

Cervical spine Evaluation and management

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2004 Michigan State University- Environmental Science

2008 - National University of Health Science

Post graduate training

300 plus hours Diplomat, Rehab American chiropractic Council

McKenzie Mechanical Diagnosis and therapy, A-C

Dynamic Neuromuscular Stabilization, DNS, Clinical A-C, Certified Exercise Trainer

Functional Movement Systems I and II

Movnat certified trainer

Selective Functional Movement Assessment

What are we doing Today?

Recent literature in Cervical spine pathology management

Ideas relating to cervical spine pathology

History

Physical exam

Rehab

Neck pain

Neck pain is the fourth leading cause of disability in the United States and exerts an important socio-economic burden around the world

World epidemic

Causes loss of work, depression, anxiety, headaches

Local and global concerns

What are we doing for it?

Evidence points to multimodal presentation and factors to combat neck pain

Recent literature

Lancet and Eur Spine have recently put literature

The Global Spine Care Initiative:

Global Spine Care Initiative: 8 Model of Care Principles



Lancet Series

Call to action

People are suffering, lots of people

Medicine is failing

The more spent the worse the outcomes

Huge opportunity in chiropractic: recommended diet, lifestyle changes, exercise, manual therapy, spinal manipulation



Recent literature

DNF (deep neck flexor)

Normals can still have pain

Normal times range from 29 sec to 56 sec

Cranial Cervical spine extensor

Normals can still have pain range in literature 45 sec to 151 sec

EMG: superficial muscles are active

Recent literature

[Spine J](#), 2018 Aug 22. pii: S1529-9430(18)31085-4. doi: 10.1016/j.spinee.2018.07.026. [Epub ahead of print]

Intervertebral kinematics of the cervical spine before, during, and after high-velocity low-amplitude manipulation.

[Anderst.W11](#), [Gale.T2](#), [LeVasseur.C7](#), [Eaj.S7](#), [Gongawara.F3](#), [Schneider.M3](#).

Single HVLA (done by a chiropractor in this study) resulted in improved motion in 3 planes and reduction in pain

More research

[Send to](#)

[Spine](#), 2018 Oct 11. **Group and Individual-level Change on Health-related Quality of Life in Chiropractic Patients with Chronic Low Back or Neck Pain.**[Hays RD1](#), [Spritzer KL1](#), [Sherbourne CD2](#), [Ryan GW2](#), [Coulter ID3](#).

2,024 participants, 3 month study.

Positive change in quality of life and pain levels

Recent literature

[Braz J Phys Ther](#), 2018 Aug 22. pii: S1413-3555(18)30475-1. doi: 10.1016/j.bjpt.2018.08.007. [Epub ahead of print]

Is forward head posture relevant to cervical muscles performance and neck pain? A case-control study.

[Ghamkhar L1](#), [Kahlaee AH2](#).

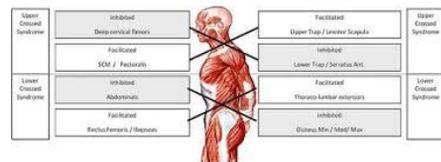
The report is yes.

Cervical spine

Text neck...Mechanical stress leads to pain



Cervical spine Upper cross syndrome



Cervical spine history

History is important in the rehab model

Mechanically thinking:

Which directions cause pain?

Pain worse in the morning?

Cervical spine: physical exam

Exam should have intent

Tests are used to confirm suspicion

Cervical spine: physical exam

Differentiation of cervical radiculopathy vs. shoulder pain

History

ULNT

Arm squeeze test

spurlings

Cervical: physical exam

Vitals: BP, Temperature, Pulse, Respiration, Height and Weight

Neuro: reflexes, power and Sensory

Posture assessment

AROM: Flexion, Extension, Right/Left rotation, Right/Left lateral flexion, Retraction

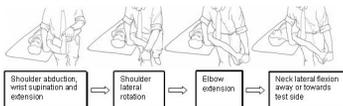
PROM: Flexion, Extension, Right/Left rotation, Right/Left lateral flexion, Retraction

Thoracic spine: Flexion, Extension, Right/Left rotation, Right/Left lateral flexion,

