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 (ie: c-spine, peripheral vestibular dysfunction, etc) or other co-morbidities (eg: 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 1-6 weeks
“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
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

Symptoms of Concussion

Previous Classification

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

## Previous Classification

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><strong>Confusion</strong></td>
<td><strong>Headache</strong></td>
<td><strong>Emotional lability</strong></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”,</td>
<td>(photophobia, blurry/double vision)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“zoned out”</td>
<td></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;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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
# 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><strong>Pressure in head</strong></td>
<td>Feeling like “in a fog”</td>
<td>Dizziness</td>
<td><strong>Sadness</strong></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></td>
<td><strong>More emotional</strong></td>
<td>Difficulty concentrating</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>Blurry/ double vision</td>
<td><strong>Balance problems</strong></td>
<td></td>
<td>Drowsiness</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Confusion</td>
<td>Sensitivity to light</td>
<td>Sensitivity to light</td>
<td></td>
<td><strong>Emotional lability</strong></td>
<td>Confusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sensitivity to noise</strong></td>
<td></td>
<td></td>
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</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

- 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
- 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
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>General: WN/WD, in NAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head: No trauma, contusion, ecchymoses</td>
</tr>
<tr>
<td>Eyes: PERRIA, EOMI</td>
</tr>
<tr>
<td>Neck: FROM, ao TTP</td>
</tr>
<tr>
<td>Neuro: (circle if +)</td>
</tr>
<tr>
<td>- CNS WNL</td>
</tr>
<tr>
<td>- CN II-XII WNL</td>
</tr>
<tr>
<td>- DTRs WNL</td>
</tr>
<tr>
<td>- Vestibulo-ocular WNL</td>
</tr>
<tr>
<td>- Gaze stability (vertical and horizontal)</td>
</tr>
<tr>
<td>- Nystagmus, provocative dizziness/blurriness?</td>
</tr>
<tr>
<td>- Reverse gaze</td>
</tr>
<tr>
<td>- Visual motion sensitivity</td>
</tr>
<tr>
<td>- Convergence insufficiency</td>
</tr>
<tr>
<td>- Divergence insufficiency</td>
</tr>
<tr>
<td>- Ocular alignment</td>
</tr>
<tr>
<td>- Cover+ uncover (presence of esophoria, exophoria, hyperphoria, hypophoria?)</td>
</tr>
<tr>
<td>- Pupill reaction</td>
</tr>
<tr>
<td>- Accommodation</td>
</tr>
<tr>
<td>- Gait &amp; Balance WNL</td>
</tr>
<tr>
<td>- Romberg/Modified Romberg</td>
</tr>
<tr>
<td>- Heel to toe walking (eyes open fwd &amp; blkw, then eyes closed fwd &amp; blkw)</td>
</tr>
<tr>
<td>- BESS, modified BESS</td>
</tr>
<tr>
<td>- SCAT 5:</td>
</tr>
<tr>
<td>- See sheet</td>
</tr>
<tr>
<td>- ImpACT tests:</td>
</tr>
<tr>
<td>- Reviewed</td>
</tr>
</tbody>
</table>

### Osteopathic Structural Exam (OSE):

<table>
<thead>
<tr>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
</tr>
<tr>
<td>UE</td>
</tr>
<tr>
<td>ribs</td>
</tr>
<tr>
<td>Thoracic</td>
</tr>
</tbody>
</table>

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

### Current Symptoms (2/3/6):

<table>
<thead>
<tr>
<th>Cognitive</th>
</tr>
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<tbody>
<tr>
<td>Feeling slowed down</td>
</tr>
<tr>
<td>HA: Migraine</td>
</tr>
<tr>
<td>Vestibular</td>
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<tr>
<td>Anxiety-Mood</td>
</tr>
<tr>
<td>Fatigue</td>
</tr>
</tbody>
</table>

| Feeling like "in a fog" |
| Don’t feel right |
| Pressure in head |
| Nausea |
| Difficulty concentrating |
| Difficulty remembering |

| Feeling like "in a fog" |
| Don’t feel right |
| Dizziness |
| Nausea |
| More emotional |
| Difficulty concentrating |

| Sensitivity to light |
| Sensitivity to noise |
| Sensitivity to light |
| Emotional lability |
| Nervous or anxious |

### Prior Injuries:

ROS Reviewed: __
PMHx Reviewed: __
Medications & Allergies Reviewed: __

### Physical Exam:

<table>
<thead>
<tr>
<th>Vitals: T HR RR BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ht: ______ Wt: ______ FDLMP: ______</td>
</tr>
</tbody>
</table>

### Anticipated RTP:

<table>
<thead>
<tr>
<th>Start RTP protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTC in: ______</td>
</tr>
</tbody>
</table>

