

How a Seemingly Minimal Physical Exam Finding Unveiled a More Serious Condition: A Case Report

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Abstract

Cerebral contusion following a concussion is a severely debilitating and possibly life-threatening condition that is not readily uncovered in American football players. We describe the case of a 16-year-old high school male who presented to a university-based concussion clinic 5 days post helmet-to-helmet collision with symptoms of nighttime headaches, dizziness, and difficulties with concentration and word finding. Neurocognitive evaluation demonstrated decreased visual and verbal memory, along with a very high concussion symptom score on the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT[®]). Physical examination findings revealed lower extremity hyperreflexia with pathologic spread to bilateral knees and Achilles tendons. These focal neurologic signs prompted obtention of brain and cervical spine imaging, which demonstrated a right temporal lobe contusion and multiple cervical disc herniations. This case emphasizes the importance of a thorough neurologic examination. Failure to recognize these critical signs could have resulted in premature or unsafe return to play, ultimately exposing the athlete to the risk of additional trauma. Concussion is primarily diagnosed clinically and therefore imaging is not routinely obtained. Thus, fastidious upper motor neuron testing should be a fundamental component of the standard neurologic examination when evaluating players suspected of having a concussion.

Keywords: Concussion; Contusion; Neurologic; Exam; Symptoms; Headaches; Memory; Hyperreflexia; Imaging; Neuron

Introduction

Each year approximately 300,000 athletes sustain sports-relat-

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ed concussions [1]. With greater than 7 million American high school athletes engaging in sports competition each year, and participation on the rise [2], concussion diagnosis and treatment strategies remain paramount to the safety and well-being of our youth.

The most recent international conference dedicated to the subject of concussion was held in 2012 in Zurich. This conference yielded the Consensus Statement on Concussion and Sport (the Consensus), which is regarded as the authoritative literature of this field. According to the Consensus, a concussion is classified as a subset of mild traumatic brain injury and is defined as a complex pathophysiologic process affecting the brain that is induced by biomechanical forces [3]. It may be a consequence of a direct blow to the head and can cause neuropathological changes. These changes may result in a functional disturbance rather than structural injury, as demonstrated by the lack of abnormalities on most neuroimaging [3]. Symptoms of concussion include headache, cognitive deficits, sleep disturbances, and emotional and behavioral changes [4]. The Consensus explains that 80-90% of people who sustain a concussion will recover within 7 - 10 days [3]. Due to the relatively short duration of recovery, and thus limited time for evaluation, it is crucial for healthcare providers to thoroughly investigate concussions prior to clearing athletes to return to play. Otherwise it could lead to serious, disabling sequelae, such as failing to recognize a brain contusion.

Although in the current medical literature cerebral contusions are not strongly correlated with concussion, they both can occur as a result of head injury. Contusion, which is a bruise of the brain tissue, occurs in 20-30% of severe head injuries, and may result from a coup or contrecoup injury. Nearly 30% of contusions exhibit additional sequelae including brain swelling and mass effect, all of which can be obtained on neuroimaging. Elevated intracranial pressure from an expanding contusion and subsequent brainstem compression can ultimately result in death [5].

We report the case of a concussed high school athlete in which an abnormal neurological finding on physical exam unveiled the more serious diagnosis of a brain contusion.

Case Report

A 16-year-old male, with a 6-year history of playing tackle

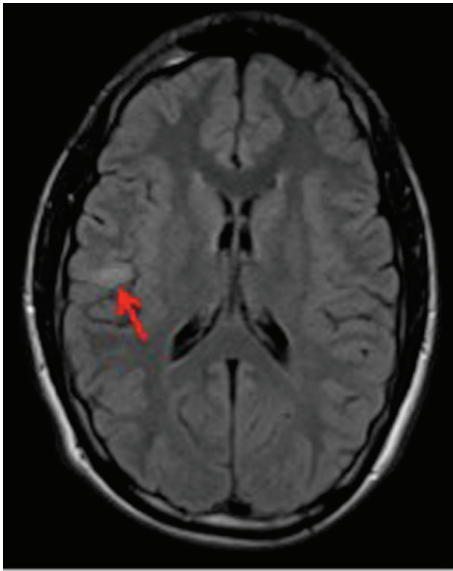


Figure 1. Axial T2 FLAIR-weighted brain MRI.



