



Concussion Updates for the Primary Care Office

Anne Marie Zeller, DO, MSc, CAQSM
Sports Medicine Physician
Associate Professor- Family Medicine and
Osteopathic Medicine

LMU

DeBusk College of Osteopathic Medicine
LINCOLN MEMORIAL UNIVERSITY

Objectives

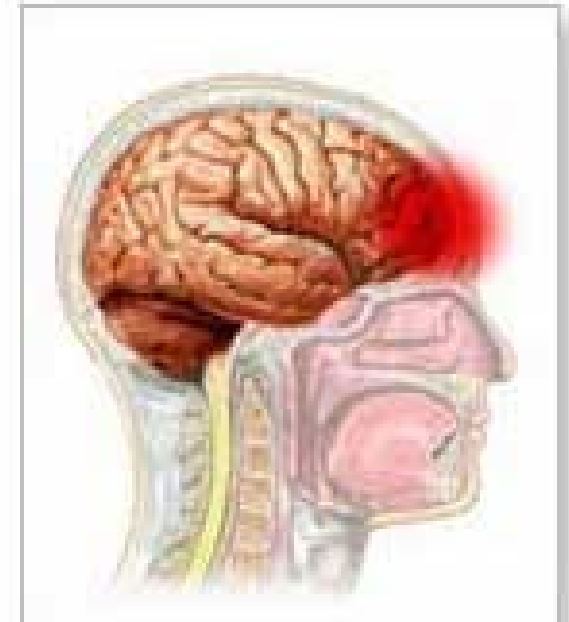
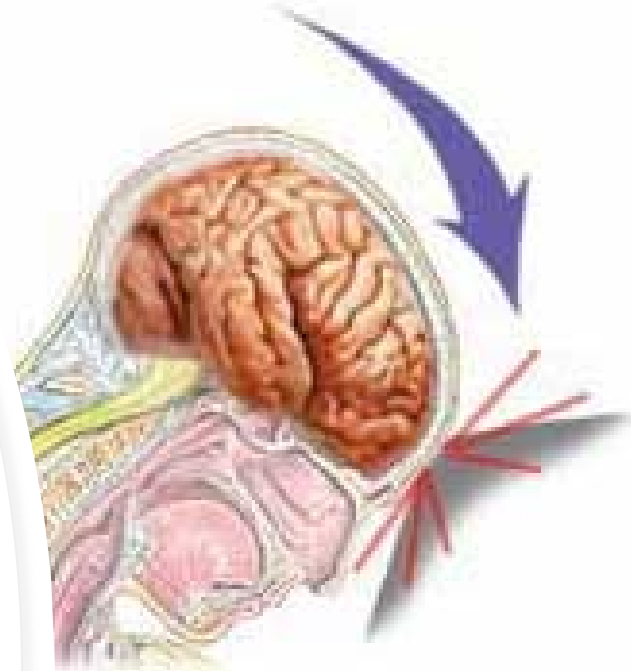
- Review efficient and evidence-based approach to sports concussion in the primary care setting
- Update examination skills when evaluating sports concussion in the primary care setting
- Understand medico-legal issues surrounding concussions

Disclosures

- I, Anne Marie Zeller, have no financial disclosures

Definition

- Blow to the head causing neurological impairment
- No structural damage: can't see on MRI / CT
- Changes at the chemical level
- Long list of symptoms / signs
- Typically reversible, spontaneous resolution



Symptoms

- Physical
- Cognitive
- Emotional
- Sleep

HEADACHES

Nausea

Vomiting

Balance

Visual

Photophobia

Phonophobia

Dazed



Symptoms

- Physical
- **Cognitive**
- Emotional
- Sleep

Fatigue

Slowed down
& foggy

Difficulty
concentrating

Difficulty
remembering

Short term
amnesia

Confusion

Delayed
mentation

Repeats
questions

Symptoms

- Physical
- Cognitive
- **Emotional**
- Sleep

Irritability

Sadness

Increased Emotionality

Nervousness



Symptoms

- Physical
- Cognitive
- Emotional
- **Sleep**

Drowsiness

Sleeping more

Sleeping less

Difficulty falling asleep



Dispelling Myths & Improving Diagnosis

- Myth: must have loss of consciousness (LOC) to be concussed
 - LOC occurs in only **10%** of concussions
- Myth: wake someone up for Q2 hour neuro checks!
 - **WRONG!** Sleep is the best medicine for concussion
 - Check in on someone once overnight
- Myth: “You have a mild concussion”
 - We no longer grade concussions
 - **AVOID** qualifying severity
 - Can’t predict recovery
 - Care must be individualized
 - Symptoms guide Management





Evaluation



Assessment

- History & subjective symptom checklist
- Neurologic exam
- Mental status exam (SCAT 5)
- Balance testing (BESS)
- Visual Ocular Motor testing (VOMS)
- Neuropsych testing



History

- Mechanism of injury
- Amnesia present?
- Cervical spine concerns?
- Neurologic symptoms – numbness, tingling, weakness?
- Vomiting?
- Prior medical history relevant?
 - Prior concussions, bleeding disorders, anxiety, depression, migraine / headaches, learning disability, somatic manifestations of stress and anxiety, sleep disorders, ADD/ADHD
- Post Concussion Scale (PCS)
 - Subjective report rating 21 common symptoms
 - Athlete, Child, Parent rating system

