

# CONCUSSION / HEAD INJURIES

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# Definitions

- ❑ Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic mechanical forces.
- ❑ Concussion is a transient change in mental state, from which full recovery is anticipated.
- ❑ Not all head injuries result in concussion, but all concussions are directly or indirectly head injuries.

# Causes

- ❑ Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an “impulsive” force transmitted to the head.
- ❑ The sudden stop or change of movement of the head causes the brain to ‘shake’ or ‘twist’ within the skull.

# Symptoms

- ❑ Headache - generally low-grade and persistent
- ❑ Dizziness/vertigo (room spinning)
- ❑ Tinnitus (ringing in ears)
- ❑ Nausea
- ❑ Confusion/amnesia
- ❑ Fogginess/Slowness
- ❑ Irritability
- ❑ Double vision/blurred vision
- ❑ Disorientation
- ❑ Light-headedness
- ❑ Feeling “dinged” / dazed / stunned



# Signs

- ▣ Loss of consciousness – NOT ALWAYS!
- ▣ Poor coordination
- ▣ Vomiting
- ▣ Convulsions – impact seizure
- ▣ Loss of balance
- ▣ Slurred speech
- ▣ Amnesia
- ▣ Personality change/inappropriate behaviour
- ▣ Dilated pupils
- ▣ Fluid leaking from the ears
- ▣ Poor concentration
- ▣ Vacant stare



# Signs – Poor Coordination

- ▣ Sometimes very obvious.
- ▣ Sometimes it is not obvious and needs to be assessed.

# Signs – Vomiting

- ▣ Commonly happens in the short term after a head injury.
- ▣ If increasing, needs further assessment.
- ▣ May indicate a more serious injury.

# Signs – Convulsions

- ▣ If they occur after a head injury, it is because of the initial blow (impact seizure), and is NOT commonly a sign of a more serious injury.
- ▣ If more persistent and associated with other symptoms, investigations may be required.

# Signs – Loss of Balance

- ▣ Should be checked for when a more complete assessment of a head injury is being performed during the assessment phase.
- ▣ Useful in follow-up to assist in assessment of recovery.

# Signs – Slurred Speech

- ▣ May be a useful sign, but common soon after the resumption of consciousness.

# Signs – Amnesia

- ▣ Pre-traumatic (retrograde) amnesia and post-traumatic amnesia (PTA) are important, common and should be documented.
- ▣ Often, the events leading up to a concussion will not ever be remembered - this is not a problem.
- ▣ PTA is a good indicator of the severity of concussion.

# Signs – Personality Change

- ▣ Irritability is common soon after concussion.
- ▣ Anger and irascibility are also common early.
- ▣ Depression is probably under under-diagnosed in the late recovery period after concussion (see later).

# Potential Complications

- ▣ There are many reports in the literature of two complications of less-than-perfect management:
  - Cumulative Cognitive Deterioration
  - Second Impact Syndrome
- ▣ These are hotly debated topics at the moment.
- ▣ While the evidence for their existence is minimal, it is still worth raising these issues as potential complications of sports concussion.



# Cumulative Cognitive Deterioration

- ❑ The hypothesis is that numerous concussions over a period of time results in cumulative damage to the brain and life-long impairments of cognitive function.
- ❑ There have been many prominent studies in boxers and soccer players.
- ❑ One example is the 'punch-drunk' syndrome that has been seen in professional boxers.



# Second Impact Syndrome

- ▣ The hypothesis is that having a second concussion before full recovery from a first concussion results in brain swelling and a catastrophic outcome (ie, death).
- ▣ This is only a consideration where the first concussion is mismanaged.
- ▣ Scientific evidence is limited.



# Immediate Management

- ▣ Injury recognition.
- ▣ Assume the athlete has been concussed until proven otherwise! (ie, by a doctor).
- ▣ You may not always see the concussion occurring, so any athlete complaining of symptoms (eg, headache) should be considered to have suffered a concussion.
- ▣ DO NOT return the athlete to play on the day of the injury.



