

A Military Clinician's Approach to Eye Movement and TBI

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Examination of the Visual System after TBI

The visual system permeates nearly every region of the brain and is thus affected by a large variety of neurological pathologies. The visual system is affected to some degree in most forms of TBI and it is also commonly impacted by medications, poor sleep, migraines and psychological factors.

There are two common clinical pitfalls in evaluating and managing the visual system and TBI.

1. **Underappreciating** abnormal eye findings in acute mTBI.
2. **Over-attributing** abnormal eye findings in the chronic stage to the initial mTBI, rather than other treatable common factors as noted above. The use of TBI screening tests that utilize eye movements can help alleviate the first error but can also contribute to the second error if providers are not conscientious of other often treatable factors that may be at play in the second error.

All primary care providers should be adept in the following initial visual historical and exam measures:

History: Any distortions or loss of vision in either eye? Double vision? Transient distortions or loss of vision attributable to migraines may not need further specialty evaluation. **All complaints of double vision should be evaluated further by a specialist.**

Examination:

- **Lids:** Palpebral fissures symmetric? Any ptosis? Full strength of eye closure?
- **Sensation:** Numbness on either side of face? Corneal blink reflex intact?
- **Visual Acuity:** Normal?
- **Visual fields:** Full to confrontation with fingers? (*Insensitive test, so formal visual fields may be needed*).
- **Pupils:** Equal and reactive to light (and dilate normally in dim light as well?). *Any relative afferent pupillary defect (RAPD) in the swinging flashlight test? Any decreased light saturation in either eye?*
- **Pursuits:** Slowly assess in all 6 cardinal directions of gaze in an "H" pattern with a small moving target, approximately three seconds to move across the visual field. *Any jerkiness of eye movements is abnormal. Commonly affected in acute mTBI.*
- **Nystagmus:** Best assessed in fixed primary gaze, fixed right and left gaze and fixed up and down gaze. It is normal to have a few beats of horizontal nystagmus in right and left gaze that extinguish. *Sustained nystagmus in any direction of gaze and any degree of vertical nystagmus is abnormal.*
- **Saccades:** Have patient look briskly from midline to targets 30 degrees to the right and left and up and down. The eyes should land squarely on target in one movement. *Commonly affected in acute mTBI.*
- **Convergence:** Patient fixates on a small target moved slowly towards the nose. It is normal for the pupils to constrict and to maintain fixation to 6 cm or less from the eyes. *Convergence insufficiency (breaking of fixation before 6cm) is a very common condition in the general population and is not specific to TBI.*
- **Vestibulo-Ocular Reflex:** Have patient fixate on a target in front of patient (often examiner's nose). Move patient's head up and down, side to side slowly. Do eyes remain firmly fixated on target the

entire time? Do the eyes remain firmly fixated if the head is moved rapidly from the side to center?
(*Head impulse test, HIT. Rule out neck injury before performing.*)

Minor eye movement abnormalities commonly exist during the acute stage of mTBI. Transient visual distortions can be common with migraines. Any other abnormalities noted above should be evaluated further by an eye professional and/or a neurologist.

Moran Eye Center Video Resources: <https://www.youtube.com/watch?v=LkJ4ue00VAI>;
<https://www.youtube.com/watch?v=xW6B05a-LTw>

References:

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4. Alvarez TL, Scheiman M, Santos EM, Morales C, Yaramothu C, D'Antonio-Bertagnolli JV, Biswal BB, Gohel S, Li X. The Convergence Insufficiency Neuro-mechanism in Adult Population Study (CINAPS) Randomized Clinical Trial: Design, Methods, and Clinical Data. *Ophthalmic Epidemiol.* 2020 Feb;27(1):52-72.
5. Moran Eye Center Videos on the Neuro-Ophthalmological exam:
<https://www.youtube.com/watch?v=LkJ4ue00VAI>
<https://www.youtube.com/watch?v=xW6B05a-LTw>