

Sport-related concussions: time to diversify care and recommendation advice

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Concussions are one of the most common sport-related injuries, and they have reached increased attention in recent years, due to awareness of the risk of long-term effects. In November 2012, the 4th and latest Consensus Statement on Concussion in sports was held in Zurich [5]. Here, it was stated that concussions should be treated individually, based on the grade of concussion. At this meeting, the latest return-to-play protocol and the Sport Concussion Assessment Tool 3 were updated.

To place the present recommendations in context, the actual damage, caused by a concussion, needs to be understood. Although the knowledge on the pathophysiology and neurobiological changes after a concussion is limited, it has become evident that an important type of change following concussion is axonal damage, often called diffuse axonal injury [7]. It is also likely that a concussion undergoes a healing process after an injury, just like other organs in the body, but on contrary to, e.g. a bone fracture, the healing process cannot be followed with simple objective investigations for healing. The ultimate would be to have one, or a panel, of quick and reliable diagnostic, as well as prognostic tool(s) to base recommendations for athletes upon, after a sport-related concussion.

Since no such perfect tool today exists, we have to apply all present knowledge and combine available examinations and tests to present practical advice, for everybody

involved in the care and training of athletes, at all levels, and those experiencing concussions. This applies to children and adults, elite athletes as well as non-elite athletes. The basics, before getting into medical advice, are of course to minimize the numbers and severity of concussions by critically reviewing each sport and adjust protection gear and rules to appropriate levels. Factors such as age and number of concussions need to be taken into account, since a young brain is more vulnerable and needs longer time for recovery after trauma [1] and multiple concussions lead to slower recovery [3]. Even though changes in risk situations and behaviours can have significant effects on the frequency of events, concussions will still appear in sport situations. The need for good medical advice when a concussion occurs is therefore fundamental, both to minimize acute phase symptoms and aiming to prevent the athletes from experiencing long-term effects and repeated injuries [2].

The paper by Collins and co-workers within this journal focus on the heterogeneity of sport-related concussions and the requirement of an individualized treatment approach. Collins and co-workers promote an approach by care givers where base-line is set by a review of each athlete's risk factors. As a second step, they advocate a comprehensive clinical investigation, neurocognitive assessment and possibly also neuroimaging investigations. Based on the findings in each case, the authors thereafter recommend targeted treatment pathways.

Beginning with the risk factors, it is worth to point out that like in many injuries, an incomplete healing before the return to sport activities increases the risk for re-injuries also in concussions. It has been shown that the brain is more susceptible to a second concussion within 10 days from the first one [3]. Contradictory to this statement, 80–90 % of all concussions heal within 7–10 days [4].

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As discussed by Collins and co-workers, positive findings in a thorough clinical investigation or testing require certain and specific actions, where different symptoms can be treated with different trajectory treatment lines. This includes the evolvement of the initial global concussion factors such as the primary “cognitive–fatigue–migraine factors” and secondary “emotional–physical–sleep factors” into more specific symptoms grouped into different trajectories: cognitive/fatigue, vestibular, ocular-motor, posttraumatic migraine, affective and cervical. However, this categorization may be difficult within the first week after a concussion.

The difficulties in the acute phase become evident when someone is directly involved in the care of these athletes: After a sport-related concussion, the athlete, trainers, relatives and medical professionals all have the same questions: When has the concussion healed and when can the athlete return to sport?

A clinical problem is that an athlete who consider their sport participation “fundamental in life”, which is not just elite athletes, might diminish their reported symptoms. Another important issue is that, like in fracture healing, the absence of symptoms is not equivalent with full recovery [6]. The intriguing problem to recommend enough resting time for recovery after a concussion will always have to be balanced against the demand on athletes, especially on elite level, from themselves as well as trainers, leaders and sponsors, to get back to their sport on a competitive level as fast as possible after any injury.

Today, the recommendations are based on recovery from symptoms rather than knowledge about healing time of a specific injury. However, there are possible objective brain injury markers that can be used. For example, the concentrations of neurofilament light protein, a marker of axonal injury, has been shown to increase in cerebrospinal fluid in athletes with mild traumatic brain injury and to correlate with the size of injury [6, 8]. Although more studies are needed before use in clinical praxis, these findings are interesting. Awareness of the problem of insufficient tools to monitor minor traumatic brain injuries and rapidly increasing research in the area hopefully will provide safer and more accurate methods in the soon future.

Until then, encouragement to participate in sports activities, with both physical and psychological benefits, should not be abandoned due to fear of concussion consequences, but the risk minimized in each sport. For those

experiencing a concussion and especially if experiencing symptoms not just in the acute phase, individualized review and treatment with an interdisciplinary approach as described in the paper by Collins and co-workers are advisable. However, the development and use of objective measurements in the assessment and return-to-play guidelines for athletes suffering a concussion would highly improve the safety, when compared to if these are solely based on the self-reported symptoms. Further, we believe that the guidelines in the present return-to-play protocol should, based on today’s knowledge, rather be slowed-down than rushed in time, to avoid repeated concussions and long-time consequences.

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