### Notes:

- Sustained on/Date of Injury (DOI): __/__/20
- CC: __/__/20
- % from baseline: OVER
- LOC: Y/N Confusion: Y/N Memory loss: Y/N
- Dizziness: Y/N Horainjury: Y/N
- If so, how many? __
- Highest level of Education: ____________________________
- Type of student: Below Avg Avg Above Avg
- Job: ____________________________
- Eval modifying factors

### Referring Physician/ATC

 Doe: ____________________________
Physical Exam

- **General**
- **Eyes**
- **Neck**
- **Neuro**
- **CNS**
  - CN II-XII
  - DTRs
- **Cerebellar deficits**
  - Dysemetria (fingertip to nose testing)
  - Dysdiakinesias
- **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

DEMONSTRATION CARD

TEST I

TEST II

TEST III
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

MEDICINE
SPORTS MEDICINE

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

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
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 physicians. 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 to 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/shurred speech

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 drowsy 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 woken 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?!

- How about OMT!!!
Other Considerations: Somatic Dysfunction

- Cranial s/d
  - OA, OM suture, OCS m, strain patterns, CRI, occipital n
- Spine
  - Cervical
  - Thoracic
  - Lumbar
- Ribs
  - Thoracic outlet, 1st rib, SC joint
  - Thoracoabdominal diaphragm
- Sacrum/pelvis
Case 1
Soft Tissue
OMT Cranium

- Suboccipital inhibition
- Condylar decompression
OMT Cranium

- **Oblique Capitis Superior (OCS) LAS/MFR**
- Borders suboccipital triangle
  - Rectus capitis posterior major - above and medially
  - Obliquus capitis superior - above and laterally
  - Obliquus capitis inferior - below and laterally
- Contains vertebral a and suboccipital nerve
OMT Cranium

Cranial strain indirect release
V-Spread

- V is made up of index and middle fingers of one hand across a suture
- Cluster fingers of other hand opposite side of skull
- “Pulse” the fluid tide toward the V to release the suture
Venous Sinus Release

- Useful for restoring the inherent physiologic mobility of the cranium
- "TaCOS Mmm"
  - Transverse
  - Confluence
  - Occipital
  - Sagittal
  - Metopic
CV4

- Induces internal rotation to redirect the potency of the CSF
- Contact occiptal squama with thenar eminences
  - Make sure you are medial to the occipitomastoid suture
- Follow extension and resist flexion
- Amplitude decreases to a still point
- Hold at the still point until the rhythm overcomes it
- You will detect a softening of the head
2 Man LAS for Craniosacral S/D

- Cranium Physician
  - Caudal hand grasp posterior arches of atlas with thumb and 2nd finger
  - Cephalad hand is rested upon top of the head
2 Man LAS for Craniosacral S/D

- **Sacrum Physician**
  - Physician sitting at pt’s side facing the pt
  - Caudal hand cups sacrum with finger tips at sacral base and palm at apex
  - Cephalad hand reaches across sacral base and compresses bilateral PSIS medially with thenar eminence and fingertips
  - With caudal hand, push slightly anterior to disengage sacrum, and carry it superiorly to balance point
  - Balance the pressure and motion between the cephalad and caudal hands
Medical Treatment Approach

Physical

Pain or mood can alone cause each of the other three

Sleep

Sleep quite commonly causes mood and cognition issues

Mood

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

Cognitive
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**: amitriptyline, nortriptyline
- **sleep only**: trazodone, zolpidem
- **sleep plus others**: amitriptyline, nortriptyline
- **mood only**: SSRI
- **mood plus others**: amitriptyline, nortriptyline
- **cognitive only**: amantadine
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
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 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,

[Signature]

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

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>
<tr>
<td>2. Light aerobic exercise</td>
<td>Walking or stationary cycling at slow to medium pace.</td>
<td>Increase heart rate</td>
</tr>
<tr>
<td>3. Sport-specific exercise</td>
<td>Running or skating drills.</td>
<td>Add movement</td>
</tr>
<tr>
<td>4. Non-contact training drills</td>
<td>Harder training drills, eg. passing drills.</td>
<td>Exercise, coordination, and increased thinking</td>
</tr>
<tr>
<td>5. Full contact practice</td>
<td>Following medical clearance, participate in normal training activities.</td>
<td>Restore confidence and assess functional skills by coaching staff</td>
</tr>
<tr>
<td>6. Return to play</td>
<td>Normal game play.</td>
<td>The athlete must be symptom free before beginning each stage.</td>
</tr>
</tbody>
</table>

