SPORTS CONCUSSION AND RETURN TO PLAY
No Disclosures
Case History

- 42 year old female, that you have seen previously for neck pain and headaches, tripped in her house and hit her head on the coffee table while falling to the ground.
- Complains of neck pain, headache, dizziness and just not feeling well. She says her face hurts and feels swollen and weird to her.
- She is hoping you can fix her neck pain, because she has to get her kids to their ball game tonight.
EXAM FINDINGS

- BP 150/96, HR 104, 5’4” 125 POUNDS
- AGITATED YOU TOOK VITALS, WANTS TO KNOW WHEN YOU ARE GOING TO FIX HER NECK. THE LONGER SHE WAITS THE WORSE SHE FEELS.
- SAYS DON’T TELL ANYONE I HAVE BEEN TAKING MY SON’S ADDERALL BECAUSE IT HELPS ME GET THINGS DONE. THAT IS WHY MY HEART IS RACING.
- CERVICAL ROM IS DIMINISHED IN ROTATION AND CAUSES PAIN, FLEXION AND EXTENSION IS LIMITED ALSO, AND SHE SAYS MOVING HER HEAD MAKES HER DIZZIER. PALPATION AT C1, 2, 3 ARE TENDER BILATERALLY.
- SHE TALKS SOFTLY SAYING LOUD NOISES HURT HER HEAD, SHE SOUNDS A LITTLE HOARSE AS WELL.
- SHE IS SHADING HER EYES FROM THE LIGHTS IN YOUR OFFICE.
UNANSWERED CLINICAL QUESTIONS

• **DTR’S?**
  • 2 bilaterally upper and lower extremity

• **COORDINATION**
  • Decreased finger to nose left side

• **STANDING**
  • Patient feels wobbly, she is visibly wobbly in Rhomberg’s position

• **WALKING**
  • Sway in her walk and she lists to the left and can not follow a straight line

• **PATHOLOGICAL REFLEXES**
  • Babinski is flexor

• **PINWHEEL SENSATION**
  • Decreased on left side of face, where she hit her head.
  • Decreased on right sided leg and foot
DIAGNOSIS

IS THIS A CONCUSSION?
MAYBE

IS THIS WHIPLASH, PRIMARILY A NECK SYNDROME?
MAYBE

IS THIS VERTEBRAL BASILAR ARTERY OCCLUSION
IT IS IN MY OFFICE UNTIL PROVEN OTHERWISE!
THIS IS EMERGENT, AMBULANCE CALLED AND
CLOSEST ER
I THOUGHT THIS WAS A SPORTS CONCUSSION SEMINAR
Concussions
Recognizing them in your patient’s and practice
You Will:
• Have a better understanding of concussion
• Be better equipped to diagnose a concussion
• Be able to better manage a concussion
• Have an understanding of Post Concussion Syndrome
Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012

Paul McCrory, Willem H Meeuwisse, Mark Aubry, Bob Cantu, Jiří Dvořák, Ruben J Echemendia, Lars Engebretsen, Karen Johnston, Jeffrey S Kutcher, Martin Raftery, Allen Sills, Brian W Benson, Gavin A Davis, Richard G Ellenbogen, Kevin Guskiwicz, Stanley A Herring, Grant L Iverson, Barry D Jordan, James Kissick, Michael McCrea, Andrew S McIntosh, David Maddocks, Michael Makdissi, Laura Purcell, Margot Putukian, Kathryn Schneider, Charles H Tator, Michael Turner
Concussions are often thought of as a blow to the head

Myth 1 You have to hit your head
Myth 2 You have to lose consciousness
Myth 3 My child doesn’t play football
Myth 4 You can tough it out
Myth 5 I had a concussion and I am fine, they must be faking it.
36,000 acres of wheat
Sports are part of this category!
SO WHY ALL THE CONCERN SURROUNDING SPORTS?
SECOND IMPACT SYNDROME
MULTIPLE CONCUSSIONS ≠ SECOND IMPACT SYNDROME OR CHRONIC TRAUMATIC ENCEPHALOPATHY
CASE HISTORY DM