Figure 2. Sagittal T2-weighted cervical MRI.

football and no prior reported concussions, was involved in a helmet-to-helmet head-on collision in a high school football game. He reported a few seconds of loss of consciousness and then was able to walk off the field. Field tests were performed on the sideline and found the patient to be disoriented and confused. The ImPACT[®] performed soon after the injury had significant reduction in verbal and visual memory when compared to the athlete's preseason baseline scores. According to the ImPACT[®] technical manual, his post-concussive symptom score of 26 placed him in the highest classification of symptoms for high school boys [6]. The patient was held out of school until a medical professional could further evaluate him.

Five days post injury the patient was evaluated by a neurologist. He experienced symptoms of nighttime headaches, dizziness provoked by position changes, and word-finding difficulty. Cognitive evaluation demonstrated mildly impaired short-term memory and decreased psychomotor speeds of processing, complex attention, and executive functions. Provocative testing exposed vestibular signs, which worsened when he turned his eyes and head to the left. Lower extremity deep tendon reflex testing revealed hyperreflexia with pathologic spread to bilateral knees and Achilles tendons. These upper motor neuron signs prompted clinicians to obtain magnetic resonance imaging (MRI) of the brain and cervical spine. The patient was held out of school and instructed not to return to play until further evaluation was undertaken.

Eleven days post injury, his symptoms of headache and dizziness persisted, although they were slightly less severe. The brain MRI demonstrated an area of increased FLAIR signal at the right lateral temporal lobe, which was suggestive of a brain contusion (Fig. 1). Cervical spine MRI revealed a bulging disc at C4-C5, a herniated disc at C5-C6, and chronic disc desiccation and degenerative changes (Fig. 2). The patient has no family history of disc disease. Management included cognitive and physical rest. The patient was counseled not to participate in contact sports for the rest of the season and was

referred to a sports medicine neurosurgeon.

Discussion

“The Centers for Disease Control estimates that 1.6 to 3.8 million concussions occur in sports and recreational activities annually” [7]. Due to the high incidence of concussion in sport, identifying cases that have potentially severe complications is vital for the safety and future of athletes. This case highlights how a simple neurological examination by a licensed physician uncovered a more serious brain contusion in a concussed athlete. Thus, we may consider having a lower threshold in performing focal neurological examinations in conjunction with ordering imaging studies in concussed athletes, since epidemiologic data suggest that 20-30% of patients that suffer severe head trauma also have cerebral contusions [5].

There is a plethora of literature exhibiting that over the past several decades the capacity of clinicians to perform a comprehensive history and physical examination has become a lost art. This can be attributed to time constraints, technological advances, and decreased self-confidence in clinical exam skills [8]. It also remains challenging for healthcare providers to predict which concussed patients will have abnormalities on imaging [9], making the physical evaluation of the athlete that much more important in uncovering avoidable, severely debilitating, and possibly life-threatening conditions. If our patient had returned to play prematurely and sustained another head injury, it may have resulted in second impact syndrome, a serious condition that can manifest as diffuse cerebral swelling, brain herniation, and ultimately, even death [10].

Legislation and mandated laws across the United States have started to address safe return to play issues. One such case, in which a 13-year-old boy suffered permanent brain damage after being cleared to play too soon, prompted legislative action in the state of Washington [11]. It is reasonable to

assume that more states are addressing this issue as it comes to the forefront. In addition, according to the Consensus, when concussion symptoms occur during sports competition, protocol requires a licensed healthcare provider to assess the injury [3]. Our case demonstrates that safety should also require policy for a focused neurological examination to be completed before clearing to “return to play”. The difference of only a few additional minutes between a neurological examination and one of unquestioning meticulousness could mean the difference between life and death for the athlete. Our case undoubtedly demonstrates how upper motor neuron findings on neurologic examination, which uncovered a cerebral contusion, preempted an unsafe situation to return to play.

Conflicts of Interest

There are no conflicts of interest, case was submitted as a poster presentation only to the AMSSM 2015 conference.

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