Physical Exam

Eyes: pupils, fundoscopic, EOM tracking

ENT: dental, palate rise, TMs, sense of smell, hemotympanum, battle's sign

Neck: ROM, tenderness, Spurling's maneuver

Extremities: ROM, tenderness, strength

Neuro: CN, reflexes, sensation, rapid movements, coordination (finger to nose)

Gait, tandem gait



- Sport Concussion Assessment Tool (SCAT5)
 - SCAT 5 – 13yo and above
 - Child SCAT – 5 to 12yo
 - Good reliability within 48-72 hours after injury
- PCS - Post Concussion Scale (See next slide)
- SAC – Standardized Assessment of Concussion
 - Orientation
 - Concentration
 - Immediate Memory
 - Delayed recall
- BESS – Balance Error Scoring System

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: Baseline Post-Injury

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6

Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6

Total number of symptoms: _____ of 22

Symptom severity score: _____ of 132

Do your symptoms get worse with physical activity? Y N

Do your symptoms get worse with mental activity? Y N

If 100% is feeling perfectly normal, what percent of normal do you feel?

If not 100%, why?

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score	of 5	

List	Alternate 5 word lists					Score (of 5)		
						Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
Immediate Memory Score						of 15		

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1

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.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan	0	1
Months Score	of 1	
Concentration Total Score (Digits + Months)	of 5	

SAC TOTAL SCORE= 30

STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

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.

Time Started

Please record each word correctly recalled. Total score equals number of words recalled.

Total number of words recalled accurately:

of 5

or

of 10

STEP 6: DECISION

	Date & time of assessment:		
Domain			
Symptom number (of 22)			
Symptom severity score (of 132)			
Orientation (of 5)			
Immediate memory	of 15 of 30	of 15 of 30	of 15 of 30
Concentration (of 5)			
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal
Balance errors (of 30)			
Delayed Recall	of 5 of 10	of 5 of 10	of 5 of 10

SAC Scoring

25-29% have no reduced score immediately

- Even though symptoms present

Need ↓ 3 pt to represent significant change

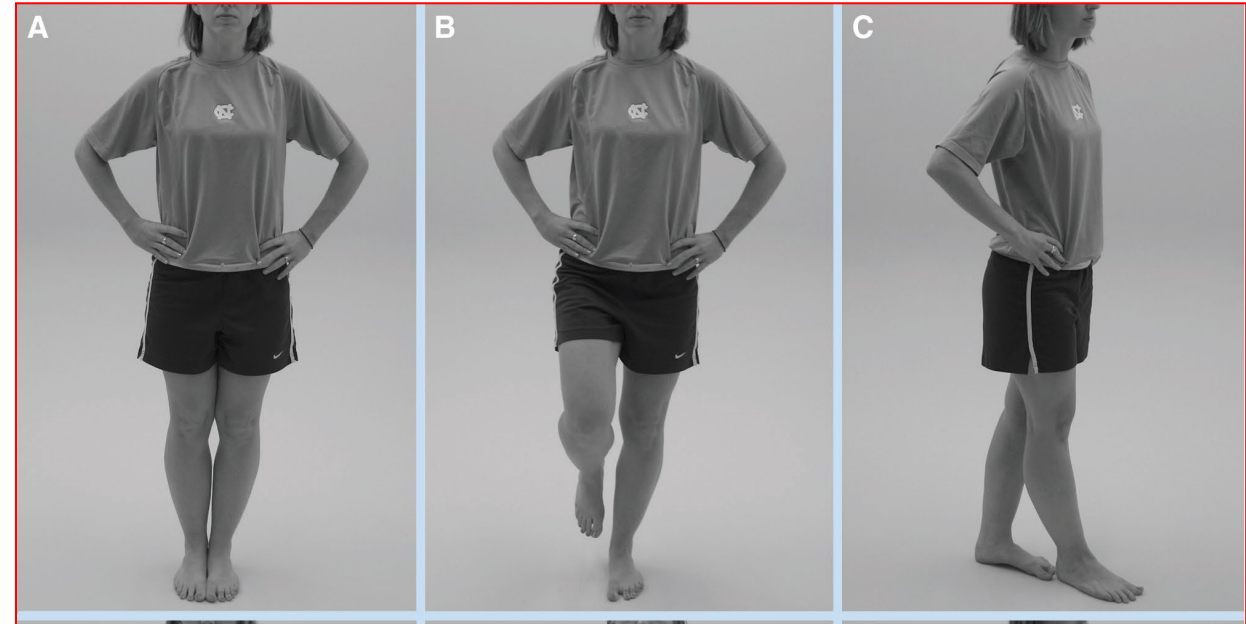
- McCrea: ↓ 3.5 (33 injured athletes)
- McDaniel: ↓ 3.4 (21 injured athletes)
- Hecht: ↓ 2.1 (78 injured athletes)

