

Sports-related brain injuries: 12 new articles in April issue of Neurosurgical Focus

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Sports-related concussion (also known as mild traumatic brain injury [TBI]) and possible sequelae such as CTE (chronic traumatic encephalopathy) are hot topics that can be found daily in news outlets and often as story lines in movies and TV shows. In March, the NFL (National Football League) conceded a link between football and CTE, and The New York Times reported a connection between the NFL and earlier faulty research on concussion.

Most symptoms of concussion—headaches, confusion, dizziness, amnesia, temporary loss of consciousness, etc.—are mild and short lived. However, some concussions or series of concussions are accompanied by sequelae such as post-concussion syndrome (prolongation of symptoms), second impact syndrome (rapid, severe [and sometimes fatal] brain swelling brought about by a second concussion sustained before the first concussion has healed), and CTE (a neurodegenerative disease whose symptoms may not appear until years after the last injury).

Although most accounts focus on professional athletes, a far greater number of people affected by sports-related concussions are found closer to home—down the street, next door, or upstairs. Heightened press interest in concussions and their sequelae has stirred worry in the parents of young athletes and suspicion in the minds of citizens who don't know whose spin to believe. There is a lot of information and misinformation about concussion, and it is up to medical science to provide accurate reports.

The April issue of *Neurosurgical Focus* offers 12 articles presenting the most up-to-date knowledge of what constitutes sports-related concussion and more severe TBIs, the latest diagnostic assessment tools, the neuropathology underlying symptoms, complications that may arise, prevention, and case management strategies. All there is to know about sports-related concussion? Not quite, but the April issue of *Neurosurgical Focus* provides a great review of what is currently known as well as new research in mild and more severe TBIs.

Early in the issue two articles examine statistics on patients admitted to the hospital for TBIs sustained while participating in five sport categories: fall and interpersonal contact sports, skiing/snowboarding, roller skates/skateboards, equestrian sports, and aquatic sports. These articles describe the incidence of injuries associated with these sports and characterize predictors of outcomes in patients of all ages:

- "Adult sports-related [traumatic brain injury](#) in United States trauma centers" by Winkler et al.
- "Pediatric sports-related traumatic brain injury in United States trauma centers" by Yue et al.

An excellent review article follows, providing details on the diagnosis of concussion based on symptoms and discussing the potential for neuroimaging as a diagnostic tool in the future. The authors describe associated injuries such as axonal injury, brain contusion, and intracranial hemorrhage, as well as complications such as skull fracture, cervical spine injury, and eye injury. Treatment strategies are reviewed; and current knowledge about the pathological characteristics of concussion, post-concussion syndrome, second impact syndrome, and CTE is included.

- "Sports related concussions: diagnosis, complications, and current management strategies" by Hobbs et al.

These subjects are taken up in other articles as well.

Two articles provide information on assessment tools used to diagnose concussion on the sideline during a game and in the clinical setting.

- "The Sport Concussion Assessment Tool: a systematic review" by Yengo-Kahn et al.
- "Clinical evaluation of concussion: the evolving role of oculomotor assessments" by Sussman et al.

The difficult decision of when young athletes must be advised to retire from play to prevent further injury is described. Variables indicating this eventuality are discussed and illustrative cases are provided.

- "Retirement-from-sport considerations following pediatric sports-related concussion: case illustrations and institutional approach" by Ellis et al.

Relationships between TBIs and pre-existing brain disorders as well as cervical spine injuries are discussed, based on systematic reviews and analyses of pertinent scientific literature. Although not a TBI, a cervical spine injury can also result from a hit to the head during play.

- "Sport-related structural brain injury associated with arachnoid cysts: a systematic review and quantitative analysis" by Zuckerman et al.
- "Cervical spine surgery in professional athletes: a systematic review" by Joaquim et al.

Traumatic brain injuries associated with cricket and rugby are discussed in light of helmets. Although so far no helmet has been developed to prevent concussion from occurring, developments in helmet shells and padding have prevented many more serious TBIs. Unfortunately, some

players may place too much trust in helmets, leading them to play more aggressively while wearing them.

- "Craniofacial injuries in professional cricket: no more a red herring" by Tripathi et al.
- "Rugby headgear and concussion prevention; misconceptions could increase aggressive play" by Menger et al. [accompanied by a podcast]

Last, two sequelae of concussion are discussed: post-concussion syndrome and CTE. Authors found five factors in college athletes that heighten their risk of developing post-[concussion](#) syndrome. With respect to CTE, one article examines the pathology of sports-related TBI and CTE, and the potential of various neuroimaging modalities and biological markers in their diagnosis. So far, a diagnosis of CTE has only been possible at autopsy. The other article discusses common questions about CTE and proposes directions for new research.

- "Predictors of postconcussion syndrome in collegiate student-athletes," by Zuckerman et al.
- "Sports-related brain injuries: connecting pathology to diagnosis" by Pan et al.
- "The science and questions surrounding chronic traumatic encephalopathy," by Ban et al.

Sports-related [brain injury](#) is not a new subject for *Neurosurgical Focus*, a topic-driven peer-reviewed neurosurgical journal that is published monthly online and is freely available to the public. This is the third compilation of articles reporting on current research findings in sports-related TBIs. New research is steadily emerging, taking us closer to unlocking the remaining secrets surrounding concussive injuries to the brain and, hopefully, to reducing the number of sports-related TBIs or at least to reducing their impact.

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