Sideline Management of Concussion

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KEYWORDS

• Sideline • Concussion • SCAT3 • Balance • Vision • Symptom scale

KEY POINTS

- Concussion is a common occurrence in the athletic setting, and can be difficult to diagnose in a sideline situation.
- History and physical examination are important aspects of the evaluation of potential concussion with an emphasis placed on associated symptoms and a complete neurologic examination.
- The SCAT3 is a vital and important test that can be used on the sidelines to evaluate a potential concussion.
- There are other sideline tools to measure vision, reaction time, neurocognitive processes, and head impact/acceleration that are used in the sideline evaluation of concussion.
- An ideal sideline concussion evaluation test should be quick, cost effective, easy to administer, and reproducible.

INTRODUCTION

Concussion is defined as a complex pathophysiologic process affecting the brain caused by biomechanical forces. These forces can either be direct (eg, the head, neck, or face striking another object) or indirect (eg, impulsive forces transmitted to the head from a force somewhere else on the body).[1] It is estimated that there are 1.6 to 3.8 million sports-related concussions in the United States on an annual basis.[2] There is evidence that children (ages 5–18) may be more susceptible to concussion and can take longer to recover.[3] It is also known that athletes who have experienced multiple concussions in the past may be more susceptible to future concussions, suffer subsequent concussions with less force, and potentially take longer to recover.[4] Females may be more susceptible, and there may also be genetic traits[5] that increase the risk of sustaining a concussion.[3,6] Concussion rate varies by the sport with American football (3.02 per 1000 athlete exposures), ice hockey (1.96 per 1000 athlete

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exposures), and women's soccer (1.80 per 1000 athlete exposures) being the most prevalent sports.[7]

The onset of symptoms is rapid or delayed, making the diagnosis of concussion difficult in the acute setting. In addition, athletes may hide symptoms to continue playing. McCrea and coworkers[8] in 2004 published a study that showed that 50% to 75% of sports concussions go unreported at the high school level. A study done in 2013 at the University of Pennsylvania by Torres and colleagues[9] indicated that 43% of athletes had knowingly hidden a concussion from their athletic trainer or coach and 22% of athletes would be likely to hide a concussion again if the situation arose. The long-term and delayed effects of concussion are still a developing and controversial subject. However, there is evidence that exposure to repeated concussions can lead to prolonged symptoms, and may increase the risk of developing psychiatric illnesses, dementia, and chronic traumatic encephalopathy.[10] The clinical diagnosis of concussion is based on a variety of factors combined with a high degree of suspicion. There is no completely reliable sideline test that can replace clinical judgment. The sideline assessment of concussion is challenging at times; however, there are tools available to help in this process.

PHYSICAL EXAMINATION

After an athlete is suspected of suffering a concussion, the athlete should be held out of participation until assessed by a licensed health care professional. In an ideal situation, the team physician or athletic trainer, who are specifically trained in concussion diagnosis and management, would be present to assess and manage the injury. It is understood that there are many instances in which there is not an athletic trainer or physician on the sidelines, making it important for coaches and parents to be educated on the signs and symptoms of concussion. If there is concern for concussion, the athlete should not return to play and should be assessed by a health care professional as soon as possible.[1] There are some signs/or symptoms that could warrant emergent transfer to a hospital including the following:

- Prolonged loss of consciousness
- Multiple episodes of vomiting
- Progressive worsening of symptoms
- Signs of a potential skull fracture
- Focal findings on neurologic examination
- Decreasing level of consciousness

If any of these symptoms are present, the emergency action system should be activated and the athlete should be transferred to the nearest hospital.

The initial part of the examination should focus on the potential injury to the cervical spine. If an athlete loses consciousness then a cervical spine injury should be assumed until ruled out. The cervical spine should be immobilized on the field and an immediate spine and neurologic examination should take place. If a cervical spine injury is suspected then the athlete should be transferred emergently via ambulance using a spine board for immobilization to the nearest hospital for further assessment and management. After ruling out a significant cervical spine injury on the sideline, neurologic examination should include the following:

- Cranial nerve function testing
- Upper and lower extremity neurologic examination with emphasis on sensation, reflexes, and strength