15 YR OLD MALE 5’10” 160LB
RUNNING BACK AND LINEBACKER
NO PREVIOUS CONCUSSION
NO PRIOR HX OF HEADACHE,
LEARNING OR MOOD DISORDERS
DM 15 YO MALE CONTINUED

• HE TACKLED SOMEONE AND AFTER IT NOTICED SOME BLURRY VISION AND A SLIGHT HEADACHE.
• HIS MOM NOTICED HE STUMBED AROUND WEIRDLY. HE WAS RECEIVING THE KICKOFF AND SAYS HE SAW 3-4 FOOTBALLS AND IT BOUNCED OFF HIS CHEST.
• HIS VISION CLEARED UP WHILE TALKING TO THE COACHES SO HE CONTINUED TO PLAY.
• He should have been pulled out of the game until evaluated by a healthcare provider
• He was diagnosed with a concussion the following Wednesday
• He got better over the next week or so and was feeling better, so he ran as a spectator at a cross country meet and all of his concussion symptoms returned with a vengeance.
• I saw him about a five weeks after his initial injury and he was no longer progressing.
2012 Kansas Statutes

72-135. School sports head injury prevention act. (a) This section shall be known and may be cited as the school sports head injury prevention act.
(b) As used in this section:
(1) "School" means any public or accredited private high school, middle school or junior high school.
(2) "Health care provider" means a person licensed by the state board of healing arts to practice medicine and surgery.
(c) The state board of education, in cooperation with the Kansas state high school activities association, shall compile information on the nature and risk of concussion and head injury including the dangers and risks associated with the continuation of playing or practicing after a person suffers a concussion or head injury. Such information shall be provided to school districts for distribution to coaches, school athletes and the parents or guardians of school athletes.
(d) A school athlete may not participate in any sport competition or practice session unless such athlete and the athlete's parent or guardian have signed, and returned to the school, a concussion and head injury information release form. A release form shall be signed and returned each school year that a student athlete participates in sport competitions or practice sessions.
(e) If a school athlete suffers, or is suspected of having suffered, a concussion or head injury during a sport competition or practice session, such school athlete immediately shall be removed from the sport competition or practice session.
(f) Any school athlete who has been removed from a sport competition or practice session shall not return to competition or practice until the athlete is evaluated by a health care provider and the health care provider provides such athlete a written clearance to return to play or practice. If the health care provider who provides the clearance to return to play or practice is not an employee of the school district, such health care provider shall not be liable for civil damages resulting from any act or omission in the rendering of such care, other than acts or omissions constituting gross negligence or willful or wanton misconduct.
(g) This section shall take effect on and after July 1, 2011.

CONCUSSION BY THE NUMBERS

• Estimates between 1.6 and 3.8 million concussions occur annually in the US
• Feared that it is greatly underreported by up to 50%
• Estimate comes from Emergency Department visits although around 80% of concussion patients see a primary care provider first
• 80-90% recover within 10 days
CONCUSSION BY THE NUMBERS

- They happen in every sport
- In sports with similar rules female athletes are at greater risk than males
- Incidence of concussion is greater in sports that have high impact collisions
- There is currently no substantiated data that shows mouthguards can help reduce concussion
- Helmets most likely help reduce the incidence of concussion, but it is not the primary role of a helmet.
Concussions
Recognizing them in your patient's and practice

I Had A Concussion
HOW DO YOU RECOGNIZE THEM

• If you are in practice you are seeing them
• History, history, history
• Physical Exam including Scat3
YOU ARE SEEING THEM

Headache
Pressure in head
Neck Pain
HISTORY

OPQRST
If traumatic onset, does the patient have hx of concussion
if so how many
how recent
course of recovery
Does pt have hx of migraine
Does pt have hx of mood disorders
Does pt have hx of ADD/ADHD or other LD
Are symptoms getting better or worse
If You Suspect a Concussion:
Use the Scat 3 Form
It is intended for a sideline assessment
There is no magic number that equals concussion
If baseline is available it is helpful but not necessary
There is a child's version available also, but we are going to cover the standard form
Potential signs of concussion?
If any of the following signs are observed after a direct or indirect blow to the head, the athlete should stop participation, be evaluated by a medical professional and should not be permitted to return to sport the same day if a concussion is suspected.

