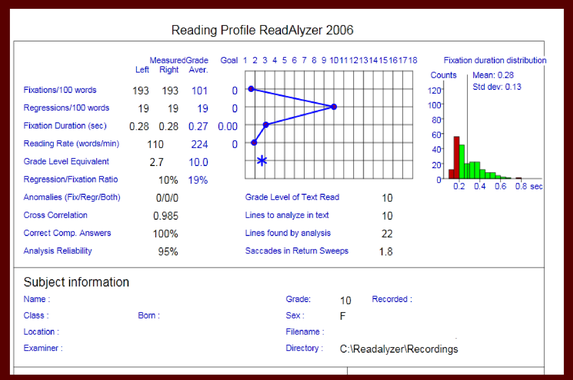
Improvement found in objective exam findings and ReadAlyzer recordings.

OBJECTIVE EXAM FINDINGS Pre VT and Post VT			
	Pre VT (7/24/12)	**Post VT (11/28/12)**	**Post VT (3 months – 2/5/13)**
Cover Test Distance Near	 Orthophoria 2 XP'	 Orthophoria 2 XP'	 Orthophoria 2 XP'
NPC	15 cm/20 cm 17 cm/ 23 cm 17 cm/23 cm	TTN	TTN
BO Ranges	8/16/14	x/>45	x/>45
BI Ranges	16/18/16	x/25/18	18/25/18
Vergence Facility	0 cpm, fails BO	13 cpm, BI/BO equal latency	13 cpm, BI/BO equal latency
BAF	0 cpm, fails plus		
Readalyzer Fixations/100 words Regressions/100 words Reading Rate (words/min) Grade Level Equivalent Comprension	 193 19 110 2.7 100%	 81 10 319 14.1 100%	

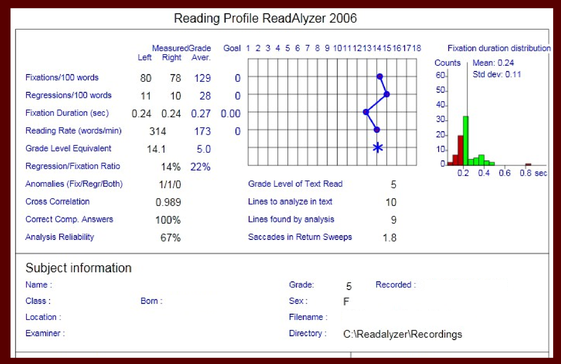
READALYZER RECORDINGS

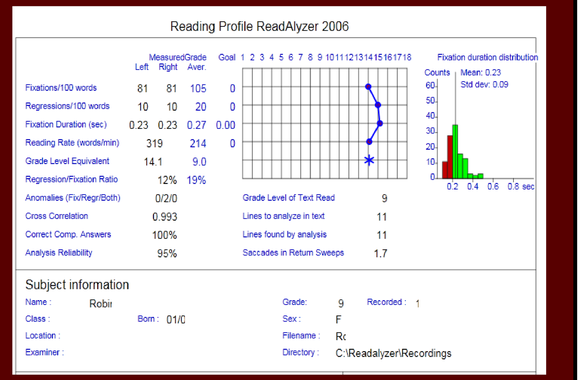
Pre VT (7/24/12)





Post VT (11/28/12)





DISCUSSION

The connection between the eyes and the brain causes the visual system to be susceptible to damage. The neural control of eye movements, accommodation, and vergences begin in the brain; thus, when the brain sustains trauma, the visual system can be affected. Therefore, patients with TBI frequently manifest visual symptoms. These symptoms include eyestrain, diplopia, oculomotor-based reading difficulties, short-term visual memory loss, and an inability to tolerate complex visual environments. These symptoms are associated with common binocular disorders[3].

The most common non-strabismic vergence dysfunction after a TBI is convergence insufficiency[3]. However, patients with TBI can also have slowed dynamic vergence responses and vergence dysfunction. Vergence is important primarily in reading other sustained near work, but also when looking at objects at various distances during activities of daily living. Similarly, the most common accommodative dysfunction after a TBI is accommodative insufficiency. Accommodation plays an important role in sustained reading in pre-presybopic patients[4,5].

Version eye movements can also be affected. Patients with TBI show saccadic abnormalities: excessive number of saccades during reading, hypometria (undershooting), and sometimes hypermetria (overshooting). These deficits can interfere with reading, visual scan, and other types of rehabilitative therapy (such as cognitive therapy) involving visual search skills. In addition to saccadic deficiencies, affected pursuits can result in increased frequency of saccades to "catch-up" and foveate a moving target[6].

As an architect who does a lot of near work, MR's quality of life was severely affected by the concussion. It is also essential for optometrists to consult with other professionals involved in the care of the patient to determine the patients' needs. Although MR"s visual symptoms have resolved, her symptoms of trouble remembering what she has read persisted. She suffered from post-consussion syndrome[5], which refers to symptoms (including visual, physical, cognitive, emotional, and behavioral symptoms) that may manifest after a concussion, which is considered to be a mild form of TBI. Studies have shown that optometric vision therapy has proven to be efficacious in the treatment of the visual disorders, in which subjective and objective findings have improved with vision therapy[7]. However, proper referral to speech and language therapist was necessary to help with MR's cognition. MR reported that she felt that memory improved, comprehension was easier, and reading was easier for extended periods of time. A multidisciplinary approach (involving the optometrist, occupational therapist, physical therapist, vestibular therapist, neuropsychologist, and psychiatrist) is important to treat individuals with post-concussive syndrome. Optometric rehabilitative services prove to help improve or even resolve visual symptoms, subsequently improving their quality of life.

REFERENCES

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