Head Injury in Cycling

Sean Crandell, SPT, ATC from Chatham University

- -

Disclaimer: This is not medical advice. If you crash and hit your head, use your best judgment and seek out further medical attention.

In this article I will be going over the types of head injuries cyclists can sustain and how to decide what further care is needed. Sometimes people crash and hit their head. Unlike road rash or a broken bone, potential injuries to the brain can be more difficult to recognize. Hopefully this article will help you form a plan and keep fellow cyclists safe in the event of a crash.

Head Injury in Cycling

Unfortunately, head trauma isn't entirely avoidable in cycling. Helmets play a key role in protecting us from severe brain injury, but may not be as resistant against concussive forces. One study suggests that those who wear helmets are more likely to get a concussion than those who don't [1]. Those who wear helmets may be more likely to take risks due to a raised sense of security, or those of us in helmets are involved in more high-risk riding that "requires" a helmet (racing vs commuting).

Bicycle racing is unique in that you can't stop the action or substitute a player out while a rider gets evaluated. This pressures a cyclist to get back on the bike quick so the peloton doesn't ride away. As such, injuries are often downplayed or go unnoticed. Thankfully, from an outsider's perspective, professional cycling is attempting to address this issue, thus increasing awareness. An article by bicycling.com gave a good inside look into how a pro team, Cannondale Drapac, deals with head injuries during a race [2].

Cycling News

What to do when a fellow rider crashes

Sadly, unlike the pros, most cyclists don't have a physician following them around in a team car. Therefore, the big question is: what do you do when someone crashes and you're worried about a head injury?

Step 1: Basic First Aid

The first step is to assess consciousness. If they're unresponsive, have someone immediately call 911. Secondly, check their pulse and make sure they are breathing. If they have no pulse, initiate CPR. Additionally, if there is profuse bleeding it's important to control it via compression.

If they are responsive but still lying on the ground, have them remain still. Ask them if any part of their body is hurting and do a quick "up-down" to make sure no injury needs immediate attention. If their neck/back is hurting or have numbness, tingling, or weakness of the extremities, make certain their neck and body remains still. Call 911.

Step 2: Determine if they hit their head

If they are responsive, able to stand on their own, walk on their own and there are no other major injuries, you can do a little more detective work. You should inspect their helmet, face and head for any indication of making contact with the ground. Modern cycling helmets are built to absorb shock by breaking in different places, so cracks are often present. Any cuts or wounds on the face are a clear indicator that their head hit the ground.

Virginia Bicycling Federation

Step 3: Is there a brain bleed?

Use the following signs to determine if a more severe brain injury may be present. These signs should be monitored over the next 48 hrs. If signs of severe brain injury arise, immediately go to a hospital ER or call 911. If you're unsure, it's better to play it safe and seek medical attention.

Table 1: Red flags requiring emergent medical attention (ER or 911)

Unconscious/unresponsive

Not oriented: gets any of the following questions incorrect

- What is your name?
- Where are we?
- What day of the week is it?
- What year is it?

Deteriorating mental status: This is where knowing the person well can be really helpful. Relevant signs include changes in mood, lethargy or atypical behavior.

Potential spinal injury: neck/back pain, and they cannot walk or stand up on their own (in this case don't get them up)

Progressive, worsening or new neurological symptoms

- Headache that gets worse
- Very drowsy or can't be awakened
- Unable to recognize people or places
- Repeated vomiting
- Confused or irritable
- Seizures
- Weak or numb arms or legs
- Unsteady on their feet
- Slurred speech

I don't think I have a brain bleed but something doesn't feel right

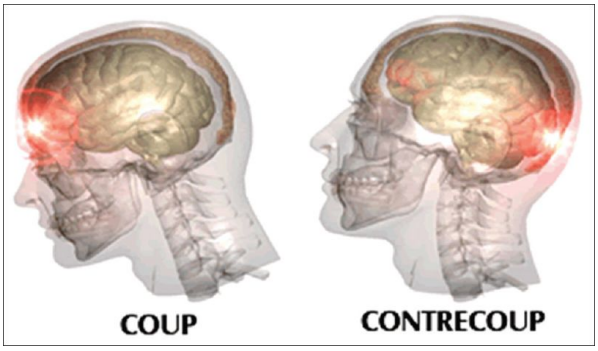
Thankfully, the vast majority of head injuries aren't going to require urgent medical attention. If there's any suspicion of a head injury, the rider should cease activity until cleared by a medical professional. Below are the top ten most common (but not exhaustive) symptoms experienced by those with a sports-related concussion. The onset of these symptoms can appear gradually over time. If you crash and then start to experience these symptoms later in the day or week, that's a good indication to seek out a concussion clinic in your area.

Table 2: Most common symptoms experienced with sports-related concussion [3].

#	Symptom	% of Athletes With Concussion
1	Headache	75%
2	Difficulty concentrating	57%
3	Fatigue	52%
4	Drowsiness	51%
5	Dizziness	49%
6	Foggy	47%
7	Feeling slowed down	46%
8	Light sensitivity	45%
9	Balance problems	39%
10	Difficulty with memory	38%

What is a concussion?