Any loss of consciousness?  Y  N
“if so, how long?”
Balance or motor incoordination (stumbles, slow/laboured movements, etc.)?  Y  N
Disorientation or confusion (inability to respond appropriately to questions)?  Y  N
Loss of memory:
“if so, how long?”
“Before or after the injury?”
Blank or vacant look:  Y  N
Visible facial injury in combination with any of the above:  Y  N
## Maddocks Score

"I am going to ask you a few questions, please listen carefully and give your best effort."

Modified Maddocks questions (1 point for each correct answer)

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>What venue are we at today?</td>
<td>0</td>
</tr>
<tr>
<td>Which half is it now?</td>
<td>0</td>
</tr>
<tr>
<td>Who scored last in this match?</td>
<td>0</td>
</tr>
<tr>
<td>What team did you play last week/game?</td>
<td>0</td>
</tr>
<tr>
<td>Did your team win the last game?</td>
<td>0</td>
</tr>
</tbody>
</table>

**Maddocks score**

Maddocks score is validated for sideline diagnosis of concussion only and is not used for serial testing.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>&quot;Pressure in head&quot;</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Neck Pain</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nausea or vomiting</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Dizziness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Balance problems</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling slowed down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Feeling like &quot;in a fog&quot;</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>&quot;Don’t feel right!&quot;</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Fatigue or low energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Confusion</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Trouble falling asleep</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>More emotional</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Irritability</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sadness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Nervous or Anxious</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total number of symptoms** (Maximum possible 22)

**Symptom severity score** (Maximum possible 132)

*Do the symptoms get worse with physical activity?*
- Y
- N

*Do the symptoms get worse with mental activity?*
- Y
- N

**Overall rating:** If you know the athlete well prior to the injury, how different is the athlete acting compared to his/her usual self?

<table>
<thead>
<tr>
<th></th>
<th>No different</th>
<th>Very different</th>
<th>Unsure</th>
<th>N/A</th>
</tr>
</thead>
</table>
**Cognitive assessment**

Standardized Assessment of Concussion (SAC)

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>What month is it?</td>
<td>0/1</td>
</tr>
<tr>
<td>What is the date today?</td>
<td>0/1</td>
</tr>
<tr>
<td>What is the day of the week?</td>
<td>0/1</td>
</tr>
<tr>
<td>What year is it?</td>
<td>0/1</td>
</tr>
<tr>
<td>What time is it right now? (within 1 hour)</td>
<td>0/1</td>
</tr>
</tbody>
</table>

**Orientation score** of 5
IMMEDIATE RECALL

“I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order.”

“I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.”

Do not inform the patient that delayed recall will be tested.
I am going to read you a string of numbers and when I am done, you repeat them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.”

<table>
<thead>
<tr>
<th>List</th>
<th>Trial 1</th>
<th>Alternative digit list</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-2-9-7-1</td>
<td>1-5-2-8-6</td>
<td>3-8-5-2-7</td>
</tr>
<tr>
<td>7-1-8-4-6-2</td>
<td>5-3-9-1-4-8</td>
<td>8-3-1-9-6-4</td>
</tr>
<tr>
<td><strong>Total of 4</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MONTHS IN REVERSE ORDER

“Now tell me the months of the year in reverse order. Start with the last month and go backward. So you’ll say December, November … Go ahead”
NECK EXAMINATION

5

**Neck Examination:**

- Range of motion
- Tenderness
- Upper and lower limb sensation & strength

Findings: ________________________
Balance examination

Do one or both of the following tests:
Footwear (shoes, barefoot, braces, tape, etc.)

**Modified Balance Error Scoring System (BESS) testing**

Which foot was tested (i.e., which is the non-dominant foot)  
Left  Right

Testing surface (hard floor, field, etc.)

