

CONCUSSIONS IN FOOTBALL, WHAT THEY ARE, HOW
THEY CAN BE PREVENTED, AND WHEN IT'S SAFE TO
PLAY AGAIN

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TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
1. Introduction	3
2. Defining and Recognizing Concussions	4
3. Prevention of Concussions.	8
4. Returning to the Field.	12
5. Conclusion	15
Bibliography.	17

CHAPTER 1

Football, by its very nature, is a rough sport. The human body was not really constructed for collision and impact, and yet this fall, every week from mid-August until at least mid-November, young men (and the occasional young woman) will hurl themselves together in that frantic time between the snap of the football and the shriek of the whistle.

Most of them will take an impact to the skull at some point in the season. Almost all of them will leap to their feet and run back to the huddle. Some of them will not even realize that they were hit hard enough to jar their brains into the bones of their cranium. Brain injuries are so difficult to diagnose and treat that few coaches and fewer parents are prepared to cope with the enormous risk to the player that they present. In football, the most prevalent of these injuries is the concussion.

In his article for the Mom's Team website, Dr. Robert C. Cantu, MD, presents one of the major issues facing coaches, athletes, parents, and medical personnel alike. Dr. Cantu phrases the problem very eloquently, "No consensus has developed in the medical community on either the definition and grading of concussions or when it is safe for an athlete to return to play, as evidenced by the different guidelines that have been proposed." (2) If the medical community cannot come to accord on the proper treatment of a concussion, we cannot reasonably expect an untrained youth football coach and his staff to do so.

This paper will attempt to provide a set of clear-cut guidelines for concussion safety at the youth level, and will focus on three specific issues for the youth football coach: 1. Preventing concussions, 2. Recognizing the symptoms of a concussion, and 3. Returning an athlete to the field after concussion recovery.

CHAPTER 2

“A concussion is a violent jarring or shaking of the head that results in a disturbance of brain function.” (6)

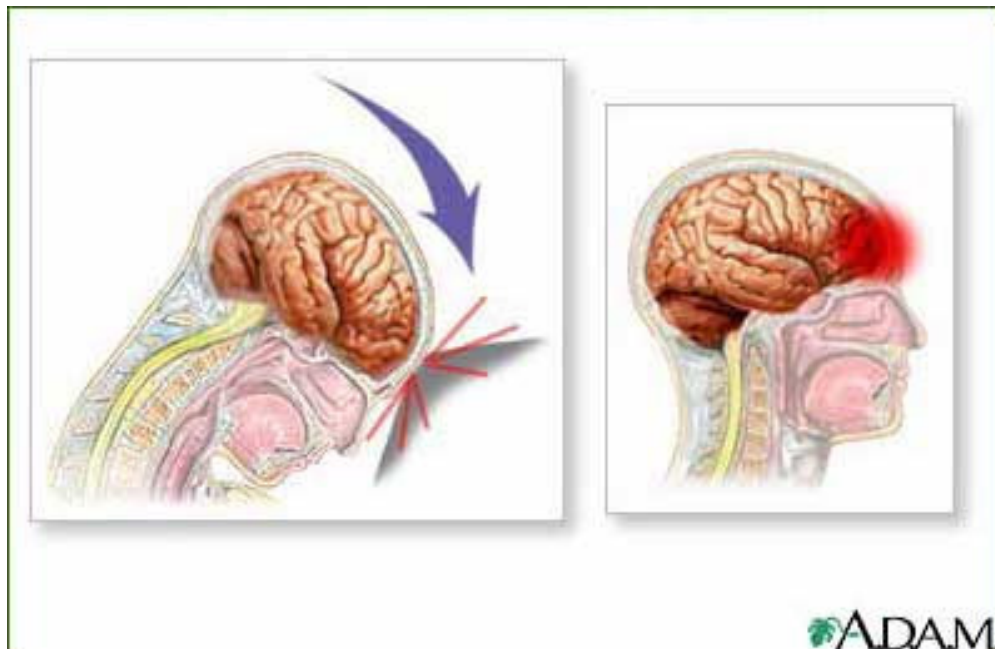


Figure 1: “A concussion occurs when a violent impact causes a disturbance of brain function. Most concussions do not cause loss of consciousness.”(4)