# Immediate Management

- ▣ Basic First-Aid principles
- ▣ DRABCD
  - Danger
  - Response
  - Airways
  - Breathing
  - Compressions
  - Defibrillation
- ▣ If unconscious, do not move until the neck has been stabilised.



# On field/sideline Evaluation of Acute Concussion 1

- ▣ A medical evaluation on site is ideal.
- ▣ Exclude a cervical spine injury.
- ▣ If no healthcare provider is available, the player should be safely removed from practice or play and an urgent referral to a physician/hospital arranged.



# On field/sideline Evaluation of Acute Concussion 2

- ▣ Assessment of the severity of the injury, using the Pocket SCAT 2, DSST or similar tool.
- ▣ The player should not be left alone following the injury.
- ▣ A player with diagnosed concussion should not return to play on the day of injury.

# On/off field/sideline Evaluation of Acute Concussion

- ▣ Standard orientation questions (e.g.; time, place, person) have been shown to be unreliable) .
- ▣ Appearance of symptoms may be delayed several hours following a concussive episode.

## Evaluation in emergency room, or by medical personnel

- ▣ A medical assessment of mental status, cognitive functioning, gait and balance should occur.
- ▣ The clinical status - improvement or deterioration since the time of injury - will be noted and the player observed, generally for 4+ hours.
- ▣ Possible emergency neuroimaging will occur.



# Medical Management

- ▣ Steps in the process:
  - Check for symptoms and signs.
  - Perform neuropsychological test.
  - If all OK, graduated return to play.
  - If not OK, wait and review later.



# Concussion Follow Up Investigations

- ▣ Neuroimaging
- ▣ Objective balance assessment
- ▣ Neuropsychological assessment
- ▣ Genetic testing
- ▣ Experimental concussion assessment modalities



# Post-Concussion Syndrome

- ❑ Prolonged symptoms after a concussion is called a Post-Concussion Syndrome.
- ❑ May last weeks to months.
- ❑ Symptoms include: headaches, difficulty concentrating, emotional and behavioural problems, irritability, noise sensitivity, problems with concentration and memory, depression, anxiety, fatigue, poor judgement.
- ❑ Awareness important.



# Post-Concussion Syndrome Short-term

- ▣ Nausea
- ▣ Drowsiness
- ▣ Headache
- ▣ Dizziness
- ▣ Poor judgement



# Post-Concussion Syndrome Long-term

- ▣ Tend to be predominantly psychological.
- ▣ Irritability.
- ▣ Depression.
- ▣ Anxiety.
- ▣ Fatigue.
- ▣ Problems with concentration and memory.
- ▣ Noise sensitivity.

# Graduated return to play 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 exercise	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, and cognitive load
5. Full contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

# Same-day RTP

- ▣ In some settings, where team physicians are experienced in concussion management and sufficient resources are available, return to play management may be more rapid.
- ▣ Athletes allowed to return to play on the same day may demonstrate problems not evident on the sidelines, and may have delayed onset of symptoms.
- ▣ Younger (less than 18yo) athletes should **NEVER** return to play on the day of injury.



# Rules of thumb

- ▣ All suspected head injuries require urgent medical assessment!
- ▣ Assume the athlete has been concussed until proven otherwise! (ie, by a doctor)
- ▣ No athlete should return to play or training while symptomatic! (headache, nausea etc)
- ▣ Medical clearance from a qualified medical practitioner must be gained before returning to play or training!



# Thank You

- ▣ Consensus Statement on Concussion in Sport: the 3rd International Conference on Concussion in Sport held in Zürich, November 2008
- ▣ [www.jsams.org/content/consensus\\_collection](http://www.jsams.org/content/consensus_collection)
- ▣ [www.thehiddenepidemic.com](http://www.thehiddenepidemic.com)