

Become the Concussion Expert in Your Community: What You Need to Know [Part 2] *Todd Turnbull, DC*

What makes an individual an expert in concussions? Obtaining education about concussions and treating concussed patients are two factors that lead to expertise. Personal experience of suffering from multiple concussions is another factor that adds great depth to understanding concussion signs and symptoms and the challenges of recovering from them.

Being involved in hockey, snowboarding and martial arts has given me many opportunities to experience concussions personally. As the youngest of four siblings I also gained experience having sustained eight scars on my head by the time I was twelve years old. Most of those scars were accompanied by concussions.

I can recall at least three concussions that gave me total loss of consciousness: a baseball bat to my forehead at five years old, the grey Cadillac that hit me as I ran across the street and bounced my head on the asphalt and snowboarding off of a ten foot cliff and landing head first onto a road.

Detailed history and examination are necessary to understand the depth of injury caused by traumatic brain injuries. Assessing cranial nerve function is crucial for monitoring progression/regression and determining return to activity prognosis. Clinical evaluation may lead to referral for imaging studies and neuropsychological testing.

Symptoms

A concussion is a minor traumatic brain injury (mTBI) that may occur when the head hits an object, or a moving object strikes the head. Concussions not causing a total loss of consciousness can be described as seeing a white flash, seeing stars, getting your bell rung or the visual field getting dim or dark.[1]

Concussions are graded by the severity of symptoms. In 1991 the Colorado Medical Society published guidelines for concussions. A grade I concussion consists of confusion only, grade II includes confusion and post-traumatic amnesia, and grade III and IV involve a loss of consciousness lasting from seconds to minutes, respectively. [2]

The most common symptoms of concussions include headaches, visual disturbances, irritability and dizziness/lightheadedness. Recovery from concussions may take weeks, months or years for the symptoms to dissipate.

Evaluation

Concussions can be evaluated using imaging studies, cognitive testing and physical examination. A CT scan or MRI may reveal swelling, bleeding or direct damage of the brain tissue.[3]

Neuro-cognitive testing such as ImPACT® (Immediate Post-Concussion Assessment and Cognitive Testing) is widely used to evaluate athletes for return to play assessment. This web-based tool measures working memory, sustained and selective attention time, response variability, non-verbal problem solving and reaction time.[4]

Physical examination of cranial nerve function should be performed to assist the clinician in documenting patient progress. The tests that I recommend incorporating include visual tracking, tongue deviation, vestibulo-ocular reflex (VOR) and muscle tests of the trapezius and sterno-cleido-mastoid (SCM).

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Visual tracking is performed by using a pencil tip held about twelve inches in front of the face and following slow, side to side pencil movements with the eyes only. Experiencing headaches, irritability and nystagmus during or after this test indicates signs of post-concussion syndrome (PCS).

Deviation of the tongue to one side and/or loss of motion of the tongue during side to side movements indicates neurological dysfunction associated with PCS.

Vestibulo-ocular reflex (VOR) testing can be graded from one to five with a five being normal function. When the patient rotates their head the semicircular canals of the inner ear are stimulated and the eyes reflexively respond to stabilize vision. With concussions this reflex is challenged and may result in nystagmus, dizziness/ lightheadedness, headache, nausea and irritability.

Grade 1 involves very slow, gentle rotations of the head which results in aggravation of PCS symptoms. In VOR grade 5 the patient can vigorously rotate the head repeatedly without experiencing any PCS symptoms. A visual demonstration of these tests are available at www.youtube.com/watch?v=ECWiBSEKsrc. [5]

The spinal accessory cranial nerve directly innervates the sternocleidomastoid and trapezius muscles. Bilateral contraction of these muscles causes head flexion and extension, respectively. Unilaterally these muscles are involved in rotation of the head. Testing for weakness of cervical flexion, extension and rotation can be used to localize lesions in the nerve tissues.

According to Manon-Esaillat and Ruff, "trapezius weakness on one side and sternocleidomastoid weakness on the contralateral side indicate an upper motor neuron lesion ipsilateral to the involved sternocleidomastoid and above the oculomotor nerve nucleus. Trapezius muscle weakness with sparing of the sternocleidomastoid points to a lesion in the ventral brainstem, lower cervical cord, or lower spinal accessory roots. Sternocleidomastoid weakness alone indicates a brainstem tegmentum or upper cervical accessory root lesion. Weakness of both muscles ipsilaterally can be produced by a lesion in the contralateral brainstem, ipsilateral high cervical cord, or an accessory nerve lesion peripherally before the nerve bifurcates to both muscles. A peripheral lesion distal to the bifurcation also produces weakness involving only one muscle." [6]

Incorporating these concussion tests provides documentation of a patient's status and assists in confirming patient progress or lack of progress. Understanding how to monitor their own symptom progress is helpful for patient's during their recovery from concussions.

Becoming the concussion expert does not require getting your bell rung to understand that concussions are happening to your patient's more than they recognize. The expert will check every potential incident with greater awareness and understanding of concussion signs and symptoms. They will be able to monitor concussion progress with objective testing and comprehensive documentation.

1. Concussion. U.S. National Library of Medicine: <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001802/>
2. Cantu RC (2001). "[Post-traumatic Retrograde and Anterograde Amnesia: Pathophysiology and Implications in Grading and Safe Return to Play](#)". *Journal of Athletic Training* **36** (3): 244–248. [PMC 155413](#). [PMID 12937491](#)

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3. Head MRI. U.S. National Library of Medicine: <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0004250/>
4. Overview and Features of the ImPACT® Test. <http://impacttest.com/about/background>
5. Access the video at www.youtube.com/watch?v=ECWiBSEKsrc or search for “Concussion Self Evaluation” on YouTube.
6. Manon-Espaillat R, Ruff RL. Dissociated weakness of sternocleidomastoid and trapezius muscles with lesions in the CNS. *Neurology*. 1988;38:796–97. [[PubMed](#)]