I discovered the true meaning of a concussion for the first time as a third grader on the playground of Brigadoon Elementary, in Federal Way, Washington in 1982. While leaping from the monkey bars, my foot got caught, and the last thing I remember was the ground coming towards my face at rapid speed. I returned to class at the end of recess, thanks largely to the assistance provided by one of my friends, but I have only the most vague memories of the next hour or so.

My teacher finally sent me to the office, where the school secretary called my grandmother. My next recollection is of the hospital emergency room, and an orderly holding a pan under my jaw so I could heave the contents of my stomach into it. While I presented this charming spectacle, he calmly explained to my mother that the nausea was a common symptom of concussions.

This was the first concussion I suffered; indeed, it was the first time I ever heard the word in that context. Unfortunately, it wasn't to be the last. I endured a second severe concussion in 1985, as a seventh grade wrestler at Sumner Junior High School, and additional ones in 1988 and 1992 in competition martial arts.

According to Dr. Mark Graber, MD, Concussions are normally graded on a three-point scale, with one being the mildest, and three being the most severe. (5) Figure 2 shows this scale.

Grade 1	Transient confusion, no loss of consciousness, and a duration of mental status abnormalities of <15 minutes.
Grade 2	Transient confusion, no loss of consciousness, and a duration of mental status abnormalities of >15 minutes.
Grade 3	Loss of consciousness, either brief (seconds) or prolonged (minutes or longer).

Figure 2 Concussion Grading

“The acute symptoms of concussion have been examined in prospective studies. The only validated symptoms are amnesia, loss of consciousness, headache, dizziness, blurred vision, attentional deficit, and nausea. Headache, of course, is not confined to concussion--up to 50% of athletes report exercise-related headaches.” (7)

Judging by the lack of awareness, loss of consciousness, vision problems, and other symptoms of the concussions I suffered, it is likely that at least three, and probably all four of the concussions I endured through school were grade three.

I walked a football field as a player from 1985 through 1990. As a seventh grader, my physical size was not a detriment. I stood five foot two inches tall, and weighed in at

90 pounds. Unfortunately, by my junior year in high school I had gained merely two inches in height and twenty pounds in mass. It did not take me long to discover that being that small on a football field isn't a lot of fun. My sophomore year alone I knocked myself unconscious three times making tackles, twice in one practice. According to Doctor Graber's scale, those are also classified as grade three concussions, although I awoke with no further ill effects other than a headache.

Recognizing concussions in your players is a vital and necessary part of treating them effectively. It must start with the players themselves, who must have at least a basic understanding of concussion symptoms and be able to recognize them in their teammates as well as themselves. "Most serious head injuries in college football are never reported to team trainers or coaches because the players don't think their symptoms are severe enough to indicate a concussion, according to a new Indiana State University study." (10)

Each coach on your staff should also be properly trained in both First Aid and CPR. The National Safety Council's *First Aid Handbook* gives excellent advice on treating concussions that have been graded using the scale above:

Grade One: *Remove from activity. Examine immediately and every 5 minutes for dizziness, ringing sound in ears, and loss of memory. Can return to activity if amnesia does not appear and no other symptoms appear for at least 20 minutes.*

Grade Two: *Remove from activity and do not allow to return. Physician should examine frequently. Physician should reexamine the following day. Return to activity after one full week without symptoms.*

Grade Three: *Transport to nearest hospital by ambulance (with spine stabilized). Physician performs thorough neurological evaluation. May be admitted to hospital. If findings are normal, physician will instruct family or friend about overnight observation. Return to activity only after two full weeks without symptoms. (8)*