“A concussion is a type of traumatic brain injury (TBI) caused by forces from a bump, blow, or jolt to the head that disrupt normal brain functioning” [3]. Interestingly, the initial impact isn’t what’s most damaging, but rather the brain “sloshing” around, called coup contrecoup. Think of your head like an egg. Like a yoke, the brain is suspended in fluid (egg white) and encapsulated by the skull (egg shell). It has some room to move around. When the skull hits an immovable object, it stops suddenly while the brain continues to move due to inertia. As a result, the brain impacts the skull in multiple places, not just the site of initial impact. This is why helmets can help prevent serious injury, like skull fractures, but still have difficulty preventing concussions.



archtrauma.com

Concussions are best described as an energy crisis. The forces sustained when you hit your head disrupt cell function in the brain, causing increased energy use while simultaneously decreasing blood flow (nutrient delivery) [3]. As such, the cells in your brain are working on overdrive without appropriate energy replenishment, resulting in suboptimal function. This suboptimal function is manifested as the symptoms listed in Table 2.

Who do you see and what can they do for you?

Ok, so let's say you notice some of the symptoms from Table 2 coming on. Who should you see? The best possible place is a concussion clinic. These clinics use a team approach, giving you access to a variety of experts depending upon the symptoms and condition you present. Concussion clinics, however, aren't always accessible. Therefore, if you can't get to one, visit your primary care provider and they should be able to direct your care.

I'm going to use the University of Pittsburgh Medical Center's (UPMC) model for concussion care as it's what I'm most familiar with (not an ad) [4]. The first person you will see is a neuropsychologist. They'll perform a thorough history and a variety of clinical tests. Concussions can impact numerous systems in the brain. As such, one person with a concussion may present differently from another. It is the neuropsychologist's job to determine the health care professionals who can serve you best. Table 3 introduces the different roles within a concussion team.

Table 3: Healthcare practitioners and their role in concussion care

Healthcare practitioner	What they do
Neuropsychologists	This is the first person you will probably deal with during your care. Neuropsychologists are the ones who determine what your symptoms and impairments are, along with the best person to treat them.
Vestibular Physical Therapy	The function of your inner ear is to detect head movement. Sometimes this can get thrown out of whack, causing visual problems and dizziness. Physical therapy is a great resource to help deal with these kinds of symptoms.
Exertional Physical Therapy	Before getting back into full participation, you'll probably have to go through exertional physical therapy. This is where you gradually increase the intensity of your exercise while keeping a close eye on symptoms.
Primary Care Sports Medicine	You'll be referred to these guys if you need medical

and Physical Medicine and Rehabilitation	management for symptoms such as difficulty sleeping, headaches or anxiety.
Behavioral Neuro-Optometry	Visual problems are a frequent consequence of concussion. Behavioral Neuro-Optometrists address these impairments through computer and optical devices.
Orthopaedic/Neurosurgery	Neck issues and headaches can accompany concussions. Surgery isn't on the agenda, but these guys know their stuff about the affected structure.
Neuroradiology	Sometimes if symptoms continue to get worse, more imaging may be done to get a different look at what's going on.

When is it ok to return to cycling?

Everyone wants to know when they'll be back to sport. My best answer is that it depends. Some concussions take longer than others and are defined by its symptoms. That being said, "studies show that spontaneous recovery occurs within 10 to 21 days for 80% to 90% of athletes following sports-related concussion" [3]. Table 4 below outlines the return to play sequence for athletes. The graduated return to play protocol would likely be carried out by an exertional physical therapist. This entails increasing your exercise intensity while monitoring symptoms. Ultimately you would need to be cleared by the neuropsychologist if they were your initial point of contact.

Table 4: Return to play for athletes [3]

- Athlete should immediately be removed from play when a concussion is suspected
- Athletes shouldn't return to play the same day as a suspected concussion
- Prior to full participation, athletes should be symptom-free and not taking medication that may be modifying concussion symptoms
- Prior to full return, athletes should participate in a graduated return to play protocol, where no return of symptoms occur

Summary

Crashing is unfortunately part of the sport of cycling. Despite a helmet's ability to reduce the risk of severe brain injury, it can't prevent concussions. It's important to have a plan of action when a fellow rider crashes. This plan of action should follow basic steps of first aid and address life threatening injuries first. If the cyclist doesn't present with any major injuries, keep an eye on symptoms and irregular behaviors to determine if they might have a more severe brain injury or

a concussion. If a severe brain injury is suspected, immediately go to the ER or call 911. If a concussion is even remotely suspected, cease all activity and seek out a concussion clinic. They will provide you with a team approach and a safe return to sport. Hopefully we all can keep it rubber side down, but in the event of a crash, I hope this article can help you with your decision making. Ultimately, when in doubt, get medical help sooner rather than later.

Sources

1. Helmich, Ingo et al. “Not just contact sports: significant numbers of sports-related concussions in cycling.” *Journal of Sports Medicine and Physical Fitness,* March 2019.

2. https://www.bicycling.com/racing/a20041864/does-pro-cycling-have-a-concussion-problem/

3. Mucha, Anne, and Troutman, Cara. “Concussion: a Clinical Summary.” *American Physical Therapy Association,* January 30, 2015.

<https://www.ptnow.org/clinical-summaries-detail/concussion-3>

4.http://rethinkconcussions.upmc.com/2016/10/team-approach-concussion-program/?gclid=Cj0KCQjwkIzlBRDzARIsABgXqV9RhUtTLZhL2Hrt3omu5olG0u61XXrZ0PgvUbBXHDm0kKMtQqqGBCgaAr0IEALw_wcB&gclsrc=aw.ds