Scores return to normal before symptoms resolve

Repeat before RTP to establish baseline SAC

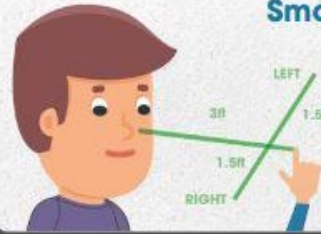
BESS – modified

- Three positions on hard surface
 - Original BESS did same 3 positions on foam in addition to hard surface
- “Which foot would you prefer to kick a ball with?”
- 20 sec each position
- Eyes shut



Right foot is dominant

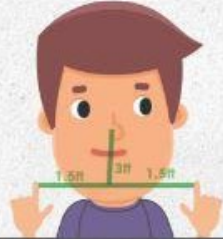
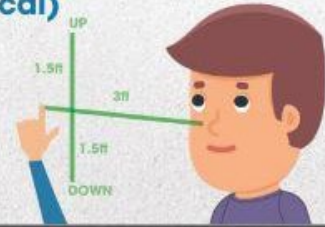
Vestibular/Ocular-Motor Screening (VOMS)



Smooth Pursuits (Horizontal & Vertical)

Tests ability to follow a slowly moving target

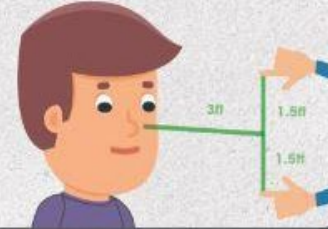
Both patient and clinician are seated
 Patient follows finger with eyes
 Do NOT move head, just eyes
 2 reps at rate of 2 sec / rep
 Rate symptoms (0-10)
 Complete for both horizontal & vertical



Saccades (Horizontal & Vertical)

Tests ability of eyes to move quickly between targets

Both patient and clinician are seated
 Clinician holds fingers 3' apart
 Patient initially looks L-R
 Do NOT move head, just eyes
 10 reps as quickly as possible
 Rate symptoms (0-10)
 Repeat with patient looking Up-Down



Convergence

Measures ability to view a near target without double vision

Patient holds target with 14-point font "X" at arms length
 Patient brings target toward eyes focusing on the "X"
 Stop when they see double
 Clinician measures distance from tip of nose to target (cm)
 Repeat 3x; record all 3
 Rate symptoms (0-10)



Visual Motion Sensitivity

Tests visual motion sensitivity & ability to inhibit vestibular induced eye movements using vision

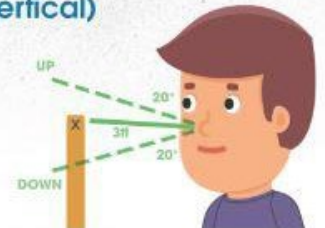
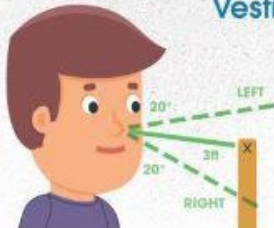
Patient holds arm outstretched in front with thumbs up
 Turn body as a unit to L-R 80 deg from midline focusing on thumb
 Use metronome 50 bpm
 Repeat 5 revolutions
 Rate symptoms (0-10)



Vestibular-Ocular Reflex (Horizontal & Vertical)

Assess ability to stabilize vision as head moves

Clinician holds target 3' from patient's eye level
 Patient initially turns head L-R 10x
 Keep eyes focused on target
 Use metronome 180 bpm
 Wait 10 seconds
 Rate symptoms (0-10)
 Repeat with patient looking Up-Down



Vestibular-Ocular-Motor Screening

- Why do we do this testing?
 - Target specific therapies that can help recovery
 - Help health-care provide give appropriate school/work accommodations for patient/athlete

Vestibular/Ocular Motor Test:	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
BASELINE SYMPTOMS:	N/A					
Smooth Pursuits						
Saccades – Horizontal						
Saccades – Vertical						
Convergence (Near Point)						(Near Point in cm): Measure 1: _____ Measure 2: _____ Measure 3: _____
VOR – Horizontal						
VOR – Vertical						
Visual Motion Sensitivity Test						

Imaging

- Evaluation of cervical spine
 - Whiplash type injuries
 - **AP, lateral, flexion, extension views (odontoid view?)**
 - Rule out fracture, ligamentous instability
- CT or not to CT?
 - R/O intracranial bleed, skull fracture
 - Used in acute setting only
 - Concern for radiation exposure
 - RARELY abnormal in sport concussions
 - Adults co-morbid conditions/anticoagulation
- MRI if prolonged symptoms, congenital abn

Neuropsychologic Testing

Product	Source	Administration Time	Metrics
ANAM Sports Medicine Battery (ASMB)	U.S. Department of Defense	20 min	Reaction time, variability, accuracy, throughput
CogSport (Concussion Sentinel)	CogState, Ltd Melbourne, Australia http://www.cogsport.com/	<18 min	Reaction time, variability, accuracy
HeadMinder	HeadMinder, Inc New York, New York http://www.headminder.com/	<25 min	Reaction time
ImPACT	ImPACT, Inc Pittsburgh, Pennsylvania http://www.impacttest.com/	<22 min	Reaction time, variability, accuracy

ANAM = Automated Neuropsychological Assessment Metrics.