On my team, *all* suspected concussions are assumed to be Grade Two until determined otherwise. To the distress of my players, this means the sufferer is

immediately removed from contact, and will not return until asymptomatic for one full week. I also recommend following the advice of *The Merck Manual*: “Patients with concussion should be closely followed for [twenty-four hours]. If a CT scan shows no evidence of intracranial bleeding or displaced fractures and the patient is neurologically intact, hospitalization is not needed. Skull x-rays are useless for making this decision.”(11)

Any player diagnosed with a confirmed Grade Three concussion is finished for the season. I love football, but I love my players more. Taking a season’s games from them is an almost physical pain to me, but it is nothing compared to the guilt I would experience if I allowed them to return to the field before they were fully healed and they were badly injured as a result.

Concussions, and the corresponding permanent and semi-permanent damage they force the victim to endure, are simply too risky to handle in any other manner. All competent football coaches should have a specific concussion policy in place that follows the guidelines listed above, and this policy should never, under any circumstances, be deviated from.

CHAPTER 3

In the years since the end of my playing days, I have been fortunate to coach football at both the youth and high school levels. Luckily, I have never had a severe or life-threatening injury on the practice field as a coach, and only one ankle dislocation on the game field. There have been no significant head injuries on my football fields, and I attribute a large part of this extraordinary success to the training tips I have received from such stellar coaches as John T. Reed and Hugh Wyatt.

Coach Wyatt, in particular, has been a force for proper tackling and following the American Football Coaches' Association guidelines to keep the head out of football. His videotape, *Safer and Surer Tackling*, is a must have for any competent football coach. His tackling system advocates the following crucial steps for proper tackling:

1. Hit
2. Fit
3. Lock
4. Lift
5. Drive (12)

In short form, *Hit* is the initial contact position, which is an eyes-up, chest-to-chest impact with the ball carrier. *Fit* is the continuation of the first step, striking upward through the ball carrier's body and keeping the head up in a position called "Eyes to the Sky." *Lock* is the wrap up, throwing the arms around the ball carrier in an upward motion from the tackler's hips to the ball carrier's shoulders. I call this movement "gunslinging" because it looks like a Wild West gunfighter drawing his pistols. This aids in the fourth step, *Lift*, which is the driving, upward force of the arm motion added to the inward and rising hip movement designed to break the ball carrier's balance and contact with the ground.

The tackle is finished by execution of the fifth step, *Drive*, which is the rapid footwork necessary to maintain forward momentum against the ball carrier's progress. (12)

The most important portion of this tackling procedure is the initial step, which, when coached correctly, places primary contact on the tackler's chest, and completely eliminates any form of collision with the helmet. In fact, Wyatt advocates an "our numbers to their numbers" body position. (12)

All coaches must remember that the helmet is not a weapon. The Encyclopedia of Sports Science has this to say on the subject:

Because football is a collision sport that requires a player to keep a low center of gravity, his head is usually extended in front of his body. Players and coaches have long understood the vulnerability of the head and neck to injury and the vital need for headgear. The first headgear was the lightweight leather skullcap developed in 1896. Like the headgear used in boxing today, skullcaps provided only modest head protection. Consequently, a player avoided using his head to tackle unless absolutely necessary.

Because the advanced, hard-shell helmets of the 1990's give players a sense of security (perhaps false), some players may risk leading their tackles with the head. (13)

The text goes on to state that the number one step that should be taken to prevent head injuries is to use a properly fitting helmet that does not have stress points, which are areas of tightness.

This is a significant problem at the very lowest levels of youth football, mitigated solely by the low speeds and lack of collision mass in the players themselves. Many children in the 6-7 or even 8-9 year-old age groups are outfitted every year in helmets and shoulder pads that are far too large for them. Parents are sometimes to blame when they purchase their child's own equipment. Young children grow so fast that parents may want

to buy a helmet their child can “grow into.” This is an unsafe practice. A far better decision would be to purchase a helmet with an adjustable, inflatable liner that can fit a range of sizes, or simply use gear provided by the team or organization that has been properly inspected and sized to the player.

