OMT for the Patient with Concussion

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Team Physician – USA Wrestling, USA Judo
Motion is Medicine Sports Medicine – Founder & Medical Director
"I like chocolate cake." --- QB Troy Aikman, when asked if the Dallas Cowboys released him because of the effects of his ten concussions.
Objectives

1. Review the most recent concussion symptom sub-domains and how this applies toward a treatment approach.
2. Understand the evolving research supporting OMT in the treatment/management of concussion injury.
3. Discuss a pediatric and adult case of concussive head injury and how OMT may apply to their treatment plan.
4. Identify structural dysfunction that could manifest after a concussion.
5. Formulate an osteopathic treatment plan to address post-concussive symptoms and somatic dysfunction.
What is a Sports Related Concussion (SRC)?

A traumatic brain injury induced by biomechanical forces:

- Results in a range of clinical si/sx that may or may not involve LOC. Resolution of the clinical and cognitive features typically follows a sequential course. In some cases, symptoms may be prolonged.

- The clinical si/sx cannot be explained by drug, EtOH, or Rx use, other injuries (i.e.: c-spine, peripheral vestibular dysfunction, etc) or other co-morbidities (e.g.: psychological factors or coexisting medical conditions).
What is PCS?

World Health Organization definition of PCS
- 3 or more of: HA; dizziness; fatigue; irritability; difficulty with concentrating and performing mental tasks; impairment of memory; insomnia; and reduced tolerance to stress, emotional excitement, or alcohol

- 3 months of 3 or more of above symptoms

Recent definition
- Presence of cognitive, physical and emotional symptoms that last “longer than expected” but at least 1-6weeks
“If you could see a brain limp then a coach would say, ‘get that brain off the field!’”
How do we explain this to patients?

“Brain sprain” analogy to explain mechanism

“Roads under construction” metaphor to explain healing process
  - How modifiers can affect the road repair

“Brain marathoner” to explain treatment plan

OMT introduced as adjunct treatment that can expedite recovery
Modifiers

- Age
- Headache/migraine Hx
- Gender
  - Female > male
- Learning disability
  - ADD/ADHD
- Mood disorders
  - Depression, anxiety, panic d/o, PTSD
- Motion disorders
  - BPPV, motion sickness
- Hx of/repetitive concussions

"For cryin' out loud, will you get back into your body?! It's just a concussion."
Why are we Concerned?

Traumatic brain injury is a common and potentially life-threatening injury.

Possible long-term sequelae and disability.

Important interventions prior to injury.

Return-to-play decisions are often left to the primary care provider.

“Real” Statements

“The ED staff told me that I couldn’t play for 3 weeks because I had a concussion. Why 3 weeks?”

The ED physician told my son he could return to the ice in 72 hours.”

“My pediatrician asked me if my child had lost consciousness. I replied ‘No.’ He told me they didn’t have a concussion.”

“The main concern or worry with TBI is loss of consciousness, right?”

“My teacher must not believe that I have had a concussion because I am not getting any of the help that my doctors have recommended.”
Post-Concussive Syndrome

Wide variety of Sx:
- Chronic headache (migraine variant)
- Photo-/phonosensitivity
- Chronic fatigue
- Vestibular deficits
- Mood issues
- Sleep deficits
- Cognitive deficits
- Academic difficulties

Those who sustain a concussion are 4-6 times more likely to sustain another

Neuropsychological effects of repeated concussions are cumulative
Symptoms of Concussion

- Cognitive
- Somatic
- Affective
- Sleep
## Concussion Signs & Symptoms

### Table 2: Selected acute & delayed signs & symptoms suggestive of concussion

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>Somatic</th>
<th>Affective</th>
<th>Sleep Disturbances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>Headache</td>
<td>Emotional lability</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Anterograde amnesia</td>
<td>Dizziness</td>
<td>Irritability</td>
<td>Sleeping more than usual</td>
</tr>
<tr>
<td>Retrograde amnesia</td>
<td>Balance disruption</td>
<td>Fatigue</td>
<td>Sleeping less than usual</td>
</tr>
<tr>
<td>Loss of consciousness</td>
<td>Nausea/vomiting</td>
<td>Anxiety</td>
<td></td>
</tr>
<tr>
<td>Disorientation</td>
<td>Visual disturbances</td>
<td>Sadness</td>
<td></td>
</tr>
<tr>
<td>Feeling “in a fog”, “zoned out”</td>
<td>(photophobia, blurry/double vision)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacant stare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inability to focus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed verbal &amp; motor responses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slurred/incoherent speech</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excessive drowsiness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Team Physician Consensus Conference, Herring et al, in press, 2011