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) ______/_____/_____.
  - Returning days for ___ days or until (date) ______/_____/_____
  - Shortened classes (ie: rest breaks during classes. Maximum class length: ___ minutes
  - Allow extra time to complete coursework/assignments and tests
  - Lessen 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 of 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 (eg: music room, hallways, lunchroom, etc.)
  - Allow to go to the nurse’s office if headaches increase
  - Allow to go home if headaches don’t subside after resting for ___ 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: [Signature]
Daniel A. Clearfield, DO, MS, FAOASM
[ ] Other:

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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
Management – Rehab

- Sub-symptom threshold exercise can be beneficial for recovery and help the athlete psychologically as well

- “Goldilocks approach”

- 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
RTP Criteria

According to concussion in sport (CIS) guidelines, the athlete has to meet these criteria for return to play:

- Symptom free per athlete
- Symptom free per parent / coach
- Normal exam
- Normal neurocognitive testing
Management – Graded RTP

Concussion Rehabilitation – Stepwise Return to Play

<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>
<tr>
<td>2. Light aerobic exercise</td>
<td>Walking or stationary cycling at slow to medium pace.</td>
<td>Increase heart rate</td>
</tr>
<tr>
<td>3. Sport-specific exercise</td>
<td>Running or skating drills.</td>
<td>Add movement</td>
</tr>
<tr>
<td>4. Non-contact training drills</td>
<td>Harder training drills, e.g. passing drills. May start progressive resistance training.</td>
<td>Exercise, coordination, and increased thinking</td>
</tr>
<tr>
<td>5. Full contact practice</td>
<td>Following medical clearance, participate in normal training activities.</td>
<td>Restore confidence and assess functional skills by coaching staff</td>
</tr>
<tr>
<td>6. Return to play</td>
<td>Normal game play.</td>
<td></td>
</tr>
</tbody>
</table>

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.
Case 2

https://www.youtube.com/watch?v=hiPhb8RocAs
OMT Spine

Craniosacral OMT, but also:

- Cervical
- Thoracic
- Lumbosacral fascia
Neutral & Non-Neutral Triaxial Plane
Supine Direct HVLA

- Pt. supine with doc on opposite side of rotation (Doc is on Right to treat Left rotation)
- Cross pt’s arms w/arm on side of rotation placed superiorly
- Doc grasps shoulder on side of rotation and rolls pt toward him
- Place thenar eminence under rotated TP at the apex of lesioned group
Neutral & Non-Neutral Triaxial Plane
Supine Direct HVLA

- Roll pt over the doc’s hand
- Doc lifts pt’s head and shoulders to localize the sagittal plane
- Neutral
  - Sidebend (away from doc) to apex of lesioned segment(s)
- Non-Neutral
  - Sidebend (toward doc) at the dysfunctional segment
Typical Cervicals

Supine-Direct-HVLA: Rotational Emphasis

- Apply an HVLA thrust in rotation through the restrictive barrier
Potential Long-Term Sequelae

- Depression
- Anxiety
- Insomnia
- Suicidality
- Migraines
- Cognitive deficits
- Dementia
- Second impact syndrome
- Chronic traumatic encephalopathy
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
Case 3

https://www.youtube.com/watch?v=Zc0H7TxEUwM
OMT Ribs

OMT Craniosacral
OMT C/T/L
Thoracic outlet, 1\textsuperscript{st} rib, SC joint
Thoracoabdominal diaphragm
OMT Ribs

1st rib FPR or Still Technique
Elevated 1st Rib
Seated, Direct HVLA

- Pt seated and physician behind pt
- Drape opposite UE over knee
- Contact 1st rib (superior & posterior) with MCP portion of 1st digit
- With pt relaxed, SB toward lesion and rotate away
- Apply a HVLA thrust in a inferior anterior and medial vector (towards opposite nipple)
  - Vector along forearm
Elevated 1\textsuperscript{st} Rib
Seated, Direct Articulatory

- Pt seated and physician behind pt
- Hold rib with thumb lateral to the costotransverse joint with a finger on its anterior end
- Physician uses hand and neck to move T\textsubscript{1} through its full ROM until best possible motion is obtained
Direct Myofascial Release of Sibsons Fascia

- Use Palms to Cup Patient’s Shoulders
- Straight Arms
- Lean Body Weight to Compress Shoulders Posterior and Inferior
- Use Respiratory Coop or Muscle Energy for Enhancement
- Can “Drive the Bus” for triplanar treatment
“Clearfield Leg Lever”
Treatment for Thoracolumbar S/D

- Patient is prone, with knees together & flexed; Doc is on contralat side of rotation dysfxn
- Doc applies cephalad hand over dysfunction with antero-lateral pressure
- Doc SB pt towards them so fulcrum is at cephalad hand
- Caudad hand pushes down on both legs towards ipsilat side
- Doc has pt try to bring their feet towards the middle of the table against resistance
- Doc takes pt further into barrier with both hands; may apply an HVLA thrust as well
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
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