Common computer-based neuropsychological tests for use in sports.

Management



Acute Concussion: Dx & Mgmt

- Tell them “YOU HAVE A CONCUSSION”
- Do NOT grade it or judge severity
- “The majority of children recover within 3 weeks”
- Adults may take longer if working or primary care giver
- Provide guidance – First week
 - Based on severity of signs / symptoms (an art)
 - Cognitive restrictions*
 - Limited use electronic use (computer, tablet, videogames)
 - Limit exertive exercise - weight training, jogging, sit ups
 - NO driving
 - Sleep: when tired, avoid daytime naps

Referral

- ENT – Otolaryngology
 - Orbital / Nasal fx
- Dentistry
- Sports medicine physician
- Physical Medicine and Rehabilitation physician
- Neurology / Neurosurgery
 - Immediate: Focal neurologic deficits
 - Prolonged headache unresponsive to medication
- Neuropsychological Rehabilitation
- Ophthalmology
 - Immediate: concern for retinal detachment, hyphema
 - Delayed: visual field defects, persistent blurry vision, floaters
- Psychiatry



Osteopathic Manipulation

- Headache
- Somatic dysfunction of the spine
 - Cranial
 - Cervical
 - Thoracic
 - Lumbar
 - Ribs
- Upper extremity strain / spasm

Initial Follow-up: 1-3 Weeks

- Repeat evaluation
- School restriction /work accommodations: gradual return
- Physical therapy
 - Cervical strains / sprains
 - Vestibular treatment
 - Balance training
 - Sub-exertion treadmill protocol
- Melatonin 3-5mg po 1 hour before bed
- Counseling immediately if history of mental health issues
- OMM
- Weekly to bi-weekly follow-up

Workload

- Provide modified versions of assignments, extended time
- Reduce overall amount of make-up work, class work and homework; eliminate all unnecessary make-up work
- Allow additional time to complete assignments
- Allow tutor/counselor/intervention specialist

Testing

- No testing until _____
- Allow additional time to complete tests
- Allow use of notes for tests
- No more than one test per day

Physical activity

- No physical exertion – including athletics, gym or recess
- Walking in gym class only
- Begin return-to-play protocol as outlined on the Return to Play handout

Attendance

- No school for _____ school day(s)
- May attend school ____ days/week
- Partial days as tolerated
- Partial days as tolerated, advance to full days as symptoms decrease
- Full days as tolerated

Breaks

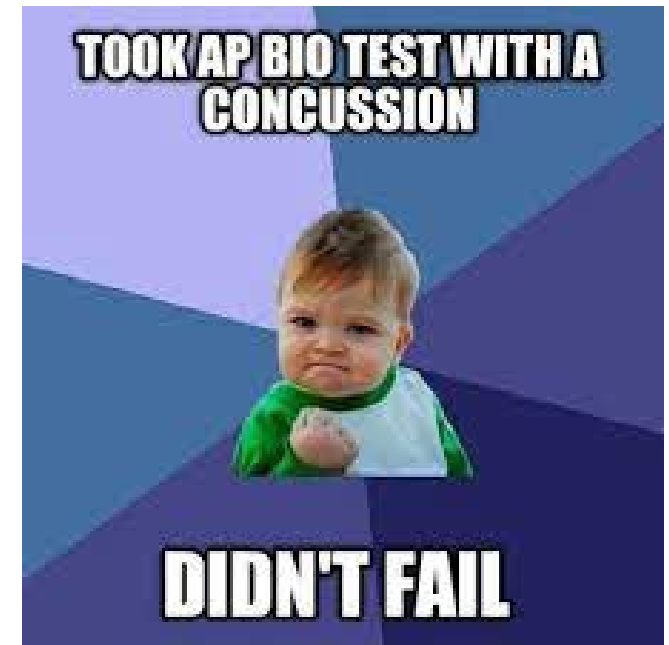
- Allow breaks during school day if symptoms are worsening (recommend resting 20 – 30 minutes)
- Allow student to go to nurse's office or other quiet area for rest, and may go home if symptoms do not subside
- Acetaminophen _____ (Q4hr) or Ibuprofen _____ (Q6hr w/food) may be given to treat headache

Visual stimuli

- Allow student to wear sunglasses/hat in school
- No screen time (e.g., computers, TV)
- Limited screen time (e.g., computers, TV) as tolerated
- Preprinted notes for class material or a note-taker

Audible stimuli

- Allow lunch in a quiet area with a friend
- Avoid music and/or workshop classes
- Allow student to wear earplugs in school
- Allow five-minute early dismissal to move between classrooms



Return to Learn

This patient has suffered a mild traumatic brain injury or concussion. The following employment accommodations may help to reduce post-concussion symptoms and any delay in recovery that can occur if a patient returns to work without needed accommodations. These restrictions must be considered as part of medical care and treatment for this diagnosis. Needed accommodations may vary by a given patient, the nature of the patient's concussion, and/or the nature of the patient's job. The employee and employer are encouraged to discuss and establish accommodations with the workplace until they are deemed no longer necessary by the patient's treatment providers.