*From AMSSM webinar: Concussion to Consequence – 2011*
## Concussion Spectrum

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>HA/ Migraine</th>
<th>Vestibular</th>
<th>Ocular</th>
<th>Anxiety-Mood</th>
<th>Fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling slowed down</td>
<td>Headache</td>
<td>Dizziness</td>
<td>Headache</td>
<td>Fatigue</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Feeling like “in a fog”</td>
<td>Pressure in head</td>
<td>Feeling like “in a fog”</td>
<td>Dizziness</td>
<td>Sadness</td>
<td>Feeling slowed down</td>
</tr>
<tr>
<td>“Don’t feel right”</td>
<td>Neck pain</td>
<td>“Don’t feel right”</td>
<td>Blurry/ double vision</td>
<td>“Don’t feel right”</td>
<td>“Don’t feel right”</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>Nausea/ Vomiting</td>
<td>Nausea/ Vomiting</td>
<td>More emotional</td>
<td>Difficulty concentrating</td>
<td></td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>Blurry/ double vision</td>
<td>Balance problems</td>
<td>Drowsiness</td>
<td>Drowsiness</td>
<td></td>
</tr>
<tr>
<td>Confusion</td>
<td>Sensitivity to light</td>
<td>Sensitivity to light</td>
<td>Emotional lability</td>
<td>Confusion</td>
<td></td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td></td>
<td></td>
<td>Nervous or Anxious</td>
<td>Nervous or Anxious</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trouble falling asleep</td>
<td>Trouble falling asleep</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Irritable</td>
<td>Hyposomnia</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hypersomnia</td>
<td></td>
</tr>
</tbody>
</table>

*Italicized symptoms are found in more than one domain*
*Bold symptoms are found only in single domain*
The Osteopathic Sports Medicine Physician

4 Principles of Osteopathy

- The body is a unit; the person is a unit of body, mind, and spirit
- The body is capable of self-regulation, self-healing, and health maintenance
- Structure and function are reciprocally interrelated
- Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function
Typical Office Evaluation

- Detailed history
- Symptom assessment
- Neurological examination
- Vestibular screening
- Cognitive testing

Same day patient feedback:
- Severity of injury
- Prognosis for recovery
- Indication for neuroimaging?
- Level of physical exertion allowed?
- Level of cognitive exertion allowed?
- Academic Accommodations?
- Return to play?

Communication to ATC, referring physician, etc.
The Sport Concussion Assessment Tool Version 5 (SCAT-5) can be used for both baseline and post-injury assessment.

Primarily a distillation of the best pieces of the previous concussion scales and systems into a standardized tool.

Provides diagnostic & return to play recommendations.

One part of concussion management, not the only part!
Concussion Form

- Help better characterize
- Prognosticate
- Eval modifying factors
- Put the big picture together
- Educational prompting

### Concussion Form

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>HA Migraine</th>
<th>Vestibular</th>
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<tr>
<td>Feeling slowed down</td>
<td>Pressure in head</td>
<td>Dizziness</td>
<td>Dizziness</td>
<td>Difficulty concentrating</td>
<td>Difficulty concentrating</td>
</tr>
<tr>
<td>Feeling like “in a fog” &quot;Don’t feel right&quot;</td>
<td>Nausea/ Vomiting</td>
<td>Headache</td>
<td>Headache</td>
<td>Drowsiness</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>Nausea/ Vomiting</td>
<td>Blurred vision</td>
<td>Balance problems</td>
<td>More emotional</td>
<td>Tired</td>
</tr>
<tr>
<td>Confusion</td>
<td>Sensitivity to light</td>
<td>Sensitivity to light</td>
<td>Emotional lability</td>
<td>Nervous or Anxiety</td>
<td>Troubles falling asleep</td>
</tr>
</tbody>
</table>

### General
- WN/WD, in NAD
- Head: No trauma, contusion, ecchymoses
- Eyes: PERRLA, EOMI
- Neck: FROM: ao TTP
- Neuro: (circle if +)
  - CN II-XII
  - DTRs
  - Cerebellar deficits
  - Dystonia (fingertip to nose testing)
  - Dysdiakinesia (one hand at a time)
  - Oculomotor
    - Smooth pursuit (H-test) • Saccades (vertical and horizontal)
  - Vestibulo-Ocular
    - Gaze stability (vertical and horizontal)
    - Nystagmus, provocative dizziness/blurriness?
    - Reverse gaze
    - Visual motion sensitivity
    - Convergence insufficiency
    - Divergence insufficiency
    - Ocular alignment
    - Cover cues (presence of esophoria, esophoria, hyperphoria, hypophoria?)
    - Pupil reaction
    - Accommodation
    - Gait & Balance
  - Romberg/Modified Romberg
  - Heel to toe walking (eyes open fwd & bkwd, then eyes closed fwd & bkwd)
  - BESS, modified BESS

