Treatment of Head Injuries

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KEYWORDS

• Concussion • Cognitive testing • Traumatic brain injury
• Chronic traumatic encephalopathy

KEY POINTS

- Concussion is a form of traumatic brain injury and appears to be increasing in incidence at all ages and levels of play.
- Concussion is no longer graded on a scale, but rather each event is assessed based on symptoms that are present at onset as well as on follow-up.
- It is helpful to have baseline evaluations of athletes prior to their participation so that future performance can be measured against this to ensure the brain has fully recovered after injury.
- Mainstays of postinjury management include avoidance of stimuli that aggravate symptoms. Return to activity cannot begin until all symptoms resolve. Once the athlete is asymptomatic, then a stepwise return to play can occur with progression based on continued lack of symptoms.
- Long-term effects of concussion remain to be better understood.

Neurologic injuries in athletes are increasing in incidence. These injuries are currently among the most common medical concerns in athletes, as they affect all ages and all levels of competition.[1] Concussions appear to be increasing in incidence across a wide variety of sports, with an estimated 1.6 to 3.8 million events per year in the United States alone. It is also estimated that up to 9% of high school athletes will suffer a concussion in any given year. This number does appear to be increasing, especially among high school athletes.[2,3] A recent annual survey suggested that the sports and activities most commonly associated with traumatic brain injury were as follows (ranked in order of incidence): cycling, football, baseball/softball, basketball, water sports, powered recreational vehicles, soccer, skateboards/scooters, winter sports, and equestrian sports.[4]

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DEFINITION AND CLASSIFICATION

Concussion is defined as a complex pathophysiologic process that affects the brain and is induced by traumatic biomechanical forces.[5] Concussion is essentially a form of mild traumatic brain injury, although some have objected to the use of the term mild with the view that no type of traumatic brain injury should be viewed as mild.

Concussions are complex injuries that cause changes in neurologic function including balance and cognition as well as a variety of symptoms. Most sports concussions occur without loss of consciousness or overt neurologic signs.[6]

Previously, the presence of certain symptoms was used in an attempt to divide concussions into certain grades of severity based on established guidelines.[7] However, concussions are no longer divided as such, since these grading systems had little clinical usefulness. Instead, concussions are now considered individually and described based on duration and nature of symptoms. Several modifiers have been suggested as reflecting the severity and likely recovery from a concussion.[8] These modifiers include symptoms, neurologic signs, any sequelae such as convulsions, temporal factors in terms of number of events over time and how close the injuries are together, threshold for future injuries, age of the patient, comorbidities of other neurologic conditions, concurrent use of medications, behaviors that are encouraged, repeat injuries, and whether the sport is considered a contact or collision sport as well as the level of play.

In general, athletes who have suffered concussions previously will take longer to recover from their injury because of prolonged symptoms. There is some evidence to suggest that a longer time to recovery is required for each subsequent concussion.[9] Genetics may actually play some role in the risk of concussion. Some neuropathologic studies have indicated an association between ApoE4 promoter genotypes and risk of concussion and a relationship between the tau protein polymorphism and increased risk of concussion.[10]

Age of the athlete also may affect recovery for concussion. Younger athletes may be more vulnerable to injury because of the developing state of their brain and variable rates of their neurologic development. In general, children and adolescents are felt to be more susceptible to concussion than adults, tend to have more symptoms, and have more prolonged recoveries (7–10 days in high school athletes vs 2 to 7 days in college athletes).[11]

BASELINE EVALUATIONS

Concussions frequently present with symptoms such as headaches, fogginess, dizziness, light or noise sensitivity, or with impairments of balance and/or cognitive deficits. Each of these areas can be tracked using symptom scales, specific testing of balance, and neurocognitive testing. All of these functions can be measured at baseline in the noninjured state, and these are all known to be sensitive to significant changes in the first few days following injury. Generally, these factors (and thus most concussions) will normalize over the first 2 weeks.[12–14]

To establish an appropriate baseline for each individual athlete, a history should be obtained, and focused assessment done. The history should focus on previous concussions with regard to duration and nature of symptoms and time loss both from school and from sport. This information helps the provider to better understand the severity of previous injuries. History should also obtain any data about related neurologic conditions such as presence of migraine headaches, seizures, learning disabilities, or other major neurologic illness. Each of these factors has been suggested to favor a prolonged recovery from concussion.