

Concussions

Recognition, Management, and Care

Sports Concussion:

- Complex, pathophysiological process affecting the brain, induced by traumatic bio-mechanical forces.¹
- 1.6-3.8 million concussions occur as a direct result of sports and recreational activities.
- It's estimated that over half of those concussions go unreported each year.

Signs of Concussion²

- Vacant stare
- Delayed verbal and motor responses
Confusion and inability to focus attention
- Disorientation
- Slurred or incoherent speech
- Gross observable lack of coordination
- Emotions out of proportion to
circumstances Memory Deficits
- Loss of Consciousness

Symptoms of

- **Early** (minutes to hours)

Concussion²

- Dizziness or vertigo
- Lack of awareness of surroundings
- Nausea or vomiting

- **Late** (days to weeks)

- Persistent low grade headache
- Lightheadedness
- Poor attention and concentration
- Memory dysfunction
- Easily fatigued (lethargy)
- Irritability and low frustration tolerance
- Photophobia (sensitivity to light)
- Intolerance of loud noises, sometimes tinnitus (ringing in ears)
- Anxiety and/or depressed mood
- Sleep disturbances

Brain Chemistry Changes⁸

- K^+ spills out of the brain cells
- Ca^{2+} surges into the brain cells
- Active pump using glucose is needed to correct
- At time of injury blood supply to the brain decreases by as much as 50%
 - May take up to 10 days to have blood supply normalized
- During this time glucose is not in sufficient supply to do the work required

Past Classifications of Concussions

- Grade I, II, III (brief or prolonged)³
 - Grade I -No LOC, symptoms last <15'
 - Grade II -No LOC, symptoms last >15'
 - Grade IIIb -brief (seconds) LOC, symptoms last >15'
 - Grade IIIp -prolonged (minutes) LOC, symptoms last >15'
- Simple V.
Complex¹
 - Simple: progressively resolves over 7-10 days. Formal neuropsychological screening does not play a role.
 - Complex: athletes suffer persistent symptoms, specific sequelae, or prolonged cognitive impairment following the injury
 - *A concussion is categorized as simple or complex post recovery.*

Dangers

- Post-concussion Syndrome⁴: A progressive deterioration of cognitive function following repeated brain trauma
- Second Impact Syndrome⁵: acute, 50% usually fatal, brain swelling that occurs when a second concussion is sustained before complete recovery from a previous concussion that causes vascular congestion and increased intracranial pressure.

Special Considerations for Pediatric Concussions¹

- Cannot be treated in the same manner as an adult concussion because of the still developing brain -must be more conservative with care.
- Students that are diagnosed as being ADD or ADHD have been shown to be more prone to receiving concussions.
- Cognitive assessment is difficult until late years because of rapidly developing cognitive maturation.
- Student-athletes need more restrictions on activities of daily living and scholastic activities while still symptomatic than do adults.
- Due to increased need for glucose other brain processing demands must be removed.
- May have periods of minutes or hours where they are back to normal.

Clinical Assessment Tools

- MRI: can identify areas of contusion or axonal shear injury⁶.
- CT scan: can determine the presence of intracranial injury or bleeding⁶.
- Blood testing: blood markers can identify trauma to the brain when there is a negative CT scan⁶.
- ImPACT: computer based test measures neuropsychological loss. Proven to be a reliable indicator for measuring recovery process¹.

Management⁷

(while symptomatic)

- Inform Pediatrician
- Acutely suspend all academic work and physical activities until symptoms improve.
- Return to school when symptoms have stabilized at home.
- Identify what triggers an increase in symptoms and avoid those things.
- Initially suspend “screen” work (TV, texting, computer, video games, etc) while still suffering symptoms.
- Once in school attempt only work that doesn’t increase symptoms and work in chunks of time with rest inbetween.
- Avoid caffeinated and sugary beverages, alcohol, and nicotine.

Student-Athlete Return To Play Protocol⁷

Initial Treatment:

- No physical activity until the athlete's symptoms are gone
- Avoid mental (cognitive) exertion; school attendance, test taking, reading, studying, computers, video games, and text messaging

When symptom free for 24 hours in school:

Step 1. Advance when full day of school is tolerated; begin low impact activity such as walking, stationary bike, etc.

(Gradually increase the intensity and duration as tolerated)

Step 2. Advance to aerobic activity fundamental to the specific sport such as skating, running, etc.

Step 3. Advance to non-contact activity drills to the specific sport such as dribbling, batting, shooting

Step 4. Advance to full contact in a practice setting

(Note: The student athlete must remain asymptomatic to advance through the various levels or return-to-play as described above.

If symptoms return, while exercising, the athlete should return to the previous activity after waiting a day).

If all the above is accomplished without any return of signs and symptoms, they may return to play following final clearance. Some athletes, especially if they had multiple previous concussions, should consider having a baseline computerized neuropsychological test performed because of the increased risk of concussion.

References

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