### SCAT 5:
- See sheet
- ImPACT tests:
  - Reviewed

### Neuropsych report

### Osteopathic Structural Exam (OSE):
- Head
- Cervical
- UE
- Ribs
- Thoracic

### A/P:
- Concussion: Post-traumatic HA Mild cognitive impairment
- Vestibular dysfunction Cervicalgia Somatic dysfunction

### Limitations:
- Cell phone/texting video games computer TV driving sideline/games/events

### Anticipated RTP:
- Start RTP protocol

### RTC in:
- ___ days ___ weeks
Physical Exam

- **General**
- **Eyes**
- **Neck**
- **Neuro**
- **CNS**
  - CN II-XII
  - DTRs
- **Cerebellar deficits**
  - Dysmetria (fingertip to nose testing)
  - Dysdiadokinesis
- **Gait & Balance**
  - Romberg/Modified Romberg
  - Heel to toe walking
  - Eyes open fwd & bkwd, then eyes closed fwd & bkwd
  - BESS, modified BESS
- **Oculo-motor**
  - Smooth pursuits (H-test)
  - Saccades (vertical and horizontal)

**Vestibulo-Ocular**
- Gaze stability (vertical and horizontal)
  - Head still, move eyes left/right then up/down between two fingers examiner holds up
  - Check for nystagmus, provocative dizziness/blurriness?
- Reverse gaze
  - Eyes still, move head up/down and left/right while focusing on single point
- Convergence insufficiency
  - Normal is double vision within 6cm from nose
- Divergence insufficiency
- Ocular alignment
  - Cover-uncover (presence of exophoria, esophoria, hyperphoria, hypophoria?)
- Pupil reaction
- Accommodation
- Dix-Hallpike maneuver
- King-Devick test - printed test
Physical Exam

Figure 1. Smooth pursuit testing.

Figure 2. Saccade testing.

Figure 3. Convergence testing.

Figure 4. Divergence testing.
King-Devick Test
Neuropsychologic Testing

- Computerized programs
  - Easily accessed
  - Can be done quickly with immediate results
  - Can obtain “baseline” data on all athletes
  - Evaluate multiple aspects of cognitive functioning in brief time period
  - Measures multiple cognitive processes:
    - Verbal & Visual Memory
    - Cognitive Speed
    - Interaction of Memory & Speed
    - Self-Report of Symptoms
Vestibular Screening

On-field dizziness best-predictor of protracted recovery (>10 days) and PCS

Etiology of dizziness:
- Migraine variant
- Central vestibular dysfunction
- Peripheral vestibular dysfunction
- Cervicogenic
- Psychiatric

Physical Exam
- Ocular-Motor
- Vestibular-Ocular
- Balance Examination
- Dix-Hallpike
Management

Avoidance of activities and situations that may slow recovery
- Eg: athletics, texting, video games, etc.

Allowing adequate time for full physical and cognitive recovery
The Multi-Disciplinary Team Approach for the Concussed Athlete

**Medical Team:**
PCP, SM, NP, Neuro, NS, NR, PM&R, Ortho, Op, OMM, ED

**Rehabilitation Team:**
ATC, PT, SM, Visual, NP, OMM, PM&R

**School/Work Team:**
ATC, Coaches, Nurses, Teachers, Principal, Couns, AD, Employer

**Home Team:**
Athlete, Parents, Significant Other, Siblings, Friends

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ATC – Certified Athletic Trainer; AD – School Athletic Director; Couns – School Counselor; ED – Emergency Department; Neuro – Neurologist; NP – Neuropsychologist; NR – Neuroradiology; NS – Neurosurgeon; OMM – Osteopathic Manipulative Medicine; Op – Ophthalmologist/Optometrist; Ortho – Orthopedic Surgeon; PCP – Primary Care Physician; PM&R – Physical Medicine & Rehabilitation; PT – Physical/Vestibular Therapist; SM – Sports Medicine
My treatment approach

- Explanations
- Concussion packet
  - Explanation and immediate things to watch out for
  - Neck exercises
  - Oculomotor exercises
  - Subsymptom threshold explanation
  - Vitamin Regimen
  - Can’s and cant’s list
- Expected time to symptom recovery
- Expected time to RTP
  - Underpromise and overdeliver!!
- Academic/work accommodations
Concussion Take-Home Sheet

So you’ve had a CONCUSSION. Now what?

