Diagnosis and Management of Concussion

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Overview

- Definition
- Epidemiology
- Symptoms and Signs
- Diagnosis
- Management
- Return to School/Play/Work
- Post Concussion Syndrome
- Chronic Traumatic Encephalopathy

Concussion Definitions

- **No universal definition**
- **Although most study is done in sport related concussion (SRC), this is applicable to any concussion**

Berlin Consensus

The 5th International Conference on Concussion in Sport, Berlin, October 2016

Sport related concussion (SRC) is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilised in clinically defining the nature of a concussive head injury include:

- **SRC 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.**

- **SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.**

- **SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.**

- **SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.**

- **The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (eg, psychological factors or coexisting medical conditions).**

My Definition of Concussion

- **A generally short lived (<10 days) disturbance of brain function resulting from a direct hit to the head, or from forces transmitted to the head from a body blow**
- **Results in immediate neurologic symptoms**
- **Generally does not cause structural or pathologic change to the brain**

Epidemiology of Concussion

- Majority will be sports or activity related
- Contact sports have the highest incidence (football, hockey, rugby, also soccer, basketball)
- Approximately 5% of athletes in high risk sports/year
- Rate of concussion has been increasing over the last two decades
- Trend may be due to improved detection and awareness (3,4)

Concussion Symptoms

- Typically occur immediately, rarely delayed by hours; usually last <72 hours
- Headache
  - Global or worse where struck, nonspecific, worse with physical or cognitive activity
- Dizziness
  - Sense of dysequilibrium, brief positional vertigo
- Cognitive
  - Cognitive slowing (foggy), impaired memory/concentration, irritable, anxious, fatigue
  - Insomnia or hypersomnolence

Concussion Signs

- **Bump or bruise on head, neck stiffness**
- **Impaired balance**
  - **Stand on 1 foot (do each separately) with eyes open and then closed**
- **Normal neurologic exam otherwise**

Loss of Consciousness (LOC)

- **Most concussions occur without LOC**
- **LOC is a risk factor for prolonged recovery**
- **People will report LOC because they cannot recall events before, during or after their concussion (amnesia)**
- **Usually very brief**

Concussion Symptoms and Signs

- **Not all concussions will include all these components**
- **If one or more of these components is present, a concussion should be suspected and the appropriate management implemented (2)**

Diagnosis of Concussion

- **Variety of tools exist to aid diagnosis and management**
- **None are exclusively effective**
- **Clinical judgment must be used**
- **Have a high index of suspicion**

Assessment of Concussion in your Office

- **Step 1: History**
  - **Have parent/friend provide information**
  - **Ask about past concussions:**
    - **More easily concussed**
    - **Frequency**
    - **Symptoms more severe or prolonged**
  - **Ask about the event which lead to the concussion**
    - **Need to establish a temporal relationship between appropriate mechanism of injury and onset or worsening of symptoms**
    - **Coaches or trainers report may be helpful**

Assessment of Concussion in your Office

- **Step 2: Physical Exam**
  - **Check for head and neck injuries**
- **Step 3: Neurologic Exam**
  - **3 minute neuro exam**
  - **Balance testing (balance on each leg in turn with eyes open and then shut)**

Assessment of Concussion in your Office

- **Step 4: Imaging?**
  - **Concussion is a functional, not a structural injury**
  - **Imaging is not generally useful**
  - **Needed if you suspect a structural injury (brain, face or neck)**
  - **CT without contrast if you suspect intracranial bleeding**
  - **MRI is best, especially if prolonged symptoms (looking for axonal shear injuries, or microhemorrhage)**

Formal Assessment Tools

- **Neuropsychological Testing**
  - **Designed to identify subtle cognitive deficit**
  - **Multiple computer products (ImPACT, CAAT)**
  - **Neuropsychologist ($$$ and not always practical)**
- **Sports Concussion Assessment Tool 5 (SCAT5)**

Concussion Management

- **The majority of concussions will resolve within 10 days**
- **Remove from play the day of the injury is critical**
- **Current standard of care is cognitive and physical rest until acute symptoms resolve then graded return to activity**
- **Evidence for these recommendations are sparse**

How Much Rest?

- Optimal period is unknown
- Expert consensus recommends 24-48 hours of rest before beginning stepwise return to activity
- Many clinicians recommend longer periods (some use “cocooning” – may be harmful)
- One study found 5 days of strict rest did not improve recovery and led to increased symptoms (5)
- A few days of rest followed by a gradual resumption of cognitive activities seems prudent

What is Rest?

- **Ensure patient and/or parents know what you mean by rest!**
- **Cocooning likely not necessary**
- **Physical:**
  - **No physical activity (just necessary walking)**
- **Cognitive:**
  - **Limit “screen time” (some TV likely OK)**
  - **No school for a couple of days, then modify school to self pace (do not provide prolonged period of time away from school/work)**

Return to School Strategy

- Provide notes/written instructions
- Allow self pacing, and perhaps alternate work space
- Hold gym, orchestra and choir
- No use of power tools, equipment, ladders etc.
- Limit use of computers
- Revise curriculum: alternate assignments, open book tests, limit make-up work
- Address school anxiety issues

Return to Sport Strategy

- **Initial period of 48 hours of rest is recommended before starting return to sport strategy**
- **If they experience new symptoms or worsening symptoms at any stage, they should go back to the previous stage**
- **All athletes must provide their coach with a Medical Clearance Letter prior to returning to full contact sport activities**

Return to Sport Strategy (8)

Stage	Aim	Activity	Goal of each step
1	Symptom- limiting activity	Daily activities that do not provoke symptoms	Gradual ret-introduction of work/school activities
2	Light aerobic activity	Walking or stationary cycling at slow to medium pace No resistance training	Increase heart rate
3	Sport-specific exercise	Running or skating drills No head impact activities	Add movement
4	Non-contact training drills	Harder training drills, i.e. passing drills May start progressive resistance training	Exercise, coordination and increase thinking
5	Full contact practice	Following medical clearance	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play	

IMPORTANT!