Attendance

- No work for _____ work day(s)
- Partial work days as tolerated
- Partial days as tolerated, advance to full days as symptoms decrease
- Full days as tolerated

Breaks

- Allow breaks during work day if symptoms are worsening (recommend resting 20 – 30 minutes)
- Allow employee to go home if symptoms do not subside with breaks

Work Restrictions

- Light duty nonrisk work activity
- Up to moderate duty nonrisk work activity

Environmental Restrictions

- Avoid heights (ladders, scaffolding, etc.)
- Avoid heavy lifting
- Limit computer use
- Limit driving

Additional Restrictions/Accommodations

Return to Work

Management: Return to Sport

- MUST be symptom free
 - “Normal” PCS score < 12
 - HEADACHE free
 - “I feel 100%”
 - School and work full-time, no issues
- Neuropsychological testing back to baseline
 - Repeat computerized test if baseline available before advancing to contact
 - Refer to neuropsychology
 - Fail to improve from baseline
 - No computerized baseline available

Graduated Return to Sport Strategy

Return to Play

Exercise step	Functional exercise at each step	Goal of each step
1. Symptom-limited activity	Daily activities that do not provoke symptoms.	Gradual reintroduction of work/school activities.
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/sport	Normal game play.	

Complications of Concussion

- Second impact syndrome
- Decreased threshold for further concussion
- Decreased cognitive function
- Post-concussive syndrome
- Chronic Traumatic Encephalopathy



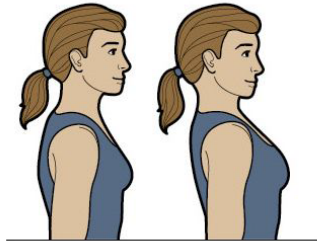


When in doubt...sit out !!

Home Exercise Program

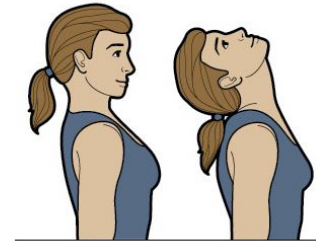
- Cervical retraction
 - Tuck chin in
 - Stretches posterior neck muscles
- Cervical side bending
 - Bring ear toward ipsilateral shoulder
 - Place ipsilateral hand over head to parietal area
 - Push gently to feel stretch of SCM & trapezium
- Cervical rotation
 - Turn head toward ipsilateral shoulder
 - Place ipsilateral hand to contralateral jaw
 - Push gently to feel stretch of SCM

» THE PROGRAM



▼ Neck Retraction

While lying faceup or sitting down, bring head straight back, keeping your eyes on the horizon. Then return to neutral. Repeat 10 times.



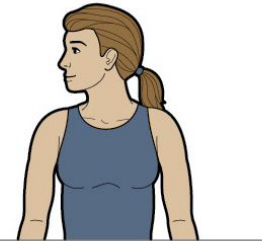
▼ Head Drop

Starting in a seated position, retract neck (as above). Slowly move head up and backward as far as you can comfortably go. Return to neutral. Repeat 10 times. Do this exercise again at the end of each session (so you do it twice each session).



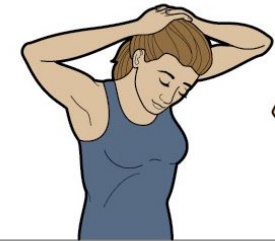
▼ Side Bend

Sit down, bring head into neck-retraction position, then gently guide right ear toward right shoulder with right hand. Stop when you feel a stretch on left side of neck. Return to neutral. Repeat 5 times on each side.



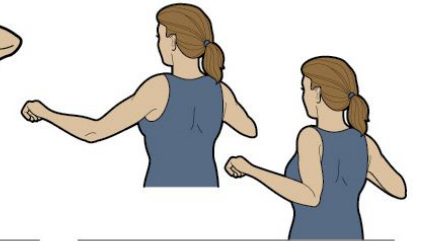
▼ Rotation

While sitting, bring head into neck-retraction position, then gently turn head diagonally to the right so your nose is over your shoulder. Return to neutral. Repeat 5 times in each direction (left and right).



▼ Flexion

Sitting down, bring head into neck-retraction position. Clasp hands behind head and gently guide head down, bringing chin toward chest. Stop when you feel a stretch in the back of your neck. Return to neutral. Repeat 5 times.



▼ Shoulder Blade Pull

While sitting, bend raised arms at 90-degree angles. Relax shoulders and neck. Keeping arms and neck still, squeeze the muscles between shoulder blades, drawing shoulder blades closer together. Return to neutral. Repeat 5 times.

Documentation-Examination

- **EXAMINATION:**

- **Gen:** Patient is alert and oriented to month, date, day of the week, year and time
- **Gait:** Normal heel, toe and tandem gait
- **Head:** Normocephalic
- **Eyes:** Extra-ocular muscle intact, pupils are equal, round and reactive to light and accommodation Peripheral visual fields are intact
- **Skin:** no ecchymosis or edema
- **Neuro:** sensation intact, reflexes 2/4 UE and LE, heel to shin nml, coordination finger to nose nml, nml rapid alternating motions. Cranial nerves II through XII are grossly intact.
- **Psych:** mood and affect appropriate
- **Special Testing-** VOMS? BESS?