Condition

<table>
<thead>
<tr>
<th>Double leg stance:</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single leg stance (non-dominant foot):</td>
<td>Errors</td>
</tr>
<tr>
<td>Tandem stance (non-dominant foot at back):</td>
<td>Errors</td>
</tr>
</tbody>
</table>

Footwear can skew results, especially if comparing to baseline.
SET UP A 10 FOOT LONG STRAIGHT LINE OF ATHLETIC TAPE.

PT WALKS HEEL TO TOE ALONG THE LINE AS QUICKLY AS THEY CAN TURNS AROUND AND COMES BACK.

TIMED TEST BEST TIME OUT OF 4 TRIALS

SHOULD BE LESS THAN 14 SECONDS

TRIAL IS FAILED IF THEY STEP OFF THE LINE, GRAB SOMETHING OR SEPARATE HEEL FROM TOE IN THE STEP. (REPEAT TRIAL IF NECESSARY)
COORDINATION

5 times in under 4 seconds
Fails if misses nose even once.
Fails if they don’t bring their hand back to original spot.
Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.
### ADD IT ALL UP

#### Symptom score
- Number of symptoms $\times \frac{x}{22}$
- Severity of symptoms $\times 132$

#### SAC Total
- Sum of all of the cognitive tests $\times \frac{x}{30}$

#### BESS Total Errors

#### Tandem Gait Seconds

#### Coordination

---

<table>
<thead>
<tr>
<th>Test Domain</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Symptoms of 22</td>
<td></td>
</tr>
<tr>
<td>Symptom Severity Score of 132</td>
<td></td>
</tr>
<tr>
<td>Orientation of 5</td>
<td></td>
</tr>
<tr>
<td>Immediate Memory of 15</td>
<td></td>
</tr>
<tr>
<td>Concentration of 5</td>
<td></td>
</tr>
<tr>
<td>Delayed Recall of 5</td>
<td></td>
</tr>
<tr>
<td><strong>SAC Total</strong></td>
<td></td>
</tr>
<tr>
<td>BESS (total errors)</td>
<td></td>
</tr>
<tr>
<td>Tandem Gait (seconds)</td>
<td></td>
</tr>
<tr>
<td>Coordination of 1</td>
<td></td>
</tr>
</tbody>
</table>
You have to weigh all of the evidence. The more you know about the patient previously the easier it is to diagnose. Diagnose of concussion is difficult because it is a clinical diagnosis. There is no structural damage, more of a functional lesion, there is not a commercially available blood test yet. It is a diagnosis that encompasses evidence from history and exam and your clinical experience. Because we are dealing with the brain, it is prudent to error on the side of caution.
DM 15 YO MALE 11/13/15

39 DAYS POST CONCUSSION
SYMPTOM SCORE 22/22
SEVERITY SCORE 54/132
SAC SCORE 23/30
  DELAY RECALL 3/5
  CONCENTRATION 1/5
BESS 20 ERRORS
  10/10 ON ONE FOOT 10/10 TANDEM
DM 15 YO MALE 11/13/15

OTHER EXAM FINDINGS
REFLEXES AT PATELLAR, BICEPS, BRACHIORADIALIS AND ACHILLES ARE SLUGGISH 1+
PUPILS ARE EQUAL AND REACTIVE TO LIGHT LARGER THAN SHOULD BE
DERMATOMES FEEL DIFFERENT ON LEFT THAN RIGHT PT HAS A HARD
TIME DESCRIBING WHAT HE FEELS
CN 7-12 INTACT
BP SITTING 124/62 HR 56 SPO2 98
BP STANDING 108/62 HR 70 SPO2 98
RAPID ALTERNATING MOVEMENT IS SLOW BILATERALLY WITH
BREAKDOWNS ON THE RIGHT
FINGER TO NOSE WITH EYES CLOSED UNABLE TO HIT HIS TARGET
VOR TEST PT LOSES 3+ LINES OF VISUAL ACUITY
PT CAN NOT MAINTAIN GAZE FIXATION
SMOOTH PURSUITS ARE JERKY
PALPATION OF C-SPINE SHOWS FIXATION C1-4 WITH TENDER HYPERTONIC
MUSCULATURE. DOES NOT REPRODUCE HIS HEADACHE. HURTS LOCALLY
HEAD TILT LEFT, ROTATION TO THE RIGHT GENERALLY FLEXED POSTURE
A FEW WORDS ABOUT OUR KANSAS STATE LAWS

