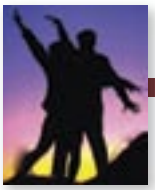

New guidelines for concussion management

Based on the second International Conference on Concussion in Sport

J. Carson, MD, DIP SPORT MED, CCFP **C. Tator,** CM MD, PHD, FRCSC, FACS **K. Johnston,** MD, PHD, FRCSC, FACS
J. Kissick, MD, CCFP, DIP SPORT MED **L. Purcell,** MD, FRCSC, FAAP, DIP SPORT MED **B. Hunt,** MD, FRCSC
From the Concussion Education and Awareness Committee of ThinkFirst-SportSmart Canada

In November 2001, the first International Symposium on Concussion in Sport was held in Vienna, Austria, to recommend ways to improve the safety and health of athletes who suffer concussive injuries in sports. A mandate was given to draft a document describing the agreement reached.[1] The second International Conference on Concussion in Sport was held in Prague, Czech Republic, in November 2004. It resulted in a revision and update of the Vienna consensus recommendations, published in April 2005.[2]

The Prague statement included a standardized Sport Concussion Assessment Tool.[3] This article provides an overview of the conference statement for family physicians and serves as a guide to make appropriate return-to-play recommendations. The Concussion Education and Awareness Committee of ThinkFirst-SportSmart brings this new information about concussion management, which is available on **www.thinkfirst.ca**, to family physicians.[4]

The new definition of concussion states the following.

- Concussion can be caused by a direct blow to the head, face, neck, or elsewhere on the body with an "impulsive" force transmitted to the head.
- Concussion typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously.
- Concussion can result in neuropathologic changes, but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.
- Concussion results in a graded set of clinical syndromes that might or might not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course.
- Concussion is typically associated with grossly normal structural neuroimaging studies.

Historically, concussions have been classified with various grading systems. Grading has been abandoned because using loss of consciousness as the primary measure of injury severity is of limited value in assessing the severity of sporting concussive injury. In addition, published evidence suggests that the nature, burden, and duration of clinical symptoms after concussion is more important than the presence or duration of amnesia alone (**Table 1**). Concussion severity can be determined only in retrospect after all concussion symptoms have cleared, the neurologic examination is normal, and cognitive function has returned to baseline.

Table 1. Signs and symptoms of traumatic brain injury to be monitored

SYMPTOMS
Headache
Dizziness
Feeling dazed
Sensitivity to light
Ringing in the ears
Tiredness
Irritability
Confusion, disorientation
SIGNS
Poor balance or coordination
Slow or slurred speech
Poor concentration
Delayed responses to questions
Vacant stare
Deterioration in sport performance
Unusual emotions, personality change, and inappropriate behaviour

One of the key contributions of the Prague group is the understanding that concussion can be categorized for management purposes as simple or complex. Simple concussion represents the most common form of this injury and can be appropriately managed by primary care physicians. Complex concussion requires the attention of physicians specially trained in the management of concussion. In simple concussion, all symptoms and signs resolve by 10 days and do not recur during rehabilitation (ie, using the return-to-play guidelines outlined in **Table 2**). Complex concussion includes any one or more of the following:

- symptoms and signs persist beyond 10 days or recur during rehabilitation (**Table 2**),
- prolonged cognitive impairment, and
- prolonged loss of consciousness (more than 1 minute).

Table 2. Return to play after a concussion follows several steps

1	No activity; complete rest. Once athlete is asymptomatic, proceed to step 2
2	Light aerobic exercise, such as walking or stationary cycling, no resistance training
3	Sport-specific exercise (for example, skating in hockey, running in soccer); progressive addition of resistance training at steps 3 or 4
4	Non-contact training drills
5	Full-contact training after medical clearance
6	Game play

The cornerstone of concussion management is rest until all symptoms resolve, then a graded program of exertion before returning to sport (**Table 2**). These recommendations have been used in Canada for several years.[5] During the period of recovery in the first few days after an injury, it is important to emphasize to athletes that physical and cognitive rest is required. Activities that require concentration and attention, such as reading or computer work, can exacerbate symptoms and delay recovery. In children, limits might be needed on exertion with activities of daily living and on scholastic activities while symptoms persist.

Athletes should proceed to the next step in the return-to-play guidelines daily if asymptomatic. A minimum of 1 day at each level is necessary. If any postconcussion symptoms appear, patients should drop back to the previous asymptomatic level and try to progress again after 24 hours.

Complex concussion encompasses cases in which athletes suffer persistent symptoms or in which symptoms recur with exertion. This group can also include athletes who suffer multiple concussions over time or whose concussions occur with progressively less impact force. This group might also have management considerations beyond simple return-to-play advice. Formal neuropsychologic testing and other investigations should be considered in complex concussions. Such athletes would be managed by a multidisciplinary team of physicians with specific expertise in managing concussive injury, such as neurosurgeons or sports medicine specialists with experience in concussion.

When players show any symptoms or signs of a simple or complex concussion, they must be examined by a physician. The following precautions should be applied.

- Players should not be allowed to return to play in the current game or practice.
- Players should not be left alone, and regular monitoring for deterioration is essential during the initial few hours after injury.
- Return to play must follow a medically supervised series of steps.
- Players should never return to play while symptoms persist.

Dr Carson *is an Assistant Professor in the Department of Family and Community Medicine and the Department of Surgery at the University of Toronto in Ontario.* **Dr Tator** *is a Professor of neurosurgery in the Division of Neurosurgery at the University of Toronto.* **Dr Johnston** *is Director of the Concussion Program in the Department of Neurosurgery at McGill University in Montreal, Que.* **Dr Kissick** *is a sports medicine physician and Clinical Lecturer in the Department of Family Medicine at the University of Ottawa in Ontario.* **Dr Purcell** *is an Assistant Professor and Pediatric Emergency Consultant in the Division of Emergency Medicine at the University of Western Ontario in London.* **Dr Hunt** *is a neurosurgeon in North Vancouver, BC. All authors are members of the Concussion Education and Awareness Committee of ThinkFirst-SportSmart Canada.*

Correspondence to: **James David Carson**, *MD, DIP SPORT MED, CCFP, 255 Main St, Unionville, ON L3R 2H3; fax 905 477-0027; e-mail* **james.carson@utoronto.ca**

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