

Concussions, the Invisible Injury

Summary

- Definition of concussion
- Update on information
- Sideline assessment – SCAT2 Available as an app
- Management of concussion
- Return to play protocol
- Good websites to get more informed

Introduction

It is difficult for athletes, parents, coaches to deal with an injury that can't always see; concussions or minor brain injuries. The topic of concussions and minor brain injuries are coming to the attention more often and the public are becoming more aware of them and how to suspect concussions. They are now being better recognized immediately after the trauma. We now know they do happen frequently in sport. There still is a lot of misinformation and much that the medical profession still doesn't fully understand. The information in this paper must be modified accordingly as new knowledge from research is gained. This also is partial information on concussions; visit the websites listed to give you a better understanding.

Concussion versus Minor Traumatic Brain Injury (mTBI)

A concussion is defined as a complex pathophysiological process affecting the brain induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathologic and biomechanical injury constructs that may utilize in defining the nature of a concussive head include:

1. Concussion may be caused either by a direct blow to the head, face, or neck or elsewhere on the body with an "impulsive" force transmitted to the head.
2. Concussion typically results in the rapid onset of short lived impairment of neurological function that resolves spontaneously.
3. Concussion may result in neuropathological changes but the acute clinical symptoms largely reflect a functional change, rather than a structural injury.
4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. In small percentage of cases, however post – concussive symptoms may be prolonged.
5. No abnormality on standard structural neuroimaging studies is seen in concussion.

International Recognition

On the international scene there are a panel of experts that get together periodically to discuss concussions. In 2008 the 3rd International Conference on concussion in sport was held in Zurich. This conference came up with a number of consensus, one is adopting the sideline assessment tool named SCAT2 (sport assessment concussion tool second revision). This tool is available online however depending on the website it may not have all the information. I recommend purchasing it as an app so you have it readily available with you. It is also recommended that the SCAT2 be used prior to the sporting season.

For Alpine skiing this would be of good idea to do over a Christmas camp or in a fall dryland training session. The assessment is recommended for ages over 10 years of age. The test should be modified for younger age groups.

Signs and Symptoms of concussion

80-90% concussions resolve in a period of 7-10 days but with children it may be longer. The SCAT2 card is designed to assess physical signs, behaviour, balance, sleep and cognition. A detailed history should be part of this assessment. A suspected concussion is any one or more deficits such as having a headache, feeling like being in a fog, loss of consciousness, emotional and behavioural changes, (parents or coaches may help with this.) slowed reaction times and sleep disturbances.

On-field assessment

1. Standard first aid procedures should make sure to rule out cervical trauma
2. The onsite health care provider must decide appropriate care. Remove safely from play or deliver immediately for urgent care.
3. After first aid then the SCAT2 can be given
4. The athlete should never be left alone. In case of a ski trip skier should not be allowed to go to hotel room alone or their ski chalet. Must be monitored and if condition deteriorates, seek emergency care.
5. Athlete should never be allowed to return to play the same day. Adults are exceptions when there are highly trained physicians experienced in concussion management and have the resources available to them.
6. It should be noted that symptoms maybe delayed several hours following a concussive episode.

Modifying Factors

1. The number of symptoms and duration and severity of the symptoms lasting longer than 10 days.
2. Concussive convulsions
3. Repeated concussions occurring with progressively less impact force or slower recovery after each concussion
4. Children and adolescence under 18 yrs.
5. Migraine, depression, or other mental disorders
6. Psychoactive drugs, anticoagulants
7. Dangerous play
8. High risk activity
9. Collision in sport and high level of competition

Other assessment tools

Postural balance testing appears to be a reliable tool for assessing up to 72 hours post concussive episodes using force plates or the balance error scoring system(BESS). This should be done prior to the season to get a baseline score.

Neuroimaging, CT scans and Brain MRI do not contribute to concussion evaluation but should be used where intercerebral lesions are suspected. These should be used when any symptoms are prolonged or worsened.

Treatment

Rest both physical and mental until symptoms are gone. This may include limited time reading, video games, text messaging and activities of exertion. Children and adolescents should not return to play on the same day as the injury regardless of the level of play. Reinforce the long term consequences by explaining the impact, the increase in neurological encephalopathy in retired football players, soccer player and boxers to name a few.

Graduated return to sport protocol

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Complete physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity <70% MPHR	No resistance training increase HR .
3. Sport-specific	Skating drills in ice hockey, running drills in soccer. No head impact activities.	Add movement
4. Non-contact training drills Progression to more complex training drills (e.g. passing drills in football and ice hockey).	May start progressive resistance training	Exercise, coordination, cognitive load
5. Full contact practice	Following medical clearance, participate in normal training activities Restore confidence	Assessment of functional skills by coaching staff
6. Return to play Normal game play	HR = heart rate, MPHR = maximum predicted heart rate.	Note that athletes not only be symptom free but should not be on any medication that masks or modifies the symptoms. Where medication for depression is been taken the Clinician must be careful on return to sport approval.

Nationally

St. Michael's hospital put together a panel of experts and had an online conference for coaches and other people that deal in sports. This was an informative webcast information session that discussed the some of the long term effects from concussions or repeated concussions and that is the demyelination of the nerve fibers. This may lead to Alzheimers.

Because of the mechanism of injury causing concussions; mouth guards do not play a role in preventing concussions but do protect dental and orofacial injury.

Many medical doctors are not that proficient in dealing with assessment and management of concussions. Seeking out someone who knowledgeable in this field.

B.C. Legislation

At the present time B.C. legislation has a private members bill that has recommendations that in principle states that if a concussion is suspected then they are removed from play until they are cleared by a physician. This bill has been endorsed by the Canadian Athletic Therapists Association in principle. The CATA is an association that specializes in the therapy and sideline assessment and treatment of athletes.

I hope this gives parents, coaches and athletes a better insight into concussions, hopefully the not so invisible injury. Please take the time to read the attached websites for more information. In my clinic I see mild concussions to severe brain injuries all too frequently and I urge everyone, coaches, officials, parents to constantly monitor how we treat our children in the activities that they do, the protective gear that they wear and the rules of the game.

I'm available to come to your Ski Club and speak about concussions and other related sport injuries at one of your parent meetings.

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Websites

This is a brief overview of concussion that would be a good handout at parent meetings
<http://www.thinkfirst.ca/downloads/concussion/Concussion%20Handout%20for%20Families%20and%20Caregivers.pdf>

Summary of the Concussion symposium
<http://sportconcussions.com/html/Zurich%20Statement.pdf>

This a site that explains and has pictures of BESS
<http://www.knowconcussion.org/concussion-management/balance-error-scoring-system-bess/>

This the website that you can purchase for \$3.99 the SCAT2 app
<http://itunes.apple.com/ca/app/scat2/id434110174?mt=8>