65-2871. PERSONS DEEMED ENGAGED IN PRACTICE OF CHIROPRACTIC. FOR THE PURPOSE OF THIS ACT THE FOLLOWING PERSONS SHALL BE DEEMED TO BE ENGAGED IN THE PRACTICE OF CHIROPRACTIC: (A) PERSONS WHO EXAMINE, ANALYZE AND DIAGNOSE THE HUMAN LIVING BODY, AND ITS DISEASES BY THE USE OF ANY PHYSICAL, THERMAL OR MANUAL METHOD AND USE THE X-RAY DIAGNOSIS AND ANALYSIS TAUGHT IN ANY ACCREDITED CHIROPRACTIC SCHOOL OR COLLEGE AND (B) PERSONS WHO ADJUST ANY MISPLACED TISSUE OF ANY KIND OR NATURE, MANIPULATE OR TREAT THE HUMAN BODY BY MANUAL, MECHANICAL, ELECTRICAL OR NATURAL METHODS OR BY THE USE OF PHYSICAL MEANS, PHYSIOTHERAPY (INCLUDING LIGHT, HEAT, WATER OR EXERCISE), OR BY THE USE OF FOODS, FOOD CONCENTRATES, OR FOOD EXTRACT, OR WHO APPLY FIRST AID AND HYGIENE, BUT CHIROPRACTORS ARE EXPRESSLY PROHIBITED FROM PRESCRIBING OR ADMINISTERING TO ANY PERSON MEDICINE OR DRUGS IN MATERIA MEDICA, OR FROM PERFORMING ANY SURGERY, AS HEREINABOVE STATED, OR FROM PRACTICING OBSTETRICS.
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MANAGING A CONCUSSION

How long ago was the injury?

Are symptoms getting better or worse?

Are their symptoms constant or do they come and go?

Is their symptomatology likely to respond to your care?
MANAGING CONCUSSION

There is not a linear progression in concussion recovery.
MANAGING CONCUSSION

Recovered 2 weeks
THINGS THAT COMPLICATE RECOVERY

Age <18 yoa heal slower from concussion
HX of previous concussions
HX of ADD/ADHD
HX of mood disorders
HX of migraine
Pt compliance
Pressure from peers, parents, school
ACUTE INJURY LESS THAN 72 HOURS

Rest is key.

This is a do nothing time for you as a doctor and for the patient

Let them sleep.  
may sleep 19-20 hours in a 24 hour period

IT IS NOT NECESSARY TO KEEP SOMEONE AWAKE OR WAKE THEM EVERY HOUR.

Family monitors to make sure symptoms are not progressing should not be left alone for 12-24 hours

The less the patient does the better.  
no school, no work etc...
ACUTE LESS THAN 72 HOURS

Referral to family practice doctor

Lost of consciousness or post injury amnesia with at least one of the following:
- Headache
- Vomiting
- Age > 60 years old
- Drug or alcohol intoxication
- Deficits in short-term memory
- Physical evidence of trauma above the clavicle
- Posttraumatic seizure
- GCS score < 15
- Focal neurologic deficit
- Coagulopathy
1. Progressing Headache
2. Progressing Neuro Signs
3. Loss of orientation to time and space
4. Pathological reflex
Patient is still very likely to get better without any intervention!

Light exercise a walk stationary cycle as long as it does not increase or provoke symptoms

May still need restrictions from school or work.