- **Cervical exam:** No tenderness to palpation of the midline cervical spinous process or transverse processes, full range of motion without any significant tenderness, mild tenderness to palpation of the paravertebral cervical region on the {LEFT/RIGHT:2652}
- **MSK strength:**
 - 5/5 Shoulder abduction bilaterally (C5)
 - 5/5 Elbow extension bilaterally (C7)
 - 5/5 Elbow flexion bilaterally (C6)
 - 5/5 Wrist extension bilaterally (C7)
 - 5/5 FDI and ADM bilaterally (C8)
 - 5/5 Grip bilaterally (T1)
 - 5/5 Hip Flexion (L2)
 - 5/5 Knee extension (L3)
 - 5/5 ADF (L4)
 - 5/5 EHL (L5)
 - 5/5 APF (S1)

Effective and Efficient OMM Techniques to Consider

Cervical soft tissue

Sub-occipital release

Trapezius Pinch

Thoracic Inlet treatment (Indirect)

Muscle Energy C2-C7

Muscle energy for trapezius / levator
scapulae / SCM

Occiput-C1 muscle energy

C1-C2 muscle energy

*Cranial

DOCUMENTATION-OSTEOPATHIC STRUCTURAL EXAMINATION

- Head/Cranial: OA FSrRl; left suboccipital muscle hypertonicity
- Cervical- AA Rl, right paraspinal hypertonicity
- Thoracic- T1 F/E RrSr
- Ribs- Rib 1- exhaled on right
- Upper extremity- restriction of right SCM, levator scapulae, and trapezius

OMT Procedure NOTE

- After discussion of risks and benefits, patient was treated with osteopathic manipulation to the head, cervical spine, thoracic spine, ribs and upper extremity (5-6 regions) using soft tissues, MFR, ME techniques. Patient had no complications of procedure and had improvement in pain, function and range of motion.

Physical Examination and Treatment Form

Date of Office Visit: ___/___/___ Participant ID#: _____
 Physician's Name: _____ Physician ID#: _____
 Patient Classification: New Patient Returning Patient

Physical Findings OMT Duration (minutes): _____ Height (in): _____ Weight (lbs): _____ BP (mm Hg): ___/___
 Respiration (bpm): _____ Temp (°F): _____ Pulse (bpm): _____

Region	Severity						Findings	Notes	Region	Severity						Findings	Notes
	0	1	2	T	A	R				Te	0	1	2	T	A		
Head/Face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Shoulder	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Shoulder	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Thoracic	T1-T4						<input type="checkbox"/>		Arm/Elbow	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	T5-T9						<input type="checkbox"/>		Arm/Elbow	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	T10-T12						<input type="checkbox"/>		Hand/Wrist	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Ribs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Hand/Wrist	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Lumbar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Hip/Thigh	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Sacrum/Pelvis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Hip/Thigh	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Pelvis/Innominate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Knee/Calf/Shin	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Abdomen/Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Knee/Calf/Shin	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Other:								Ankle/Foot	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
								Ankle/Foot	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

Region	Treatment Method												Response				
	ART/Still	BLT/LAS	CR	CS/FPR	HVLA	IND/Func	ME	MFR	ST	VIS	Other (Please specify)	R	I	U	W		
Head/Face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Thoracic	T1-T4						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	T5-T9						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	T10-T12						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ribs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Lumbar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sacrum/Pelvis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pelvis/Innominate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Abdomen/Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shoulder	Right		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Left		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Arm/Elbow	Right		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Left		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hand/Wrist	Right		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Left		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hip/Thigh	Right		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Left		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Knee/Calf/Shin	Right		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Left		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ankle/Foot	Right		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Left		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Written Diagnosis	Diagnosis Code	Related to Somatic Dysfunction	Diagnosis Code	Somatic Dysfunction of ...	Diagnosis Code	Somatic Dysfunction of ...
		<input type="checkbox"/> Yes <input type="checkbox"/> No	___ 739.0	Head/Face	___ 739.4	Sacrum
		<input type="checkbox"/> Yes <input type="checkbox"/> No	___ 739.1	Neck	___ 739.5	Pelvis
		<input type="checkbox"/> Yes <input type="checkbox"/> No	___ 739.2	Thoracic	___ 739.9	Abd/Other
		<input type="checkbox"/> Yes <input type="checkbox"/> No	___ 739.8	Ribs	___ 739.7	Upper Ext
		<input type="checkbox"/> Yes <input type="checkbox"/> No	___ 739.3	Lumbar	___ 739.6	Lower Ext

Treatment Plan and Home Instructions (Prescribed Medications, PT, Exercise, Nutrition, Other, Follow-up):

Documentation/Billing

- Diagnosis- 1) Concussion, 2) Cervicogenic headaches, 3) Somatic dysfunction of head, cervical spine, thoracic spine, ribs, and upper extremity
- Somatic dysfunction areas treated (98927 for OMM to 5-6 areas):
 - Head / Cranium
 - Upper extremity
 - Cervical
 - Thoracic
 - Ribs
- Established patient/New patient/Consult
- Remember -25 Modifier to indicate that a separately identifiable service was performed on the same day
- In-office exercises taught and successful demonstrated
 - 97110- “Therapeutic procedure, 1 or more areas, each 15 minutes; therapeutic exercises to develop strength and endurance, range of motion and flexibility”

QUESTIONS?



