Concussions in Young Athletes

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Disclosures

* None 😞
Objectives

- Define concussion and briefly explain pathophysiology
- Understand prevalence and risk factors for concussion
- Identify concussion symptoms
- Be familiar with short and long term management of concussion
- Understand short and long term risks of concussion
- Know where to go for more information
The Test
BACKGROUND
Definitions

- **AAN**: A clinical syndrome of biomechanically induced alteration of brain function, typically affecting memory and orientation, which may involve loss of consciousness.

- **AMSSM**: A traumatically induced transient disturbance of brain function...caused by a complex pathophophysiological process.

- A subset of mild traumatic brain injury.

- A CLINICAL DIAGNOSIS!
Definitions

- **Zurich Consensus Definition 2012**
  - Complex pathophysiologica l process affecting the brain, induced by traumatic biomechanical forces
  - **Features:**
    - Caused by direct blow or transmitted force to the head
    - Results in the rapid onset of short-lived symptoms that resolve spontaneously
    - May evolve over minutes-hours
    - Results in neuropathological changes that largely reflect functional (not structural) disturbance
    - Results in graded set of symptoms that may or may not include LOC
    - No abnormality on standard structural imaging
AMSSM: Concussions occur when linear and/or rotational forces are transmitted to the brain.
There is no known biomechanical threshold for a clinical concussion.
Pathophysiology

https://youtu.be/Sno_0Jd8GuA
Prevalence/Risk

- Any athlete
  - 1.6-3.8 million concussions per year
  - A large number are unreported
- Females > Males
- History of prior concussion
- Genetics
- Younger age
- More likely in games than practice
<table>
<thead>
<tr>
<th>Sport</th>
<th>Rate/1,000 games</th>
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<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
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<tr>
<td><strong>Football</strong></td>
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<td></td>
<td></td>
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<tr>
<td>High school</td>
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</tr>
<tr>
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<td>3.02</td>
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<td><strong>Ice hockey</strong></td>
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<tr>
<td>High school</td>
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<tr>
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<td><strong>Baseball/softball</strong></td>
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<tr>
<td>College</td>
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<td><strong>Summary of 9 sports</strong></td>
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<td>High school</td>
<td>0.61</td>
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<tr>
<td>College</td>
<td>1.26</td>
<td>0.74</td>
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</table>

*a* Assumes that competitive high school and collegiate baseball players were mainly male and softball players were mainly female.

*b* Sports include football, boys’ and girls’ soccer, volleyball, boys’ and girls’ basketball, wrestling, baseball, and softball.
Mechanisms of Action

* [https://youtu.be/I4ymrEk8UAA](https://youtu.be/I4ymrEk8UAA)
* [https://youtu.be/SNZn8uNseMU](https://youtu.be/SNZn8uNseMU)
* [https://youtu.be/OaLkR2_MIUs?t=20s](https://youtu.be/OaLkR2_MIUs?t=20s)

* [https://youtu.be/JRvBqwHJ08Q](https://youtu.be/JRvBqwHJ08Q)
Symptoms

- Headache
- Loss of consciousness
- Dizziness
- Confusion
- Vision changes
- Nausea/Vomiting
- Photophobia
- Phonophobia
- Emotional lability
- Forgetfulness
- Dazed
- “Don’t feel right”
Thomas Jones
Symptoms

- “Can’t imagine how it feels”
- “Out of body experience” – 3 times
- “Seen stars… seen black spots”
- “Almost like you have a remote control to yourself”
- “A different dimension”
- “Most of the plays, I didn’t even remember until I saw the game the next day”
- “It’s almost like… their soul left them”
Preseason Considerations

- Screen for history of concussion in PPE
- Standardized baseline testing for each athlete
  - SCAT3, ImPACT, others
- Ensure coaches, medical staff, and players are on the same page
Sideline Management

- C-A-B first followed by neurological evaluation
- Balance testing and cognitive testing
- SCAT3, NFL Sideline tool, etc.
- Monitor closely
- AAN app – Concussion Quick Check
- Other apps include SCAT2, ImPACT app, PLAY IT SAFE
Sideline Management

When in doubt, take them out!
Initial Clinical/ER Evaluation

- Thorough history from the patient and a witness if possible
- Regular physical exam
- Neurological exam with strength testing, reflexes, and balance testing
- Consider a quick memory test such as 3 word recall
- If they clinically appear to be concussed, resist the urge to order brain imaging
It’s The Law!

- Mississippi House Bill 48 in 2014 created a law that states that all high school athletes diagnosed with concussion must be cleared by a physician before return to play.

- Helpful if this can be the same physician who assessed the player initially, but not required.
NCAA Concussion Policy and Legislation mandates the following:

- Annual process that ensures student-athletes are educated about signs/symptoms of concussion
- Process that ensures a student-athlete with concussion symptoms is removed from activity and evaluated by a medical staff member with experience in evaluation and management of concussion
- Policy that precludes RTP for at least that day
- Policy that requires medical clearance for a student-athlete diagnosed with concussion to RTP as determined by a physician or physician designee
Return to Play

- Progression

- Must be symptom free at each stage of the progression before going to the next

- If symptoms develop, must go back to the previous stage

- Average is about 10 days but it takes as long as it takes

- Florida AT-18 form is helpful

  - [https://www.fhsaa.org/forms/general-athletic/at18](https://www.fhsaa.org/forms/general-athletic/at18)
WHY DO WE CARE?
Short Term Dangers/Risks

- Poor performance in school/at work
- Increased likelihood for repeat brain injury later
- Exaggerated response to repeat injury
Short Term Dangers/Risks

- Second Impact Syndrome
  - Cerebral swelling caused by dysregulation of cerebral vasculature
  - Can lead to herniation and death
  - Rare, but devastating
  - Zack Lystedt
Short Term Dangers/Risks
Intermediate Complications

- 10-15% of concussions do not resolve by 10 days
  - Important to ensure that the athlete is following the RTP progression correctly

- Post Concussive Syndrome
  - Can last for weeks to months or longer
  - Symptoms basically the same as acute concussion
  - Some component of psychological disruption may play a role
  - Old > young; female > male

- Treatments
  - Symptomatic and psychological
  - Vitamin regimens?
Post-Concussive Syndrome
Long Term Dangers/Risks

- Evolving knowledge
- Chronic traumatic encephalopathy
- Sensationalized in mainstream media
Other Resources

- CDC – HEADS UP Initiative
- AAN – Concussion toolkit
- Articles by
  - AAFP
  - Mayo Clinic
  - NIH
  - AMSSM
Putting it all Together

- What are the things to look for in a concussed athlete?
- What should you do on a sideline if an athlete looks concussed?
- How should they be evaluated (and what should not happen) on initial presentation to the ER/office?
- What should happen before they return to play?
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* American Academy of Neurology Website


* Lemaster, R. Concussion Update 2013.


* Google images
Thank You!

There will be no questions.

Are there any questions?