Are they still feeling dizzy or foggy? likely vestibular system is injured

Has the patients symptoms stabilized, even if they are bad?
SUB ACUTE SYMPTOMS PERSIST
5-10 DAYS POST INJURY

Clinical decision time:
These patients are still in the self limiting time frame
Older than 13
Symptoms getting better or worse
Majority of symptoms are getting better, but headache, neck pain etc have leveled off
Normal daily motion does not provoke symptoms
VOMS
Dizziness, fogginess, blurred vision and balance problems are cleared
This test can be very provocative of symptoms.

When there is damage to the vestibular system, patients are often in for a longer battle with symptoms.

If this test is provocative, I would not adjust a pt especially if the adjustment requires head movement.
ONCE SYMPTOMS SUBSIDE

Graduated Return to Play:

Is the athlete back at school full time without accommodations and without symptom provocation!

RETURN TO LEARN BEFORE RETURN TO PLAY

Referral to athletes PCP is necessary
GRADUATED RETURN TO PLAY

Step 1 Light aerobic exercise
  walk, stationary bike....

Get the pts HR up to 70 % of target heart rate
  220-age X .70

Keep Heart Rate there for 15 minutes

Does this provoke any of the athletes concussio symptoms?
  YES, they are done for the day and
  you try again when the symptom
  subside but not before 24 hours.

  NO, they are done for the day and
  can move on to step 2, 24 hours later
GRADUATED RETURN TO PLAY

Step 2 Running on field or court

Get HR up to 80% of target and maintain it for 30-45 minutes

No equipment should be used pads, balls etc...

Jogs, sprints, shuffles, etc...

Did this increase the athletes symptoms?
Yes, done for the day can try again at this step once symptoms clear but not before 24 hours.

No, done for the day progress to next step 24 hours later.
Step 3 Sports Specific Training

This is likely some level of organized practice for your patient. MD/DO must clear them for participation.

Non Contact with full equipment, sports specific tasks, running routes, shooting drills, light weight training or resistance training.

Did this increase the athletes symptoms?
No, done for the day proceed to full contact practice 24 hours later.

Yes, done for the day return to this step after symptoms subside but not sooner than 24 hours.
GRADUATED RETURN TO PLAY

Step 4  Full Contact Practice

There must be clearance from MD/DO to proceed to this point.

Did symptom return?

Yes, done for the day. May return and try again 24 hours later. I would suggest they return to step 3.

No, they are clear to return to play 24 hours later.
RETURN TO LEARN
WHEN THE SYMPTOMS DON’T GO AWAY

Post concussion syndrome
Persistent concussion symptoms
PCS
Most current treatment is aimed at managing symptoms:

What are the patients most prominent symptoms?

- Cognitive
- Vestibular
- Ocular
- Migraine or Headache
- Cervical
CERVICAL

Typical Evaluation of C-Spine:
Even though injury was traumatic, plain films are not often done

Balance problems or dizziness should not be biggest presenting symptom

Does palpation elicit symptoms other than localized tenderness?

Brain may even be healed at this time and the underlying soft tissue injuries are the reason for their prolonged symptoms

Manage like you would whiplash or other cervical spine injuries
POST TRAUMATIC MIGRAINE OR HEADACHE

Is it Migraine or Tension Headache?

Migraine:
moderate to severe in intensity
Pulsating
nausea/vomiting
light/sound sensitivity
worsened with routine activity

Tension:
mild to moderate in intensity
non-pulsating
light or sound sensitivity (maybe)
but no nausea or vomiting
COGNITIVE

Mental activities increase symptoms
Fatigue
No Vestibular Signs
Long days increase symptoms
Neuropsychologist should be considered
Managed with lifestyle modifications most often while the brain continues to heal.
OCULAR

**Eyes do not work together**

- Often causes frontal headache
- Eye fatigue
- Slows reaction time
- Decreases visual memory
- Symptoms increase after reading or math

Consider FOCVD referral
Pts with vestibular dysfunction are most likely to have prolonged recovery.
These are the pts I work with most often.
Dark room rest therapy not the best for them.
need to undergo active rehab.
DM 15 YO MALE 11/13/15