What is a concussion?
A concussion is an injury to the brain caused by a direct or indirect blow to the head or caused by the head striking something else such as the ground. A concussion typically causes the rapid onset of short-lived impairment of brain function that resolves spontaneously with time. However, occasionally there can be a more significant problem, and it is important that the symptoms from every concussion be monitored by your athletic trainer and team physician. Concussions usually do not cause structural damage to the brain (e.g., a CT scan of the brain will be normal after a concussion). A concussion can occur whether or not a person is “knocked out.” When you suffer a concussion, you may have problems with concentration and memory, notice an inability to focus, feel fatigued, have a headache, or feel nauseated. Bright lights and loud noises may bother you. You may feel irritable, be more emotional, or have other symptoms. It may be difficult to study, attend class, use the computer, or write text messages.

What should I watch out for?
After evaluation by your athletic trainer and/or team physician it may be determined that you are safe to go home. If your symptoms are severe or are worsening you may be sent to the Emergency Department for further evaluation. If you are sent home, you should not be left alone. A responsible adult should accompany you.

Symptoms from your concussion may persist when you are sent home but should not worsen, nor should new symptoms develop. You should watch for symptoms including:

- Increasing headaches
- Increasing nausea or vomiting
- Increasing confusion
- Garbled/shuffled speech
- Unusual sleepiness or difficulty being awakened
- Trouble using your arms or legs
- Convulsions or seizures

If you notice any of these problems or have any other problems that appears worse as compared to how you felt at the time you left the athletic trainer/team physician, immediately call 911 or have someone take you to the closest emergency department. Please also call your athletic trainer/team physician if at all possible.

Is it ok to go to sleep?
A concussion can make a player feel dizzy or tired. As long as you are not getting worse, as noted above, it is alright for you to sleep. The responsible adult who is accompanying you should wake you up every 2-3 hours to make sure you can be awakened and that your symptoms are not worsening.

Do I need a CT scan or an MRI?
If the athletic trainer/team physician have determined that you are able to go home after the practice or game, these types of diagnostic tests are not necessary. If you are sent to the hospital with a concern for a more complicated injury (e.g., skull fracture, bleeding inside the skull) a CT scan or MRI examination may be considered. If your symptoms linger for several days then these examinations may also be considered by your physician.

May I take something for pain?
Do not take any medications unless your athletic trainer/team physician has told you to do so. Normally we do not advise anything stronger than Tylenol and ask you to avoid such things as aspirin, ibuprofen (Advil/Motrin), naproxen (Aleve), or any other anti-inflammatory medication. We also ask that you do not consume any alcohol and avoid caffeine and any other stimulants. If you are taking any supplements, we would suggest you discontinue the use of them as well. The team physician will determine when you can restart medications and supplements.
My treatment approach

Additional resources available

- Therapy:
  - Physical
  - Vestibular
  - Neurocognitive
  - Visual
  - Occupational
  - Speech

Anything else?!

- We’ll get to that in a minute…
Medical Treatment Approach

- Physical
- Sleep
- Mood
- Cognitive

Pain or mood can alone cause each of the other three

Sleep quite commonly causes mood and cognition issues

Each of the other factors can cause cognitive problems, much more than the other way around
Pharmacologic Approach

Patient presents with 3 months of generalized fatigue, headaches with exertion, and cognitive complaints.

What are you going to treat first?

- **pain only**: gabapentin/topiramate
- **pain plus others**: nortriptyline
- **sleep only**: trazodone, zolpidem
- **sleep plus others**: nortriptyline
- **mood only**: SSRI
- **mood plus others**: nortriptyline
- **cognitive only**: amantadine, donepezil
Pharmacologic Approach cont’d

It is recommended that any medication started to control concussion symptoms be stopped prior to return to play.
Homeopathic Approach

Cognitive:
- Fish oil/omega-3 FAs
- Zinc
- Gingko Biloba

Headaches:
- Coenzyme Q10
- Riboflavin
- Magnesium oxide
- Butterbur

Insomnia:
- Melatonin

Depression/Anxiety
- St. John’s Wort

Other:
- Alpha Lipoic Acid
- N-Acetyl Cysteine
- Curcumin/Turmeric
Management – Cognitive Rest

May include:
- temporary leave from school
- shortening of the school day
- reduction of workload
- allowance of more time to complete work
- Individualized Education Program (IEP)

Avoid taking quizzes, tests, and/or standardized exams

Adequate time to make up assignments

Avoid computer games, video games, television, TEXTING, and possibly driving

Avoid headphones

May need sunglasses & earplugs
C. M. suffered a concussion and developed a post-concussive syndrome. Please provide accommodations until his recovery.

