

Traumatic head injuries. Introduction

Traumatismos craneoencefálicos. Introducción

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Traumatic brain injuries (TBI) in sports represent a severe health problem that affects athletes and everyone around them, including sports medicine specialists as TBIs represent the main causes of death and disability among players in some sporting disciplines (boxing, American football, rugby, ice hockey, lacrosse, wrestling, etc.). A traumatic brain injury affects the brain tissue by temporarily or permanently altering brain function. The patient's life depends on its diagnosis, evolution and outcome^{1,2}.

Sports-related cerebral concussion (CC) is defined as a mild traumatic brain injury that leads to complex deterioration of neurological function. It mainly happens as the consequence of direct or indirect impact to the head or neck when playing contact sports and, in general, it is usually transitory³.

It often happens in contact sports although athletes' reporting of the injury is problematic because of severe repercussions from the health and safety protocol which clashes with the athletes' wish to carry on playing. As a result, many athletes do not report this type of injury when there is no clear clinical evidence. After suffering concussion, the chances of getting it again increase 2 to 4 times and it can occur with less impact⁴.

CC is influenced by the athletes' kinanthropometry characteristics, age, having suffered previous concussions and it is also known that accumulative impacts on the head reduce the tolerance to this injury.

Sports-related concussion is characterised by presenting a transitory deterioration of brain function that includes losing consciousness in 8-20% of cases⁵. The short and long-term consequences of CC in sport vary according to the severity of the injury; evolution is usually favourable in most cases in the first 24-72 hours.

After a TBI, initial evaluation and triage must be based on clear guidelines (losing consciousness, neurological deficit, Glasgow Coma

Scale and other signs of mental impairment) identifying patients that require immediately resuscitation, admission and observation, imaging diagnosis, emergency neurosurgery, etc. The sports concussion assessment tool (SCAT5) is very effective and one of the most widely-used to date; it can assess symptoms, level of consciousness, function, balance and detect possible signs of a severe brain injury^{6,7}. On the other hand, cognitive evaluations based on digital approaches are objective tools with a great future in analysis of these injuries^{3,8}.

Clinical practice for CC is heterogeneous with a wide variety of symptoms and signs that can present motor, sensory and emotional deficits that might go unnoticed in an initial analysis. The assessment includes various tools that analyse cognition, vision, balance...such as questionnaires. Classification schemes for concussion are based on the presence and duration of the symptoms and signs⁹.

Correct care by a sports doctor is very important after an athlete receives a blow to the head with a certain intensity. The patient requires immediate attention and although they might have been confused for just a few seconds, they must leave the sports field to avoid the second impact syndrome given that a second blow can be much more dangerous than the first¹⁰.

TBI requires an urgent aggressive treatment, to prevent or reduce an irreversible injury to the nervous system. Regarding CC treatment, studies are not conclusive on the use of certain drugs (AINE, paracetamol, tricyclic antidepressants, amantadine, melatonin, etc.) when treating the acute phase of the concussion, or the post-traumatic cerebral oedema and, although symptomatic treatment is recommended, it is very important that the doctor is up to date on this matter and understands when surgery is required and what type of operation is most recommended^{11,12}.

In terms of deciding when to return to training and competition after suffering a CC episode, the central nervous system (CNS) must

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have clearly returned to normal, thinking only of the athlete's health. After concussion, it is recommended to rest, both physically and intellectually, and abstain from sporting activities until the patient is entirely asymptomatic, although there are no clear protocols on how long is most appropriate. Some research even questions rest after the first 2 weeks or before and suggests light or moderate physical activity to start¹³. Classically, compulsory rest is recommended, but when the light concussion symptoms have been resolved (in 24 to 48 hours in most cases), according to some criteria, non-contact activity can be allowed (running, cycling, lifting objects) and if the symptoms do not return, the athlete could be authorised to train and compete¹⁴.

In any case, CC recovery times and prognosis vary widely, and it is very important to ascertain the ideal and safe moment to return to competition depending on the evolution¹⁵.

The risk should also be assessed for consequences or mental damage as a result of the chronic traumatic brain injury (CTBI), related to repetitive blows to the head, initially described in boxers and now extended to other sports. It is characterised by presenting neurodegenerative changes that are reasonably similar to Alzheimer's disease. Therefore, return to competition is not the only factor to consider, but also long-term mental health¹⁶.

It might be supposed that after recovering from a TBI, the rate of musculoskeletal injuries should be the same as if this injury had not taken place, and if the risk increases, this might be because the NS does not respond correctly in terms of reflexes and coordination¹⁷.

Some data indicate that the % of musculoskeletal injuries in athletes' post-concussion are greater after returning to play¹⁸ and lead us to think that a post-TBI after-effect had not been detected among these athletes.

Further studies are required to find out more about recurring concussions. Recurring injuries (second, third or fourth cerebral concussion) require a longer period of asymptomatic rest, although there are no scientific data to corroborate this. Tests to analyse cognitive and neurophysiological dysfunction are required that provide objective information on the cognitive deficits¹⁹.

The world of sport should be constantly aware of preventing TBI and particularly CC. We must focus on individual risk factors and the specifics of each sport using strategies that modify the rules to limit contact, the equipment and the playing technique. Primary CC prevention is vitally important to protect athletes' health and safety. In contact sports, training on specific collision techniques for each sport is very important. The American Academy of Neurology mentions the importance of baseline neuropsychological assessments to improve interpretation of concussions²⁰.

This is not easy as in many sports, the game depends on physical contact and it is unlikely that contact sports will ever be entirely safe, despite improvements to protection systems, fundamentally protective helmets with on-going design improvements^{14,21,22}.

Rehabilitation of patients who have suffered a TBI is fundamental to reduce long term functional disability and achieve a proper recovery.^{12,23}

Although TBI and CC care has changed greatly over the last 20 years, and there are consensus documents in this respect, we should look in greater depth at knowledge of the physiological changes that take place in CC. We should also make progress in determining markers that can identify the persons with risk of mental deterioration and death so that they can be caught in good time. Improvements to diagnosis techniques should continue. For all these reasons, this focus study is very important as it analyses the latest progress in TBI and cerebral concussion in sport and figures out the direction of the research related to fundamental aspects of the topic.

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