OTHER EXAM FINDINGS
REFLEXES AT PATELLAR, BICEPS, BRACHIORADIALIS AND ACHILLES ARE SLUGGISH 1+
PUPILS ARE EQUAL AND REACTIVE TO LIGHT LARGER THAN SHOULD BE
DERMATOMES FEEL DIFFERENT ON LEFT THAN RIGHT PT HAS A HARD
TIME DESCRIBING WHAT HE FEELS
CN 7-12 INTACT
BP SITTING 124/62 HR 56 SPO2 98
BP STANDING 108/62 HR 70 SPO2 98
RAPID ALTERNATING MOVEMENT IS SLOW BILATERALLY WITH
BREAKDOWNS ON THE RIGHT
FINGER TO NOSE WITH EYES CLOSED UNABLE TO HIT HIS TARGET
VOR TEST PT LOSES 3+ LINES OF VISUAL ACUITY
PT CAN NOT MAINTAIN GAZE FIXATION
SMOOTH PURSUITS ARE JERKY
PALPATION OF C-SPINE SHOWS FIXATION C1-4 WITH TENDER HYPERTONIC
MUSCULATURE. DOES NOT REPRODUCE HIS HEADACHE. HURTS LOCALLY
HEAD TILT LEFT, ROTATION TO THE RIGHT GENERALLY FLEXED POSTURE
DM 15 YO MALE 11/20/15

46 DAYS POST CONCUSSION
SYMPTOM SCORE 6/22
SEVERITY SCORE 6/132
SAC SCORE 26
DELAY RECALL 4/5
CONCENTRATION 1/5
BESSION 0 ERRORS
DM 15 YO MALE 11/20/15

He was sent home with at home exercises in school restrictions. Plan of follow up in a month progressed well for 2 weeks. At one month follow up he had 17/22 symptoms with a score of 30/132. Biggest problem was sleeping at night.
JANUARY-FEBRUARY 2016

HIS SYMPTOMS ARE MINIMAL IF HE GETS A GOOD NIGHTS SLEEP

HE CAN EXERCISE WITH HR AT 140BPM WITHOUT SYMPTOMS BUT HEADACHE STARTS AT 160

HE IS FRUSTRATED HE CAN NOT RTP WITH TRACK SEASON APPROACHING

END OF FEBRUARY HR CAN GET TO 160, SYMPTOMS ARE MOSTLY GONE BUT HE STILL FATIGUES EASIER THAN EXPECTED
HE WAS FINALLY RETURNED TO PLAY 5 MONTHS AFTER HIS INJURY

HE DECIDE TO NO LONGER PLAY CONTACT SPORTS

HE COMPETED IN CROSS COUNTRY THIS FALL

HE ALSO HELPED WITH HIS FOOTBALL TEAM AS A MANAGER
2014 Kansas Statutes

72-135. School sports head injury prevention act. (a) This section shall be known and may be cited as the school sports head injury prevention act.
(b) As used in this section:
(1) "School" means any public or accredited private high school, middle school or junior high school.
(2) "Health care provider" means a person licensed by the state board of healing arts to practice medicine and surgery.
(c) The state board of education, in cooperation with the Kansas state high school activities association, shall compile information on the nature and risk of concussion and head injury including the dangers and risks associated with the continuation of playing or practicing after a person suffers a concussion or head injury. Such information shall be provided to school districts for distribution to coaches, school athletes and the parents or guardians of school athletes.
(d) A school athlete may not participate in any sport competition or practice session unless such athlete and the athlete’s parent or guardian have signed, and returned to the school, a concussion and head injury information release form. A release form shall be signed and returned each school year that a student athlete participates in sport competitions or practice sessions.
(e) If a school athlete suffers, or is suspected of having suffered, a concussion or head injury during a sport competition or practice session, such school athlete immediately shall be removed from the sport competition or practice session.
(f) Any school athlete who has been removed from a sport competition or practice session shall not return to competition or practice until the athlete is evaluated by a health care provider and the health care provider provides written clearance for the athlete to return to such competition or practice session.