Cervical spine: Physical exam

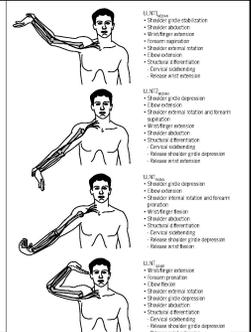
Upper limb tension test

ULNT1: MEDIAN • Shoulder girdle stabilization • Shoulder abduction • Wrist/finger extension • Forearm supination • Shoulder external rotation • Elbow extension • Structural differentiation - Cervical sidebending - Release wrist extensi--



Cervical spine physical exam

ULNT2: MEDIAN • Shoulder girdle depression • Elbow extension • Shoulder external rotation and forearm supination • Wrist/finger extension • Shoulder abduction • Structural differentiation - Cervical sidebending - Release shoulder girdle depression - Release wrist extension



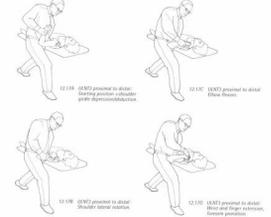
Cervical spine : physical exam

ULNT: RADIAL • Shoulder girdle depression • Elbow extension • Shoulder internal rotation and forearm pronation • Wrist/finger flexion • Shoulder abduction • Structural differentiation - Cervical sidebending - Release shoulder girdle depression - Release wrist flexion



Cervical spine: physical exam

ULNT: ULNAR • Wrist/finger extension • Forearm pronation • Elbow flexion • Shoulder external rotation • Shoulder girdle depression • Shoulder abduction • Structural differentiation - Cervical sidebending - Release shoulder girdle depression - Release wrist extension



Cervical spine : physical exam

Arm Squeeze

"...squeezing with the hand [simultaneous thumb and fingers compression, thumb from posterior (triceps muscle) and fingers from anterior (biceps muscle)] of the examiner, the middle third of the upper arm, elicited local pain"-Eur Spine J (2013) 22:1558-1563

The test was considered as positive when the score was 3 points or higher on pressure on the middle third of the upper arm compared with the other two areas (difference between results in middle third of the upper arm area and in the acromioclavicular joint and subacromial area).



Cervical physical exam

Spurling test

High sensitivity and specificity performing test this way

"Patient sitting. The examiner performed cervical extension and ipsilateral rotation and then added axial compression. An increase in symptoms was considered a positive outcome" Shabat et al., 2012

Value of physical tests in diagnosing cervical radiculopathy: a systematic review Erik J. Thoomes, MS et al. The Spine Journal 18 (2018) 179-189

Cervical physical exam

Shoulder abduction (relief) test In a sitting position, the patients position their afflicted hand above their head. A decrease in symptoms was considered a positive outcome.

Viikari-Juntura et al., 1989



Cervical physical exam

"Traction-distraction test In a supine position, the examiner applied an axial traction force corresponding to 10-15 kg to the patient's neck. A decrease in symptoms with traction and an increase or return of symptoms with the release of traction (distraction) was considered a positive outcome."

Viikari-Juntura et al., 1989



Cervical spine physical exam

ULNT series :

Median nerve

Ulnar nerve

Radial nerve

Arm Squeeze

Spurlings

Cervical spine Functional Test

Diaphragmatic Breathing

Purpose: To assess patients breathing patterns that could be contributing to neck complaints

Test Position: Supine, hook lying or seated

Performing the Test: Observe patient as they breath in and out

Normal Values: Patient is able to breathe without secondary breathing through upper chest, scalenes, SCM

Cervical spine: Functional tests

Deep neck flexor endurance test

Purpose: To assess the endurance of the deep neck flexors (Rectus Capitus Anterior, Rectus Capitus Lateralis, Longus Capitus, Longus Colli - "Muscle specificity in tests of cervical flexor muscle performance").

Test Position: Supine, hooklying.

Performing the Test: Tuck patients chin in and lift off table 1 inch. The examiner looks for substitution of the platysma or SCM muscle.

Normal Values: **Men: 38.9 seconds, Women: 29.4 seconds** ("The Deep Neck Flexor Endurance Test: normative data scores in healthy adults").

Cervical spine: Functional Tests

Cervical Extensor endurance test

Purpose: To assess the endurance of the deep and superficial neck extensors

Test Position: prone, C/T junction level stabilized.

Performing the Test: the ability of the individual to sustain a chin tuck position in neutral for 20 s is evaluated.

Normal Values: 20 sec for male and females

[J Body Mov Ther.](#) 2015 Apr;19(2):213-6. doi: 10.1016/j.jbmt.2014.04.014. Epub 2014 Apr 18.