C. M. can return to playing football in a week from now.
Concussion Care Protocols

Date:

To whom it may concern.

__________________________________________ was seen by me for a concussion sustained on ______/____/____. They were advised to abstain from any physical and/or cognitive activity until seen and evaluated by a physician trained to care for concussive injuries.

Please feel free to contact me with any further questions.

Regards,

Daniel A. Clearfield, DO, MS, FAOASM
Primary Care Sports Medicine & Concussion Management

POST-CONCUSSION CARE PROTOCOLS

Student/Athlete:
The above student/athlete has sustained a concussion. A concussion is a brain injury which should be taken seriously and be followed by a physician. In the initial period of recovery following a concussion, it is critical for the student/athlete to have both physical as well as cognitive rest to allow the brain sufficient time to rest and heal.

Academic Relief after Concussion:
Most young people will recover completely from a concussion within a couple of weeks. Typically, athletes can return to school after resting for a few days or less. If problems continue once the athlete returns to school, they should not be required to take quizzes or exams during the initial 1-2 week recovery period. If needed, classroom and homework assignments should be decreased to ensure the student can adequately manage the workload without becoming overly stressed. Scholastic work may worsen symptoms of a concussion as well as prolong recovery, so cognitive rest is important.

Please allow for the following academic accommodations:

- Return to school without academic restrictions
- No return to school. Return on (date) ______/____/____.
- Return to school with the following supports: Review on (date) ______/____/____.
  - + day school for _____ days or until (date) ______/____/____.
  - Shortened classes (i.e. rest breaks during classes). Maximum class length: ______ minutes
  - Allow extra time to complete coursework/assignments and tests
  - Allowing homework load by ______ %. Maximum length of nightly homework: ______ minutes
  - No significant classroom tests, quizzes, or standardized testing at this time
  - Allow testing in a separate, distraction-free environment
  - Limit the use of electronic screens or adjust screen settings, including font size, as needed
  - Preprinted class notes by either the teacher or copy those of a fellow student
  - Allow to participate in class only by listening with no active note taking
  - Check for the return of symptoms when doing activities that require a lot of attention or concentration
  - Take rest breaks during the day as needed
  - Allow student to leave class early to avoid crowded hallways
  - Avoid busy, crowded, or noisy environments (e.g. music room, hallways, lunchroom, etc.)
  - Allow to go home if headaches don’t subside after resting for 15 minutes
  - Allow to wear sunglasses and/or earplugs in class to avoid symptom provocation
  - Modify due dates or requirements for major projects

Other:

Request meeting of Section 504 Plan or School Management Team to discuss this plan and needed supports.

Return to Play Protocol after Concussion:
The student/athlete has the following activity restrictions: no Physical Education, no sports, no running or jumping, no weight lifting, no aggressive play, no recess.

Athletes should be free of all concussion-related symptoms or problems (e.g., headache) before returning to sports. Once the athlete is entirely free of symptoms and a doctor says it is medically safe, returning to play should occur in a gradual, step-wise fashion.

Signed: Daniel A. Clearfield, DO, MS, FAOASM

[ ] Daniel A. Clearfield, DO, MS, FAOASM

[ ] Other:

3963 Boat Club Road • Fort Worth, TX 76135

3963 Boat Club Road • Fort Worth, TX 76135
Management – Physical Rest

Athletes should be withheld from physical exertion until they are asymptomatic at rest
- Usually 1st couple of days

Withhold from organized sporting events
- School, club, etc.

Start into a sub-symptom threshold program of exercise
- Ideally supervised by ATC, parents
Sub-symptom threshold exercise can be beneficial for recovery and help the athlete psychologically as well.

Gradual, closely-supervised active rehabilitation program for children and adolescents is appropriate.

