

Acute Subdural Hematoma

Potential Soccer Injury in an Otherwise Healthy Child

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Abstract: A 16-year-old adolescent boy presented with headache, dizziness, loss of consciousness, and a tonic-clonic seizure after heading a soccer ball in a competitive match. A computed tomographic scan of the head revealed an acute subdural hematoma with a mass effect. The patient was emergently referred to a tertiary care facility where he eventually recovered completely with conservative care. No predisposing medical conditions were found. To the best of our knowledge, this is the first report of an intracranial hemorrhage secondary to the heading of a soccer ball alone in an otherwise healthy child without any underlying predisposing central nervous system abnormalities.

Key Words: soccer, sports injuries, subdural hematoma

(*Pediatr Emer Care* 2009;25: 582–583)

CASE

A 16-year-old male high school student was transferred to the emergency department after passing out on the soccer field after heading a soccer ball in a high school soccer match. During a goal kick, the patient blocked the ball with the front of his head. He denied any contact with other players during the match, and he continued to play until moments later when he felt dizzy and developed a headache. He left the field, and while resting at the bench, he lost consciousness for about 30 seconds. Upon arrival of medical personnel, the boy was awake and responsive, with normal vital signs. During ambulance transport to the local emergency department, he developed a tonic-clonic seizure that resolved spontaneously within a minute. Computed tomographic (CT) images of the head (Fig. 1) revealed an acute subdural hemorrhage with a 3- to 4-mm midline shift without sign of skull fracture. A CT scan of the cervical spine was normal. The patient was referred to our tertiary care facility for pediatric neurosurgical and neurological consultations. In the pediatric intensive care unit, the patient was treated prophylactically with anti-convulsants. Serial CT scans over the next 2 days after injury revealed a stable and then resolving mass effect of the hemorrhage. A magnetic resonance imaging study showed a 3-mm midline shift and no congenital or other potentially explanatory lesion that would predispose to a bleed. The patient's nausea, vomiting, headaches, and right leg parathesias improved, and he was discharged home on levetiracetam and activity restrictions on posttrauma day 3.

A follow-up CT scan 2 weeks later showed a resolved subdural hemorrhage. An electroencephalogram was normal, and the levetiracetam was discontinued a month later. Magnetic resonance angiography and venography done after 4 months

identified no abnormalities. A magnetic resonance imaging at that time displayed a miniscule signal abnormality in the right frontal lobe (opposite the hemorrhage) that most likely represented a small capillary telangiectasia or cavernous angioma, conditions highly unlikely to be associated with the subdural bleed. The patient was encouraged to resume full activities but was cautioned that participating in any sports places him at risk of further traumatic brain injury with the potential for permanent neurologic sequelae.

DISCUSSION

Soccer is an increasingly popular sport among children in the United States. Worldwide, there are more than 200 million Federation International Football Association–registered players, with more than 16 million participants in the United States.¹ Casual observers might conclude that soccer is a noncontact sport, particularly when compared to American football; however, soccer is a frequent precipitant to an emergency department visit. Common types of injuries reported include strains, sprains, fractures, and contusions. Commonly injured body regions vary by age.²

A unique feature of a soccer play is the purposeful use of the head for controlling, passing, blocking, and shooting the soccer ball. Using the head for these purposes places the players at risk of head injury, which can result from contact to the head from another player's head (or other body parts), the ground, the goalpost, or the ball. Young players are taught that the safe and proper method of heading the ball is to thrust the head forward and contact the ball with the upper part of the forehead. This is the method used by the player in our case, but the ball was arriving with greater than usual force because of the relative proximity of our patient to the goal kick from the keeper. This case demonstrates a rare potential danger to the use of the head in the game of soccer. Studies are available that detail other reported head injuries associated with soccer play. In a retrospective Canadian study, 1714 cases of soccer-related injuries were identified over a 5-year period, with 14% of these injuries occurring to the head.³ Very few of these could be attributed to the purposeful heading of the ball, and no serious injuries, such as the subdural hematoma in this case, were identified. Player contact injuries appeared to be a more important injury control concern. The authors concluded that injuries due solely to contact to the head by the ball were rare and of minor significance. A study from Iowa reviewed 1219 cases of traumatic brain injury in high-school athletes.⁴ Sixty-three percent of the injuries were related to participation in football, whereas 11% were from soccer. No cases of subdural or other intracranial hemorrhages were soccer related, but 6 of the cases were identified in football players. While the data from these population-based studies suggest that the rate of life-threatening intracranial hemorrhage in soccer is low, other reports, in addition to the present, also link heading the ball with intracranial hematomas. One case involved a player whose head was injured secondary to contact with another player's head.⁵ Multiple cases are available involving athletes with intracranial bleeds secondary to

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Financial Disclosures: None.

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ISSN: 0749-5161



FIGURE 1. Computed tomographic scan of the patient's brain revealing the subdural hematoma (arrows).

heading the soccer ball, but the subjects were found to have congenital arachnoid cysts as a predisposing condition.⁶⁻⁸ Again, no such predisposing condition was found in this case presentation. The long-term sequelae, if any, of heading the soccer ball are unknown at this time.^{9,10}

The risk of an intracranial bleed secondary to a soccer injury appears to be extremely low, but the true impact of head injury on cognitive function is not fully elucidated. In the recent past, the American Academy of Pediatrics Committee on Sports Medicine and Fitness recommended that adults who supervise youth soccer should deemphasize the heading technique until the potential risk of permanent cognitive impairment is better defined.¹¹ Since then, multiple studies have been published with varied results concerning soccer play and its association with impaired cognition. For example, estimations derived from self-reports in the study by Stephens et al¹² of soccer players aged 13 to 16 years indicate the absence of neuropsychological impairment arising secondary to either the cumulative effect of mild head injuries or of heading the ball. However, Webb and Ochs¹³ concluded that heading behavior is likely a contributing factor

to transient cognitive impairment based upon their study of 16- to 36-year-old soccer players.

In conclusion, we report the first case of serious intracranial hemorrhage and traumatic brain injury from contact with a soccer ball alone. This case demonstrates that a subdural hematoma can occur in an otherwise healthy child without any underlying predisposing central nervous system abnormality.

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