**Concussion**

**Definition**: From *Merriam-Webster's Collegiate(R) Dictionary*

(14c) **1 a** : a stunning, damaging, or shattering effect from a hard blow; esp : a jarring injury of the brain resulting in disturbance of cerebral function

**2**: a hard blow or collision

*con•cus•sive* \-kə-siv\ adj

**Summary Article: Concussion**

From *Gale Encyclopedia of Children's Health: Infancy Through Adolescence*

**Definition**

Concussion is a trauma-induced change in mental status, with confusion and amnesia, and with or without a brief loss of consciousness. Concussion is also called traumatic brain injury.

**Description**

A concussion occurs when the head hits or is hit by an object, or when the brain is jarred against the skull, with sufficient force to cause temporary loss of function in the higher centers of the brain. The injured person may remain conscious or lose consciousness briefly, and is disoriented for some minutes after the blow.

While a concussion usually resolves on its own without lasting effect, it can set the stage for a much more serious condition. “Second impact syndrome” occurs when a person with a concussion, even a very mild one, suffers a second blow before fully recovering from the first. The brain swelling and increased intracranial pressure that can result is potentially fatal.

**Demographics**

The incidence of concussion is estimated to be 2 per 1,000 individuals per year in the United States. Most of these concussions are mild, but about 10% cause disability or death. Statistics collected by the Centers for Disease Control and Prevention (CDC) show that between 2002 and 2010, about 2.5 million people suffered a concussion or other traumatic brain injury severe enough to require a trip to the emergency room or other healthcare provider. Of this number, about 91 per 100,000 individuals required hospitalization.

**Causes and symptoms**

**Causes**

Playing contact sports is a risk factor for experiencing one or more concussions. According to the CDC, approximately 300,000 people sustain mild to moderate sports-related brain injuries each year. However, sports-related concussions are widely underreported because athletes do not want to be medically disqualified from continuing to play. Most sports-related brain injuries occur in young men between the ages of 16 and 25 years.

The risk of concussion from football is extremely high, especially at the high school level. Studies show that approximately 1 in 5 players suffers concussion or more serious brain injury during their brief high-
Concussion and lasting brain damage is an especially significant risk for boxers, since the goal of the sport is, in fact, to deliver a concussion to the opponent. For this reason, the American Academy of Neurology has called for a ban on boxing. Repeated concussions over months or years can cause cumulative head injury. The cumulative brain injuries suffered by most boxers can lead to permanent brain damage. Multiple blows to the head can cause “punch-drunk” syndrome or dementia pugilistica, as evidenced by Muhammad Ali, whose parkinsonism is a result of his career in the ring.

Falls account for the greatest number of concussions in children ages 0–4 years and in people over age 65. Individuals over age 75 have the greatest rate of hospitalization and death from concussions.

Motor vehicle accidents are most likely to cause concussions that result in death. The death rate from motor vehicle concussions is highest in males ages 20–24 years. In motor vehicle accidents, concussion can occur without an actual blow to the head. Instead, concussion occurs because the skull suddenly decelerates or stops, which causes the brain to be jarred against the skull.

Child abuse is, unfortunately, another common cause of concussion.

**Symptoms**

Symptoms of concussion include the following:

- headache
- disorientation as to time, date, or place
- confusion
- dizziness
- vacant stare or confused expression
- incoherent or incomprehensible speech
- incoordination or weakness
- amnesia for the events immediately preceding the blow
- nausea or vomiting
- double vision
- ringing in the ears

These symptoms may last from several minutes to several hours. More severe or longer-lasting symptoms may indicate more severe brain injury. The person with a concussion may or may not lose consciousness from the blow. More prolonged unconsciousness indicates more severe brain injury.

The severity of concussion is graded on a three-point scale, used as a basis for treatment decisions:

- grade 1: no loss of consciousness, transient confusion, and other symptoms that resolve within 15 minutes
grade 2: no loss of consciousness, transient confusion, and other symptoms that require more than 15 minutes to resolve

grade 3: loss of consciousness for any period

Days or weeks after the accident, the person may show symptoms of a condition called post-concussion syndrome, which has the following signs:

- headache
- poor attention and concentration
- memory difficulties
- anxiety
- depression
- sleep disturbances
- light and noise intolerance

**Diagnosis**

**Examination**

It is very important for those attending a person with concussion to pay close attention to the person's symptoms and progression immediately after the accident. The duration of unconsciousness and degree of confusion are important indicators of the severity of the injury and help guide the diagnostic process and treatment decisions.