Inspecting for size and damage should be done on a weekly basis to make certain that the players are still adequately protected by their gear. Never allow a player to participate in contact with incorrectly fitting or damaged equipment.

Properly outfitting the player is only the beginning of concussion safety. A player can reduce his risk of injury by spending a significant amount of his training time during the season and off-season strengthening the neck muscles and improving their flexibility. This allows the neck to flex without straining and ablate the impact of a blow to the cranium.

Finally, a player absolutely must practice using proper technique in both tackling and blocking, *at all times*. He must *never* lower his head at the moment of impact. New York Jets defensive lineman Dennis Byrd made this crucial error during the 1992 season, and received a crippling spinal injury that he has still not recovered from. (13)

Above all it is absolutely imperative to follow the AFCA recommendation to “Keep the helmet out of hitting.” (1)

No helmet can completely eliminate all cranial injuries, unfortunately, so it is up to the competent coach to make absolutely certain that football players never, *ever* make contact with any portion of the helmet, which includes the facemask, whether blocking or tackling.

Helmet collisions exert two forces upon the brain. The initial impact force occurs when the brain slams forward against the skull, toward the collision point, and a whiplash effect follows as the brain ricochets to the opposite side of the skull, slamming against the skull’s ridges and bone boundaries. While the helmet absorbs impact blows, it can do little to prevent the brain from accelerating within the skull.

The acceleration of the brain within the skull can cause extremely dangerous concussions. In the middle of the 1992 season, Al Toon, an All

Pro New York Jets receiver, retired after suffering his ninth and most severe concussion. Each new concussion came from a lesser blow than the previous one, and recovery time successively increased. Likewise, each new trauma was more debilitating than the last. (13)

This is the hidden danger of the concussion, and it is a fearful one. Each successive concussion is worse than the one before, more easily caused, and more dangerous to the player's health. This condition is referred to as *Second-Impact-Syndrome*, or SIS. "The second blow may be unremarkable, perhaps only involving a blow to the chest rather than the athlete's head, but it sends accelerating forces to the brain." (3)

It should be obvious that the number one way to prevent SIS is to avoid the first concussion. Tackling and blocking, bar none, are the most dangerous techniques in the sport of football because they involve what is usually a high-speed collision with an opponent. Teaching safe and effective contact methods to players that are properly outfitted in the correct, well fitting equipment is absolutely *vital* to protecting players from injuries in general, and concussions in specific.

CHAPTER 4

The nature of football being what it is, at some point in the career of every coach it will be necessary to deal with a concussion received by one of your players. Perhaps worse than the initial fears of permanent disability is the knowledge that you may have to face your player and deny them the privilege of taking the field with their teammates as a result of their injury, even though they may seem perfectly all right.

It is vital to the safety of your players that you be firm in your concussion policy. *The Gale Encyclopedia of Medicine* states that, “Studies show that approximately 1 in 5 players suffer concussion or more serious brain injury during their brief high-school careers.” (9)

To put this into perspective, that means that on a team of twenty-five freshman players, approximately five of them are at significant risk of permanent or semi-permanent disability from brain injury. Reducing or eliminating the number of first impacts at the youth and high school levels of football can considerably lessen the risk of Second-Impact-Syndrome, and the subsequent risk of death or permanent impairment. “Head injury causes more deaths and disability than any other neurologic condition before age 50 and occurs in > 70% of accidents, which are the leading cause of death in men and boys < 35 yr old. Mortality from severe injury approaches 50% and is only modestly reduced by treatment.”(11)

I strongly encourage the following procedures for any football coach at any level of football. Even as high as the semi-professional level, competent medical professionals that are capable of immediately diagnosing and responding to concussion symptoms attend few practices. At the youth levels, it is not uncommon to even see games being played without any form of medical staff present. Therefore it falls to the coach, as always, to protect his players from harm.