Email: AnneMarie.Zeller@LMUNet.edu

IG: @Zeller.SportsMedicine

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ADDENDUM- Osteopathic Manipulative Treatments for Post-concussion Cervicogenic Headaches

A.T. Still Quote

An osteopath is only a human engineer, who should understand all the laws governing his engine and thereby master disease.

- Autobiography of A.T. Still

Contra-indications to OMM

- ABSOLUTE
 - Vertebral fracture
 - Neurologic loss
 - Cervical instability traumatic
 - Nerve root avulsion
 - Bone metastasis to cervical spine
- Cautions
 - Cervical instability from Down's Syndrome (C1-C2 instability) and severe cervical OA
 - Disc herniation
 - Spinal stenosis
 - Hemophilia (direct techniques)
 - Uncooperative patient
 - Medical-legal issues

Does Osteopathic Manipulative Medicine work for Cervicogenic Headaches?

“Let us not be governed today by what we did yesterday, nor tomorrow by what we do today, for day by day we must show progress.”

-Still, A. T., Journal of Osteopathy, 1898

Pitfalls in Osteopathic Manipulative Treatment Research and Practice

Subjectivity of treatments

- Dosage
- Frequency
- Modalities
- Duration

Time consuming

- 5-30 mins
- Clinic appointment time requirements

Reimbursement/funding

- Billing/coding lack of knowledge
- Funding??

Bias?

- Persons with low levels of education
- Non-White and Hispanic patients

Evidence Based Research for OMM for Cervical Spine

- Groisman et al 2019
 - N=90- randomized control trial
 - OMT and exercises and exercises
 - Exercise group once a week for 4 weeks
 - Stabilization, flexing, extension and rotation exercises for the cervical region
 - Self-mobilization targeting the deep neck muscles
 - OMT treatment (also with exercise) once a week for 4 weeks, 50-60 min per session.
 - Ten registered osteopaths performed all the treatments.
 - The osteopathic manipulative treatment entailed: direct (high-velocity low-amplitude; muscle energy; and myofascial release), indirect (functional techniques and balanced ligamentous tension), visceral and cranial techniques

Evidence Based Research for OMM for Cervical Spine

- Cholewicki et al 2022
 - N=97
 - Evaluated thoracic spine, rib cage, cervical spine, cranium
 - Treatment with HVLA to cervical spine, then could choose if needed soft tissue, muscle energy, myofascial or articulatory techniques
 - Received 3-4 treatments over 4-6 weeks
 - Improved pain, disability, sleep, fatigue and depression

Evidence Based Research for OMM for Cervical Spine

- No determination for appropriate “dose”
- RCT benefits with cervicogenic headache (CGH) management, but little known with post-concussion CGH
- Heterogeneity of the treatment's limits comparison of studies
- Positive response predictors for manual & manipulative treatments ¹
 - High frequency of attacks
 - Relief of headache with movement
 - Manual trigger point treatment
- Discussed research of main areas of treatment for CGH ¹
 - Upper spine
 - Thoracic
 - Deep cervical flexors

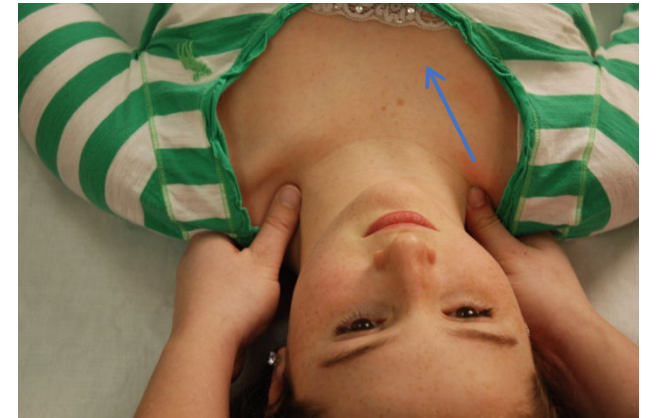
Evidence Based Research for OMM for Cervical Spine

- Bryans¹ practice recommendations:
 - Spinal manipulation: CGH, specifically HVLA
 - Joint mobilization (small oscillation motions): CGH
 - Deep neck flexor home exercises: BID for 6 weeks
- Case Reports: Combined Concussion & CGH symptoms
 - Guemsey²: resolved concussion symptoms & improved balance immediately after OMM
 - Castillo³: 16 yo female treated with OMM

- Nerves close to somatic areas:
 - Suboccipital nerve innervates **OA joint**
 - C2 spinal nerve, dorsal root ganglion close proximity to lateral capsule **AA** zygopophyseal joint, **AA and C2-3** zygopophyseal joints
 - Decreased CGH with discectomy at **C5-C6**