- **Second Impact Syndrome (cerebral edema)**
- **Increased risk of second concussion in the first 3 months**
- **Increases risk of post concussion syndrome**

Return to Work

- **Communicate with employer**
- **Allow self pacing**
- **Gradual return to full duties (usually over 1-2 weeks)**

Post Concussion Syndrome (PCS)

- No universal definition
- Widely accepted definition is persistence of multiple symptoms more than 10 days post concussion
- More likely to occur if LOC, severe initial symptoms, history of prior concussion, teenagers (especially girls)
- Allow self pacing (total rest is not helpful)
- Keep the person moving forward (see them often)

Post Concussion Syndrome

- If still symptoms at 1-2 months:
  - Treat each symptom individually (headache, insomnia, depression, pain)
  - Do bloodwork and a good physical exam
  - MRI (reassurance and to rule out pathology)
  - Refer to a neurologist
- Watch for secondary gain (MVA)
- Watch for school anxiety

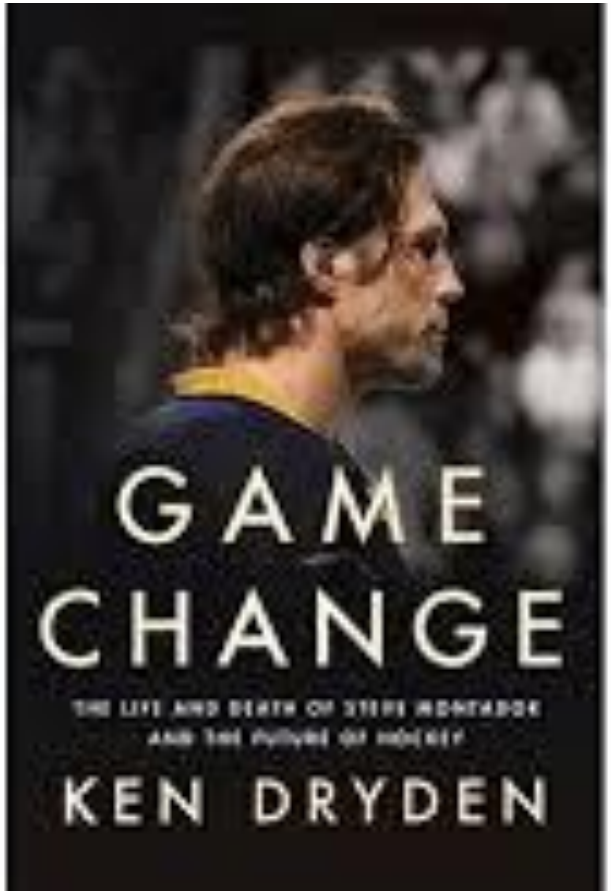
Chronic Traumatic Encephalopathy (CTE)

- Sequelae of repetitive hits to the head over many years (“Punch Drunk syndrome described in 1925: 1st CTE autopsy description 2005)
- Neurodegenerative brain disease with deposition of Tau protein
- Often early stages are psychiatric (irritability, impulsivity, anxiety, depression)
- Later leads to dementia and Parkinsonism
- MRI shows abnormalities
- Seen in professional athletes

Sydney Crosby Effect

- Good
  - Increased awareness
  - Decreased stigma and “cool factor” of being tough
  - Better diagnosis and management
- Bad
  - Fear and anxiety, especially by parents/schools
  - Cocooning
  - Post concussion symptoms are not specific to concussion
  - Secondary gain

A Good Read



Let's Protect Our Young Athletes!

Questions?

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Sport Concussion Assessment Tool 5 (SCAT5)

- **Useful tool to help with diagnosis and monitoring recovery**
- **Complete the SCAT5 at each visit**
- **Provides documentation**
- **For ages 13 and older (Child SCAT 5 for patients under 12)**
- **Free to use and distribute (2)**

Sport Concussion Assessment Tool 5 (SCAT5)

- **Steps:**
  1. **Athlete Background**
     - **Demographic information**
     - **Concussion history etc.**

  2. **Symptom Evaluation**
     - **Checklist scoring from none to severe**
     - **Completed by patient**

Sport Concussion Assessment Tool 5 (SCAT5)

- **Steps:**
  3. **Cognitive Screening**
     - **Simple tests to evaluate orientation, immediate memory and concentration**
  4. **Neurological Screen**
     - **Incudes tests in 3 minute neuro exam and balance examination**
  5. **Delayed Recall Test**

Sport Concussion Assessment Tool 5 (SCAT5)

- **Steps:**
    6. **Decision**
        - **Composite score**
        - **Section for clinical notes**
        - **Tear-off for concussion injury advice**
- **Medical Assessment Letter**
    - **Concussion Diagnosed with directions regarding return to school, work and sports activity**
    - **Concussion Not- Diagnosed patient can return to school, work and sports activity without restrictions**

Return to School Strategy (8)

Stage	Aim	Activity	Goal of each step
1	Daily activities at home that do not give the student-athlete symptoms	Typical activities during the day as long as they do not increase symptoms. Start at 5-15 minutes at a time and gradually build up	Gradual return to typical activities
2	School activities	Homework, reading or other cognitive activities outside of the classroom	Increase tolerance to cognitive work
3	Return to school part-time	Gradual introduction of schoolwork. May need to start with partial school day or with increased breaks during the day	Increase in academic activities
4	Return to school full-time	Gradual progress	Return to full academic activities and catch up on missed school worn