1. Research and decide upon a tackling and blocking system that does not involve the use of the helmet in any way as a contact surface—this includes the facemask.
2. Commit to the use of this system—train your staff, managers, assistants, and players in how to teach it and spot potential mistakes.
3. No matter what specific tackling and blocking system you select, teach your players to do so with the head up at all times.
4. Avoid using full-speed tackling drills in practice. (John Gagliardi of St. John's College in Minnesota has never done a full-speed hitting drill in his 52 years of coaching, and recently passed Grambling legend Eddie Robinson as the most successful college coach of all time, with 409 lifetime wins. Full-speed drills are not necessary to teach proper tackling or blocking form.)
5. Learn the proper ways to fit protective padding and helmets to your players. Contact helmet manufacturers like Riddell and Schutt for information on proper helmet fit.
6. Establish weekly equipment checks for your players in which you and your staff examine pads and helmets for any incorrectly fitting items or damages that might prove hazardous.
7. Understand the grading system for concussions provided by the National Safety Council's *First Aid and CPR Handbook*. Use this system any time you suspect one of your players has received a blow to the helmet, or shows any of the signs of concussion, no matter how minor.
8. Always assume a concussion to be Grade Two or worse. Never send a player back into the game or practice after a concussion, and don't let him return to

the field until a competent physician has examined him. Treat even the most minor concussions as life threatening.

9. Keep all players with confirmed Grade Two or Grade One concussions out of action for at least one week. Sideline all confirmed Grade Threes for the season.

It must be fully understood that the minimum recovery time allowed for by this policy is one week, *regardless of the apparent insignificance of the wound*. Brain injuries are simply too dangerous to be treated in any other manner. Speak with the parents and players before the season begins so they understand your policy and can help distinguish the warning signs of any potential concussions.

CHAPTER 5

Football is a rough sport. Some people call it a contact sport, but I would disagree. Contact is made in basketball. Contact is made in wrestling. Football is a sport of collisions, a sport of *impact*. In that frozen, perfect moment between the snap of the ball and the whistle's cry young men and women across this country will learn and display a truly astonishing amount of selflessness, courage, and dedication as they walk the grass of our nation's gridirons this fall.

It is the responsibility of the competent football coach to do his utmost to protect these players from harm. One of the most significant and potentially life threatening injuries consistently received on the football field is the concussion, the violent jarring of the brain into the skull. This hazardous injury can never be completely eliminated from impact-driven sports such as football, hockey, and rugby, but the likelihood of receiving one can be drastically reduced by preventative measures that are the cornerstone of good coaching.

Outfit your players properly in a well-fitting helmet that has been inspected and certified by a helmet refitting company. Be certain that the helmet does not have any tight spots that can chafe or cause impact zones on the head. Make sure the player keeps the helmet's air pockets, if equipped, fully inflated until the helmet is tight upon the skull. Check your players' gear weekly and inspect for damaged or poorly fitting equipment. Youth players grow very rapidly, so this is extremely important.

Teach proper blocking and tackling with an eye towards the safety of your players and their opponents. Keep the head out of football, and make sure that the contact points you teach are not the helmet or facemask. Run your drills at 1/2 to 3/4 speed, and never let the players reach full acceleration prior to impact during practice.

Learn the symptoms of a concussion, and the grades of severity. Remember, every concussion is a Grade Two until diagnosed otherwise by a physician, and the physician can only revise the diagnosis *upwards*, never downwards. Keeping a kid out of contact for one full week sounds like an eternity to the player that thinks he isn't badly hurt, but it is far preferable to a permanent disability. Never gamble with your player's health and safety. We need look no further than Muhammad Ali to see the result of multiple concussions.

Above all, once you establish a concussion treatment policy, never deviate from it. You set it up for a reason: the health and safety of your players, and that never changed.

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