A doctor, nurse, or emergency medical technician may make an immediate assessment based on the severity of the symptoms; a neurologic exam of the pupils, coordination, and sensation; and brief tests of orientation, memory, and concentration. Those with very mild concussions may not need to be hospitalized or undergo expensive diagnostic testing.

**Tests**

Questionable or more severe cases may require a computed tomography scan (CT) or magnetic resonance imaging (MRI) scans to look for brain injury. More extensive neuropsychological testing may be done, especially on athletes who are at risk for repeat concussions.

**Treatment**

The symptoms of concussion usually clear quickly and without lasting effect, if no further injury is sustained during the healing process. Guidelines for returning to sports activities are based on the severity of the concussion.

A grade 1 concussion can usually be treated with rest and continued observation. The person may return to sports activities that same day, but only after examination by a trained professional, and after all symptoms have completely resolved. If the person sustains a second concussion of any severity that same day, he or she should not be allowed to continue contact sports until he or she has been symptom-free, during both rest and activity, for one week.

A person with a grade 2 concussion must discontinue sports activity for the day, should be evaluated...
by a trained professional, and should be observed closely throughout the day to make sure that all symptoms have completely cleared. Worsening of symptoms, or continuation of any symptoms beyond one week, indicates the need for a CT or MRI scan. Return to contact sports should only occur after one week with no symptoms, both at rest and during activity, and following examination by a physician. Following a second grade 2 concussion, the person should remain symptom-free for two weeks before resuming contact sports.

**KEY TERMS**

**Amnesia**—
A loss of memory that may be caused by brain injury, such as concussion.

**Parkinsonism**—
A neurological disorder that includes a fine tremor, muscular weakness and rigidity, and an altered way of walking.

A person with a grade 3 concussion (involving any loss of consciousness, no matter how brief) should be examined by a medical professional either on the scene or in an emergency room. More severe symptoms may warrant a CT or MRI scan, along with a thorough neurological and physical exam. The person should be hospitalized if any abnormalities are found or if confusion persists. Prolonged unconsciousness and worsening symptoms require urgent neurosurgical evaluation or transfer to a trauma center. Following discharge from professional care, the patient is closely monitored for neurological symptoms that may arise or worsen. If headaches or other symptoms worsen or last longer than one week, a CT or MRI scan should be performed. Contact sports are avoided for one week following unconsciousness of only seconds, and for two weeks for unconsciousness of a minute or more.

For someone who has sustained a concussion of any severity, it is critically important that he or she avoid the possibility of another blow to the head until well after all symptoms have cleared to prevent second-impact syndrome. The guidelines are designed to minimize the risk of this syndrome. A person receiving a second grade 3 concussion should avoid contact sports for at least a month after all symptoms have cleared, and then only with the approval of a physician. If signs of brain swelling or bleeding are seen on a CT or MRI scan, the athlete should not return to the sport for the rest of the season, or indefinitely.

**Prognosis**

About 90% of concussions leave no lasting neurological problems. Nonetheless, symptoms of post-concussion syndrome may last for weeks or even months.

Studies of concussion in contact sports have shown that the risk of sustaining a second concussion is even greater than it was for the first if the person continues to engage in the sport.

**QUESTIONS TO ASK YOUR DOCTOR**

- Do I have to restrict any of my daily activities after the concussion?
Prevention
Many cases of concussion can be prevented by using appropriate protective equipment. This includes seat belts and air bags in automobiles, and helmets in all contact sports. Helmets should also be worn when bicycling, skiing, skateboarding, or horseback riding. Soccer players should avoid heading the ball when it is kicked at high velocity from close range. Playground equipment should be underlaid with soft material, either sand or special matting.

Parental concerns
The value of high-contact sports such as boxing, football, or hockey should be weighed against the high risk of brain injury during a young person's participation in the sport. Steering a child's general enthusiasm for sports into activities less apt to produce head impacts may reduce the likelihood of brain injury. Children participating in any contact sport or activity that can cause brain injury should always wear the appropriate protective equipment, including helmet.

See also Head injury; Sports; Sports injuries.

Resources

BOOKS


WEBSITES


ORGANIZATIONS

APA

Chicago

Harvard

MLA