Sport Concussion

Chantel Debert MD MSc FRCPC CSCN
Physical Medicine and Rehabilitation
Department of Clinical Neurosciences
Hotchkiss Brain Institute, University of Calgary
Objectives

- Definition
- Epidemiology
- The journey of an athlete
Definition

Sport Concussion

Sport concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces sustain during sport.

Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012
Epidemiology

- Concussion ~600 per 100,000 population

Calgary Data
- 9456 head injuries in ER in 2013
- ~20% revisit rate to the ER within 30 days
- ~1200 mTBI were seen in the sport concussion clinic
- ~2000 pediatric head injuries to ACH

- ~3.8 million annually
- 5-9% of all sports related injuries

WHO TBI is the leading cause of death on young adults world wide.

In 2020, it will be the third leading cause of death and disability in the general population

Ryu et al. 2012
CDC 2012.
The Journey of Jill the Gymnast

- 14 y.o. provincial level gymnast
- Previously healthy
- Hit her head on the vault
- No loss of consciousness
- Felt immediately unwell
Pathophysiology

Rotational Forces
- Shearing
- Twisting

Coup ("blow")

Contrecoup ("counter-blown")
- Contusion
- Swelling
- Blood clots
Immediate Symptoms of Sports Concussion

- Headache
- Blurry Vision
- Amnesia
- Ringing in ears
- Nausea
- Confusion
- Disorientation
- Loss of consciousness
- Balance problems
Immediately Removed from Sport until assessed by a qualified individual...
Emergency / Family Doctor

- Neurological Examination
- Sport Concussion assessment Tool 3
- +/- Imaging (CT head rules)
  - Over the age of 65
  - Vomit >2X
  - Signs of basal skull fracture
  - Open skull fracture
  - Decrease level of conscious within 2 hours of injury
  - Dangerous mechanism of injury
  - Amnesia before impact >30 min
Recommendations

if you notice any change in behaviour, vomiting, dizziness, worsening headache, double vision or excessive drowsiness, please contact your doctor or the nearest hospital emergency department immediately.
Recommendations

Relative REST from Physical and Mental activity

- Easily rousable
- No alcohol
- No sleeping pills
- No aspirin or NSAIDS
- No driving
- No sports until cleared
85-90% of patients with a sport concussion will improve within 1-3 weeks following the injury!!!!!!

Return to Work and School

- **Mental activities:**
  - **Return to school**
    - Common to take ~ 1 week off school
    - Most likely will need a gradual return to school
    - Consider extra time, quiet room, frequent breaks, shorter assignments, more repetition, peer support, reassurance
  
  - **Return to work**
    - Common 1-3 weeks off work
    - Most likely will need a gradual return to work
    - Consider quiet environment, frequent breaks, shortened work day, more repetition, memory aids, softer lighting, peer support, reassurance

Waljas et al. 2013. Return to work following mTBI. J of Head Trauma Rehabilitation.
Atabaki SM. 2013. Pediatric Concussion Update.
## Return to Play Protocol

<table>
<thead>
<tr>
<th>Rehabilitation Stage</th>
<th>Functional exercise at Each Stage of Rehabilitation</th>
<th>Objective of Each Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No activity</td>
<td>Symptom limited physical and cognitive rest</td>
<td>Recovery</td>
</tr>
<tr>
<td>1. Light Aerobic Exercises</td>
<td>Walking, swimming or stationary cycling keeping intensity &lt;70% maximum permitted heart rate</td>
<td>Increase heart Rate</td>
</tr>
<tr>
<td>1. Sport-specific exercises</td>
<td>Skating drills in ice hockey, running drills in soccer, no head impact</td>
<td>Add Movement</td>
</tr>
<tr>
<td>1. Non-contact training drills</td>
<td>Progression to more complex training drills (e.g. passing drills in football and ice hockey)</td>
<td>Exercise, Co-ordination and cognitive load</td>
</tr>
<tr>
<td>1. Full-contact practice</td>
<td>Following medical clearance, participate in normal activity</td>
<td>Restore confidence and assess functional skills by coaching and staff</td>
</tr>
<tr>
<td>1. Return to Play</td>
<td>Normal game play</td>
<td></td>
</tr>
</tbody>
</table>
Jill still has symptoms 4 weeks after the concussion...now what?
Post Concussion Syndrome
Signs & Symptoms of Post Concussion Syndrome

- Cognitive
- Sleep
- Emotional
- Physical
- Headache
- Fatigue
- Sleep
Treatment of Post Concussion Syndrome

- If the patient has a protracted recovery (> 4wks) then a slow ↑ in physical and cognitive activity is recommended.
  - Sub-threshold exercises such as swimming, stationary bike
  - Heart rate should be at 70% of maximum heart rate: 220-age x 0.70 = HR
  - Cognitive activity reading, computer work without becoming symptomatic.

- Complete bed rest is NOT recommended.

The Management of Concussion/mTBI Working Group. Department of Veterans Affairs and Department of Defense; 2009.
Treatment of Post Concussion Syndrome

- Symptom based treatments:
  - Headaches
  - Fatigue
  - Cognition
  - Sleep
  - Visual & auditory difficulties
  - Dizziness & Balance
If the athlete has not improved by 3 months post injury they should be referred to multidisciplinary PCS treatment program.

In Calgary you can refer to the brain injury program. Referral letters and very good educational handouts can be found at:

http://www.albertahealthservices.ca/cbi.asp

Other: University of Calgary Sports Medicine or WinSport

Jill slowly returns to physical and mental activity with the guidance of her physician.

She returns to school full time 5 weeks post injury. She returns to gymnastics 8 weeks post injury.....
Prevention

- Educate
- Monitor
- Wear Protective Gear
- Keep Track of previous concussions
- Insist health and safety comes first
Potential Consequences of Sport Concussion

- Post Concussion Syndrome
- Repetitive Concussions
  - Chronic Traumatic Encephalopathy
- Second Impact Syndrome
Research

- Safe to Play Study
- Neck involvement in Concussion
- Assessing recovery in Concussion using Robotics
- Biomarkers for diagnosing Concussion
Thank you!!!

Questions?

chantel.debert@albertahealthservices.ca

http://www.albertahealthservices.ca/cbi.asp