

Body System: Neurologic

Session Topic: Concussion and Minimal Brain Injury

Learning Category I: Didactic Lecture

Needs Assessment

A concussion is a mild traumatic brain injury (TBI) that may result in severe headache, altered levels of alertness, or unconsciousness. It can also affect memory, judgment, reflexes, speech, balance, coordination, and sleep patterns. A concussion can result from a fall, sports activity, car accident, or any activity that causes jarring of the brain in any direction. The length of time the patient is unconscious is often related to the severity of the concussion; however, many individuals with concussions never lose consciousness, and some may be unaware they have a concussion.¹

The signs and symptoms of a concussion can be subtle and may not be immediately apparent. Symptoms can last for days, weeks or longer. Symptoms may include:

- Headache or a feeling of pressure in the head
- Temporary loss of consciousness
- Confusion
- Amnesia surrounding the traumatic event
- Dizziness
- Ringing in the ears
- Nausea or vomiting
- Slurred speech
- Fatigue²

Symptoms may be immediate or delayed in onset by hours or days and can also include:

- Concentration and memory complaints
- Irritability and other personality changes
- Sensitivity to light and noise
- Sleep disturbances
- Psychological adjustment problems and depression
- Disorders of taste and smell²

To confirm whether a patient has suffered a concussion, family physicians should perform or recommend certain tests, including a complete neurological exam, which should include assessment of cranial nerves, strength and reflexes of extremities, and test memory and concentration, vision, hearing, strength and sensation, balance, coordination, and reflexes.

If the individual in whom concussion is suspected sustained excessive trauma, which could include a motor vehicle accident, or was under the influence of alcohol or drugs, experiencing short-term memory loss or other change in mental status, vomiting, or

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having a seizure, family physicians should consider recommending a cranial computerized tomography scan to assess the extent of brain injury. In some cases, patients may need to be hospitalized overnight for observation, or family physicians should ensure patients with concussions have a friend or family member check on and awaken them periodically for at least 24 hours to ensure they can be roused to normal consciousness.³ An individual may be experiencing postconcussive syndrome if at least three of the following symptoms either appear within a week or persist for more than three months following the initial head injury: headache, dizziness, fatigue, irritability, impaired memory and concentration, insomnia, and lowered tolerance for noise and light. If a family physician suspects postconcussive syndrome in an individual, MRI, SPECT, and positron emission tomography scans are more sensitive than CT scans in detecting abnormalities associated with minor head injury.⁸

In rare cases, a blood clot may form in the brain post-concussion. Epidural hematomas occur because of trauma and develop most commonly with fractures of the squamous portions of the temporal and parietal bones that tear the middle meningeal vessels. Epidural hematomas can cause significant pressure and brain injury, are seen in 2.7 to 4 percent of TBI, and have an overall mortality of 10 percent. Cranial fractures are present in 70 to 90 percent of cases. Acute subdural hematomas are seen in 12 to 29 percent of severe TBI and have a mortality rate of 40 to 60 percent. Chronic subdural hematomas can also occur following TBI, but the injury is typically to the veins in the brain. This causes a slower leak of blood in the space below the dura, which has much more room or blood to accumulate before brain function suffers. Because the bleeding may be very slow and not cause acute symptoms, chronic subdural hematomas are often found incidentally on CT scans.^{10, 11} Family physicians should screen patients in whom concussion is suspected for persistent headaches, weakness, numbness or decreased coordination, vomiting or nausea, and/or slurred speech, and they should encourage caregivers of individuals with concussions to take the patient to the emergency department if the individual cannot be awakened, has one pupil larger than the other, has convulsions or seizures, cannot recognize people or places, or loses consciousness.⁴

One of the most common occurrences for concussions is head trauma during sporting events. The International Conference on Concussion in Sports recommended that concussion be divided into two groups: simple and complex. In a simple concussion, the individual's symptoms gradually resolve and function returns to normal in seven to 10 days. In a complex concussion, symptoms persist and affect thought processes. This is especially common in individuals who have suffered more than one concussion. Complex concussions are more severe and may require longer recovery times.⁹

When evaluating athletes following concussions, family physicians should consider the following 2002 guidelines from the American College of Sports Medicine, which ensure the following before an athlete can return to play:

- Safety of the athlete

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- Potential risk to the safety of other participants
- Functional capability of the athlete
- Functional requirements of the athlete's sport
- Federal, state, local, school and governing body regulations related to an injured or ill athlete returning to practice or competition⁵

Additionally, according to 2010 updates from the American Academy of Neurology, following concussion athletes should not return to play until all symptoms have passed.¹³ Because cognitive recovery from concussion may precede or follow resolution of other clinical symptoms, assessment of cognitive function should not form the sole basis of return-to-play decisions. It may still be an important aid in the decision; however, the final decision should be based on complete resolution of all concussive signs and symptoms.¹²

To prevent severity of concussions in athletes, family physicians can recommend appropriate headgear, as well as one-minute tests performed on the sidelines of sporting events that include reading numbers on index-sized note cards, which tests for impairments of eye movement, attention, language and other symptoms of impaired brain function. Any increase in the time needed to complete the test may indicate a concussion and an immediate need for medical attention.⁶ To prevent initial or repeated concussions in the general population, family physicians can recommend individuals take simple steps, such as wearing a seatbelt, keeping floors free of clutter to prevent trips and falls, using caution around swimming areas, and blocking off stairways, windows, and sharp edges from children.⁷

Gaps in Knowledge, Competence and/or Performance

- Family physicians should be familiar with the immediate and delayed symptoms of concussion or mild traumatic brain injury and recommend testing/monitoring of the patient as necessary.
- Family physicians should be aware of the symptoms that can indicate a possible intracranial blood clot following a concussion.
- Family physicians should be familiar with guidelines allowing athletes to return to play following concussions and advise as necessary.
- Family physicians should be able to advise patients on how to prevent initial or repeated concussions.

Learning Objectives

At the end of this session, participants will be able to:

1. Identify the immediate and delayed symptoms of concussion or mild traumatic brain injury and recommend appropriate testing or monitoring of the patient.
2. Recognize when a concussion might have caused an intracranial blood clot and recommend additional testing, monitoring, and treatment.

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3. Advise athletes and coaches on when an athlete is able to return to play following a concussion or mild traumatic brain injury.
4. Suggest preventive measures for athletes and the general population to avoid initial or repeated concussions.

References

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