

Visual Dysfunction Related to Mild Traumatic Brain Injury (MTBI)

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The visual system involves complex actions and interactions of the eyes and the brain. To simplify this description, the visual system is being placed into three areas of function: acuity, perception, and eye movement. Any one of these can be impaired without impairment to the remaining two functions. Or, all functions may be impaired as the result of MTBI.

Acuity or How Sharply You See

The Eye and the Optic Nerve

As light enters the eye, it travels through the cornea, lens and retina (the neural part of the eye). The image of what is seen is processed, reversed and transmitted along the optic tracts (visual pathways). The eye can be injured by a direct blow, which may injure the cornea, lens, retina, and/or optic tract. Blurred vision or partial visual loss can result from this injury, which may be transient, permanent, or improve with treatment.

Perception or Interpreting What You See

The Occipital Lobe

This lobe sits at the back of the brain and receives images transmitted from the optic tracts. A blow to the occipital lobe may result in an inability to make sense of what you see (visual agnosia). The worst result would be cortical blindness, an inability to see anything secondary to an impaired interpretation of what is viewed. This condition may be permanent or transient.

Control of Eye Movements

Each eye has approximately six muscles. Each muscle independently controls an eye movement and is controlled by one of three cranial nerves: III, IV, and VI. Normal eye movements are synchronized to present reflections onto the retina to result in a single image. If any one or all of the three cranial nerves are damaged, the eye movement and synchronization are altered and two images may be seen. This is double vision or diplopia.

Independently activated eye movements involve different areas of the brain:

- Saccades, movement on command, and searching movement (pons - brainstem)
- Slow pursuit or tracking a moving object (occipital lobe)
- Vestibulo-ocular reflex eye movement (VOR) keeps the eye fixed on an object while the head is moving (brainstem and vestibular system)

Other Vision Problems Related to MTBI

- Sensitivity (photophobia): an increased sensitivity to light
- Nystagmus: an involuntary rhythmic movement of the eyes with a normal range of duration
- Visual overstimulation: intolerance to changing light patterns, movement, or clutter

To tour a CNS facility, call 800.922.4994 or visit neuroskills.com.

To make a CA referral, fax 661.873.2509. For a TX referral, fax 972.871.5332.