



Recovering From a Concussion

A concussion or minor traumatic brain injury (MTBI) is primarily a metabolic disturbance of brain function following an injury. Concussions are not diagnosed by CT scans and may or may not be associated with loss of consciousness. Sometimes serious blows to the head may result in relatively minor injuries while other seemingly minimal hits can result in a significant MTBI and take a long time to resolve. I have cared for athletes with concussions where they never hit their head directly but rather a hard hit to the body jarred their head with enough force that they suffered a concussion.

Usually an athlete will feel dazed or foggy immediately following a concussion. However this is not always the case. Sometimes, the *adrenaline* of the game can mask the immediate symptoms and the athlete may not feel any physical symptoms until a few hours later.

In order to understand how to best recover from a MTBI, it is important to understand what happens to the brain in the days to weeks following the injury. As mentioned earlier, a concussion is primarily a metabolic disturbance to brain function. Electrolyte levels inside and outside of neurons become abnormal because the cell membranes of the nerves are damaged and leak. To repair this damage, the metabolic requirements of the brain, primarily glucose and oxygen, *increase* substantially. At the same time, the physiologic response of the body is to *decrease* blood flow to the brain. This creates a mismatch of supply and demand. When the needs of the brain outstrip the body's ability to supply necessary nutrients, then symptoms of concussion (headache, dizziness, fogginess) increase and recovery is prolonged.

The initial strategy following MTBI is to decrease the metabolic needs of the brain so that as much of the nutrients delivered to the brain may go toward healing and repairing damage. Things that increase blood flow, and work against this, are cognitive activities (reading, thinking, reasoning, watching TV, and playing video games) and physical activities such as exercise.

In most cases, at the initial office visit, the degree of concussion will be assessed by taking a detailed history, performing a series of neurologic tests and undergoing follow-up ImpACT testing. Depending on the degree of impairment seen, a program of cognitive and physical rest may be recommended. In the most extreme cases, this would mean being restricted to bed (or couch) rest, not attending school, not doing homework or even watching TV. In less severe cases, or as things improve, a student may be allowed to attend school (on a limited basis), complete some homework assignments, and go for leisurely walks.

Once cognitive work does not cause symptoms such as headaches and dizziness and ImPACT testing has returned to normal then the concussed individual may begin a stepwise return to physical activity with the goal of safely returning to practice and then play. The usual progression back to activity is as follows:

- Step 1: Aerobic activity (such as riding stationary bike)
- Step 2: Sports related exercise (running, throwing/catching ball)
- Step 3: Sports specific drills (non-contact)
- Step 4: Full contact practice
- Step 5: Game play

The athlete cannot progress faster than one step per day. If moving to the next step elicits further symptoms, then the individual must return to the prior level for at least a day before attempting the next level of activity again.

The average concussion takes approximately 7-10 days to clear before the athlete then can begin the stepwise return to activity protocol. Some MTBI's take much longer to resolve, however. The length of time to recovery can depend on the concussed individual's compliance with the initial "brain rest" program. As mentioned earlier, increasing the brain's metabolic needs during this phase can increase symptoms, prolong recovery, and potentially worsen long term outcome.

With increased awareness regarding the seriousness of concussion in the adolescent athlete, schools and coaches are generally very understanding regarding the need for modified academic and athletic schedules. The office would be happy to provide you with letters outlining a recommended academic and physical activity plan to help minimize recovery time and improve outcome.

--Be Well

Drew Nash, M.D.