Return to light activity improved patients mood, anxiety, fatigue level, cognitive ability and postural stability.
According to Vienna Conference and concussion in sport (CIS) guidelines, the athlete has to meet three criteria for return to play:

1. Symptom free at rest
2. Symptom free with exertion
3. Normal neurocognitive testing
# CONCUSSION 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. Symptom-limited activity</td>
<td>Daily activities that do not provoke symptoms.</td>
<td>Gradual reintroduction of work/school activities</td>
</tr>
</tbody>
</table>
| 2. Light aerobic exercise            | 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, e.g. passing drills.  
May start progressive resistance training.                                   | Exercise, coordination, and increased thinking                                   |
| 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.                                                                                                   |                                                                                        |

The athlete must be symptom free before beginning each stage.  
Each stage must have at least a 24-hour interval in between.  
If signs/symptoms of concussion return at any stage then return to previous asymptomatic stage.
Vestibular Rehabilitation

Balanced ATHLETE

Concussion Management System

<table>
<thead>
<tr>
<th>Normal vision</th>
<th>Eyes closed</th>
<th>Sway referenced vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sway referenced surface</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1
2
3
4
5
6
Other Considerations: Somatic Dysfunction

- Cranial s/d
  - OA, OM, OCS, CRI

- Spine
  - Cervical, Thoracic, Lumbar
    - Thoracic
    - Lumbar

- Ribs
  - Thoracic outlet, 1st rib, Thoracoabdominal diaphragm

- Sacrum/pelvis
Osteopathic Approach

Head/cranial – OCS, OM suture,
  – Predicted strain patterns from MOI

Neck

UE

R

Thoracic

Sacrum
Other Considerations: Cranial Dysfunction

- Many post-concussion patients have cranial strain patterns.
- Correcting these are critical to the recovery of these patients.
- Treated by DO trained in cranial osteopathy.
Case 1
Case 2

https://www.youtube.com/watch?v=hiPhb8RocAs
Potential Long-Term Sequelae

- Depression
- Anxiety
- Insomnia
- Suicidality
- Migraines
- Cognitive deficits
- Dementia
- Second impact syndrome
- Chronic traumatic encephalopathy

Tony Dorsett

André Waters
Suicide 11/20/2006
Chronic Traumatic Encephalopathy (CTE)

Progressive degenerative disease of the brain found in athletes (and others) with a history of repetitive brain trauma

- Tau protein

Normal Brain  45yo former NFL player  73yo boxer
“Concussion prevention” has become the “holy grail” for sports equipment marketers
- Soccer head gear
- Girl’s Lacrosse head gear/helmets
- Pole vaulting helmet

New football helmets, soccer head pads, mouth guards - NO PROVEN PROTECTION FROM CONCUSSION!!

Multiple flaws in a study looking at “Riddell Revolution” helmet
- Neurosurgery, 2006
Prevention

“The best way to treat an injury is to avoid it in the first place!” --- Mom
The Bottom Line

Any athlete suspected of having a concussion needs to see a HCP trained extensively to deal with brain injury and not just trained to administer a test.

Those professionals should examine athletes' symptoms, balance and medical history along with cognitive function and should have the final say in return-to-play decisions in the interests of athletes' long-term health.

The confluence of symptom assessment, balance assessment, physical assessment, neurocognitive assessment and clinical interview is the 'best practice' approach.
Final Points

Concussions are becoming more generally reported and better managed with increased awareness and national and state legislation as well as education.

There is an international consensus on the definition and standardized sideline evaluation of sport-related concussion.

Osteopathic approach involves treating the whole athlete; considering: home, school, work, social, sports; and evaluating and treating somatic dysfunction.

Appropriate management for sport-related concussion involves a customization of the presented guidelines for each patient.

“When in doubt, sit ‘em out”
My empathy – 9 Concussions!

- 1 baseball in Jr. High
- 3 wrestling in High School
- 1 fall out of truck doing drive-by egging in High School
  - Nailed my target though!
- 1 nunchuk to the head in college
- 1 stethoscope to the head in college
- 1 MVC in med school
- 1 basement beam in residency
“There are many things you can point to as proof that the human is not smart. But my personal favorite would have to be that we needed to invent the helmet. What was happening, apparently, was that we were involved in a lot of activities that were cracking our heads. We chose not to avoid doing those activities but, instead, to come up with some sort of device to help us enjoy our head-cracking lifestyles.”

--- Jerry Seinfeld
Any questions?

4 years old

13 years old

7 years old
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Gagnon, Isabelle., et al. Active rehabilitation for children who are slow to recover following sport-related concussion. *Brain Injury*; 23(12); 956-964’ November 2009.


References


