Sport-Related Concussion

When's It Safe to Suit Up?

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Josh's case

- Josh, 17, presents four days after receiving a blow to his head during a high school football game.
- He experienced transient dizziness, blurred vision and unsteadiness following the hit; symptoms resolved spontaneously within a couple of minutes.
- He continued to play, despite not feeling right and did not tell anyone about his symptoms.
- Following the game, he developed a headache that persisted for the entire evening; ibuprofen, 600 mg, did not relieve the pain.
- He awoke the next morning feeling tired, but his headache had subsided.
- For the past two days, he has felt fine, apart from mild fatigue and intermittent headaches experienced during football practice and weight lifting.
- He is otherwise healthy with no prior history of concussions that he can recall.
- Josh has an important game this weekend.

Questions:

1. **Did he sustain a concussion?**
2. **Should he play football this weekend?**

What is a concussion?

The 3 principle components

1. Loss of consciousness

It is estimated up to 90% of sport-related concussions do not result in loss of consciousness,[1] yet it is often one of the first questions asked by clinicians. Assessing loss of consciousness by history would seem simple if someone is clearly unconscious for a prolonged period of time; however, there may be episodes of brief loss of consciousness lasting five to 10 seconds, which are not clearly witnessed.

Some authors have suggested a brief loss of consciousness may, in fact, represent a relatively minor grade of injury.

2. Memory dysfunction

When seen immediately after injury, athletes can sometimes demonstrate the inability to lay down new memory after the event or may have loss of memory for the events leading up to the injury.

3. Presence of other symptoms

Table 1 lists concussion symptoms. Symptoms are usually transient in nature and largely reflect functional disturbances rather than structural brain injury.

Many different concussion severity grading systems have been published, but none have been scientifically validated. In 2001, the First Symposium of Concussion in Sport was held and the following definition was put forth: "A complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces."[2]

Table 1

Concussion symptoms

- Headache
- Confusion
- Dizziness
- Nausea
- Blurred vision
- Unsteadiness
- Ringing in the ears
- Slowed thinking
- Feeling "foggy"
- Sensitivity to light or noise

Table 2

Important elements of patient history

- Circumstances of injury
- Mechanisms of injury
- Protective equipment used at time of injury
- Function in the immediate post-injury period
- Changes in neurologic function or systems post injury
- Current symptoms
- History of previous concussions

Making the concussion call

1. History

With the history, not only is it important to ask the patient relevant questions, but the physician must collaborate with a family member due to the propensity of athletes to forget or deny elements of the history (Table 2).

It has been our clinical experience that it is more important to ask athletes to grade themselves on a scale from 0% to 100%. If they report that they are not 100%, they tend to be more willing to report symptoms that would account for the fact they do not feel perfect. One of the more useful tools we have employed in our clinic to tease out symptoms is the McGill Abbreviated Concussion Evaluation (ACE) Post-Concussion symptom score.[3] This scale asks patients to rate 20 different symptoms from 0 (no symptoms) to 6 (severe).

2. Physical exam

Physical exam should include typical neurologic evaluation, including balance testing, co-ordination, cranial nerve function, pupil response and fundoscopic exam. It is also import to evaluate neurocognitive status, including mental status and orientation. The four best tests in our clinical experience are five-word recall, reverse spelling, quoting months of the year in reverse and quoting a string of digits in reverse up to a string of five or six.

3. Investigations

Routine investigation with computed tomography or magnetic resonance imaging is not typically recommended in sport-related concussion unless there is suspicion of a structural lesion. For those with persistent vertigo imbalance, a computerized dynamic posturography or electronystagnogram evaluation can be helpful. In addition, formal neuropsychologic testing can be beneficial.

The traditional full battery is obviously the most comprehensive test, but can be difficult to schedule in a timely fashion. There are abbreviated thirty-minute batteries under development in the National Hockey League and National Football League that may be of benefit.

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• Tips •

Some practical guidelines in managing recurrent concussions are:

1. Extend the time for return to play after recurrent injury.
2. Recommend a period of time or season off if the patient demonstrates a lower threshold of injury or prolonged recovery.
3. Be more conservative with younger patients, as there may be an element of "susceptibility."
4. Always consider asking the patient to change to a lower-risk activity.

Useful Web site

www.concussionsafety.com

References

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Treating the concussed athlete

How is concussion managed?

In terms of the immediate post-concussion period, it is critical that any athlete sustaining a suspected concussion be removed from play. The athlete should be medically evaluated and then observed with serial exams. Some authors have questioned whether it is safe to return athletes to play if their symptoms completely resolve in less than 10 minutes. In fact, patients may present with minimal findings at the time of impact and subsequently develop delayed symptoms; therefore, the most cautious or most conservative approach would be to simply remove everyone from play. When in doubt, sit them out!

What about followup management?

Providing there is no deterioration of neurologic function, no sign of focal head injury and the athlete is either stable or slowly improving, the most important element of followup management is to ensure complete rest, which means no sports, no exercise, no weight lifting and no exertion with activities of daily living.

Once all symptoms have completely resolved and the patient has normal neurologic and cognitive evaluations, the athlete can then be placed on a medically supervised exertion protocol. We recommend athletes perform a five- to seven-day stepwise protocol of gradually increasing activity in terms of duration, intensity and sport specificity. If symptoms recur along the path of this protocol, the athlete should return to rest until he/she is asymptomatic for 24 hours.

When can the patient return to sport?

Athletes must be asymptomatic and must have passed a graded exertion protocol. In additon, it is important to discuss whether they are confident to go back to the same sporting environment that caused the injury. Hesitancy is a sign athletes may not be fully recovered and, thus, should not be allowed to go back to play until their confidence has returned.

It is also essential to evaluate any protective equipment. Consider replacing any head protective gear, as it may confer less protection if it was worn at the time of the concussive injury. It is also important to assess the age and fit of the equipment to ensure the protection is optimal.

The other component of return to sport is education. The athlete, parent and coach should be instructed on the signs and symptoms of concussive injury so that any further injury is recognized early and managed appropriately.

Dealing wih recurrent injuries

The treatment plan with recurrent injury differs slightly. There is some evidence to suggest there is cumulative damage associated with repeat concussions.[4-7] Clinical experience would tell us players with recurrent injury have a lower threshold for subsequent injury and typically experience more severe symptoms that take longer to resolve.

A factor to consider with recurrent injury is how many concussions the athlete has previously had. Athletes tend to minimize this on history, as many in the sporting environment consider headaches and dizziness to be a normal part of playing sports. This may be the hallmark of recurrent injury. It is also important to look at how recently the last injury occurred. Also, the perception of recovery time following previous injuries should be elicited.

In cases of recurrent injury, it makes sense to require a longer asymptomatic period before starting any exertion protocol and then to extend the stage of time for progressive exertion before allowing return to contact activity.

There is no agreement on how many concussive injuries are too many. It has been our experience that the pattern of injury may be the most important factor, rather than the absolute number. Dx