Chronic Traumatic Encephalopathy: Football vs Soccer

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Due to the increasing participation in sports and recreational activities in the recent years, related injuries are also rising in number.[1] Around 2 million sports-related head traumas were documented by US emergency departments from 2007 to 2011.[2] Cycling accidents result in the highest number of brain injuries, while football and soccer accounted for most head traumas related to organized group sports.[2]

Sport-related concussion is recognized as a public health issue. Contact sports involve repetitive closed head traumas, causing the brain to undergo acceleration and deceleration forces. The long-term neuropathologic sequelae associated with such repetitive injuries are called chronic traumatic encephalopathy (CTE). First recognized in 1928, CTE in boxers was known as the "punch-drunk syndrome," and it was neuropathologically characterized in 1973.[3] The first case of pathologically confirmed CTE dementia in a football player was published in 2005,[4] while the first instance in a soccer player was documented in 2014.[5]

The mechanism of injury that leads to CTE begins with tau oligomerization in the brain, resulting in axonal deformation and microtubular destabilization.[4] Following repetitive head traumas, tau oligomers alter white matter tracts causing aberrant signaling and communication.[6] The initial symptoms of CTE are inattention and/or diminished concentration. Deterioration can gradually progress to lack of insight, poor judgment, and cognitive impairment.[7] Case series[4] report CTE manifestations can result in an Alzheimers-like dementia, with medial temporal lobe atrophy and ventriculomegaly. The precise association between developing manifestations of CTE and the frequency and type of causative head injury is not fully determined.

American football causes more central nervous system trauma than soccer, due to more frequent and severe linear and rotational impacts. The greater number of high-energy head impacts while playing football, as compared to soccer, result in a bigger risk of injury and consequent CTE.

Hitting the ball with the head in soccer is called "heading"; these repetitive impacts also can injure the brain. An average soccer player reportedly "heads" the ball up to 12 times per game, in addition to heading drills during training.[8] However, significant trauma in soccer is more likely to be caused by head-to-player impacts, rather than head-to-ball contacts (40% vs 13%, respectively).[9]

The incidence and prevalence of football and soccer players at risk of CTE is not determined; yet, head injuries can result in an overt cognitive dementia. Further professional and public awareness about the risk of CTE is warranted. Physicians should widely disseminate this information, especially since football attracts so many young players and soccer is the most played sport in the world.

Published online: April 22, 2021.
Potential conflicts of interest: None.
Funding/support: None.

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Prim Care Companion CNS Disord 2021;23(2):20br02653

To cite: Cornejo M, Alhasan F, Lippmann S. Chronic traumatic encephalopathy: football vs soccer. *Prim Care Companion CNS Disord*. 2021;23(2):20br02653.
To share: https://doi.org/10.4088/PCC.20br02653