Myofascial Release of Cervico-Thoracic Inlet Technique

- Place thumbs on 1st ribs near cervico-thoracic junction
- Evaluate freedom of movement in rotation and side-bending (1st rib moves caudal)
- Gently apply pressure with thumb in direction of the ease of motion until tissue relaxes or motion is less asymmetric
 - Optional: Approximate hands during techniques to enhance release
- Picture shows ease of motion in side-bending and rotation to the right



Sub-occipital Release

- Place hands near inferior nuchal line
- Lift head up onto fingertips
- Allow a slow release of tissues under head until head is back to neutral
- Repeat 2-3 times



Muscle Energy for Trapezius

- Trapezius isolation for treatment:
 - Place distal hand near AC joint
 - Place superior hand on occiput
 - Side bend away with small amount of cervical flexion
 - Ask pt to shrug shoulder
 - Ask pt to move head to neutral
 - Alternate command motion
 - Repeat 2 times



Trapezius treatment position

Muscle Energy for Levator Scapulae

- Levator scapulae isolation:
 - Place distal hand near superior border of scapula
 - Place superior hand on C2/C3
 - Side bend away with cervical rotation and flexion
 - Ask pt to shrug shoulder
 - Ask pt move head to neutral
 - Alternate command motion
 - Repeat 2 times



Levator scapulae treatment position

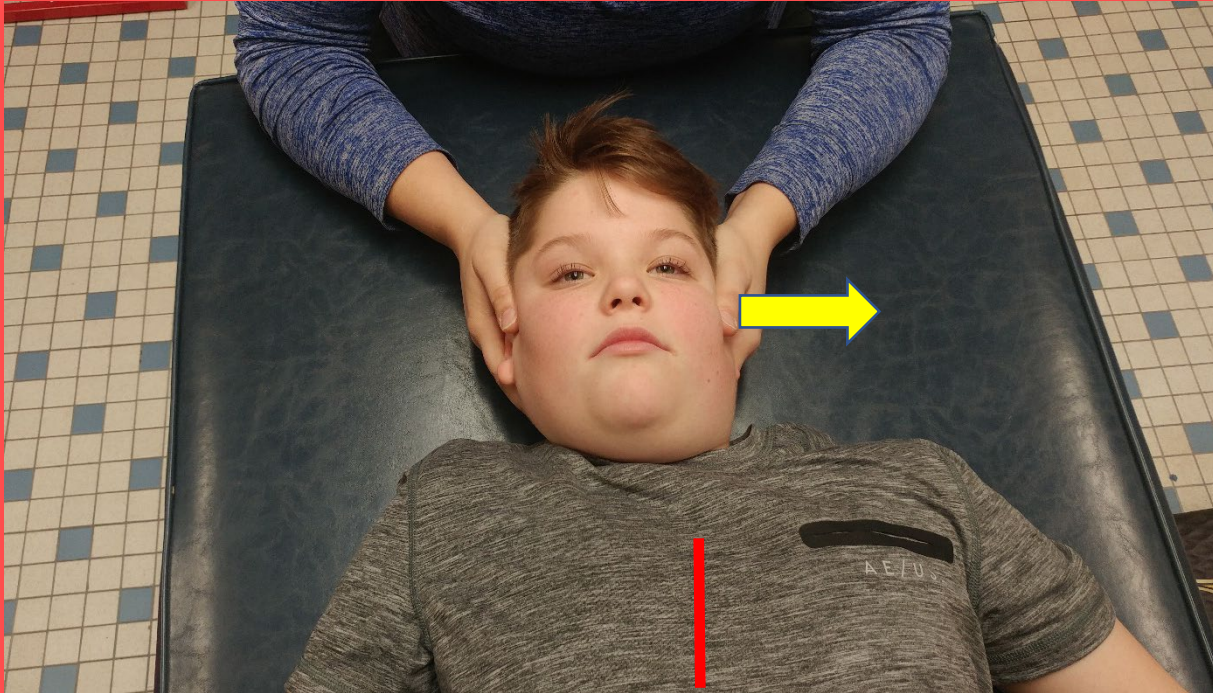
Muscle Energy for Sternocleidomastoid (SCM)

- SCM isolation:
 - Place distal hand near superior clavicle
 - Place superior hand on mastoid process
 - Side bend away and rotate towards treatment side
 - Ask pt to shrug shoulder
 - Ask pt to move head to neutral
 - Alternative command motion
 - Repeat 2 times



Sternocleidomastoid treatment position

Occipital-Atlantal Muscle Energy Treatment



- Diagnosis:
 - Induce mild cervical flexion
 - Translate L & R
 - Repeat with mild cervical extension
 - Note direction of ease & restriction
 - Picture shows OA restricted right
- Treatment:
 - Translate head into restriction
 - Ask patient to push head to neutral for 3 secs (yellow arrow)
 - Return patient head to neutral
 - Repeat 2 times

Atlanto-Axial Muscle Energy Treatment

- Diagnosis:
 - Introduce 30-45 degrees of cervical flexion
 - Introduce rotation to R/L
 - Note area of ease & restriction
 - Picture shows AA restricted right
- Treatment:
 - Rotate pt head into restriction
 - Ask pt to rotate head to neutral (yellow arrow)
 - Repeat 2 times