Cervical spine: Functional Tests

Shoulder Abduction:

Purpose: To assess shoulder range of motion, evaluating for aberrant motion the movement

Test Position: standing with hands by side

Performing the Test: patient reaches over head with thumbs out (anatomical position)

Normal Values: 180 degree arc bilaterally, with good motion

Fails: scapular crash, pain upon reaching, shoulder hiking and limited range of motion

Cervical spine: Functional Tests

Shoulder rock Test: Stability

Purpose: To assess the endurance of the deep and superficial scap stabilizers

Test Position: Quadruped or table top

Performing the Test: Patient is instructed to move forward and backward several times 5-10 reps depending on ability

Normal Values: Able to move forward and back with shoulder and spine centred

Failure to keep scaps to the thorax, pain in the shoulder,

Cervical spine: manual muscle testing

Serratus anterior:

Purpose: Testing the strength of scap stabilizing muscle

Test Position: Patient seated or standing arm 120 degrees of flexion

Performing the Test: Clinicians hand wrapped around scap, thumb on serratus anterior m. and index and middle on inferior angle of the scap. Apply downward pressure

Normal Values: Patient able to hold arm with no scap protrusion or adduction

In overhead athletes can do the same test at varying angles, as you increase the angle lower trap becomes tested as well

So where do we go?

Rehab can get overwhelming.

So many exercises, so many assessments...

What does it all mean?

Cervical spine rehab

Simple rules.

Start proximal. Posture and breathing;

Then add in challenges.

Muscle and Tendon issues tend to do better with some load or resistance.
Cook et. al

Rehab leaders advice

"Attack Success!" Gary Gray PT

..[the hardest thing your patient can do well." Craig Liebenson DC

"In simplest terms it all boils down to the CNS" Vladimir Janda MD

"If breathing is not normalized, no other movement can be " Karel Lewit, MD

Test, Treat, Re -test

Spinal manipulation and rehab

Best practice

Restore the normal range of motion

Elicit a motor control of segmental muscles multifidus, rotatores

Decrease pain

Thoracic spine palpation

Anterior head carriage and chest breathers tend to have restricted joints through the thoracic spine

Patient seated: Hands intertwined and placed behind head, clinician behind and used, Clinician places one hand on spine and other on patients elbows

Palpate for extension and rotation of the thoracic spine

Cervical spine palpation

Upper cervical palpation

Patient supine, Clinician passively puts patient head in cervical flexion then rotation bilaterally, assessing for restriction for rotation

Lower cervical palpation

Patient supine, Clinician passively lateral flexes the cervical spine feeling for joint restriction

Cervical spine palpation

C/T junction

Patient prone, Clinician assesses for extension with P to A palpation

Then Clinician standing at head of table rotates the head of the patient evaluating for Motion through the segments

Cervical spine rehab

Thoracic spine adjusting

Supine Roll or Thoracic anterior

Prone Thenar

Seated or standing long axis

Cervical spine rehab Adjusting

Cervical spine adjusting

Seated or supine Lateral break

Prone C/T junction

Cervical spine rehab

Diaphragmatic breathing

Patient supine position

Inhalation: expansion of the abdomen in 360 degrees, diaphragm drops down

Expiration: abdomen softens slightly, diaphragm raises



Cervical spine Rehab

Neck Retractions

Goal: develop better posture to reduce mechanical stress on structures

Improve range of motion of the cervical spine

Develop strength and endurance to the DNF and Cervical extensors(muscle balance)

Multiple position options Chose from patient direction of preference

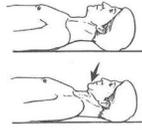
Cervical retractions:

Supine hook lying position

Have the patient try to flatten neck against table

Clinician can use hands to help patient develop motion

Towel or ball can be used at home



Cervical retractions

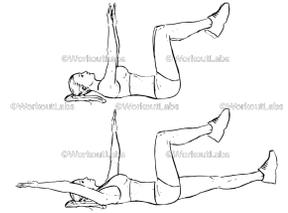
Supine Advancements

Patient able to hold neck position

As they bring legs and arms up.

Then advance to a deadbug

Could even go to a foam roller as well



Cervical spine retractions

Foam roller with legs up



Foam Roller angels



Cervical spine rehab

In groups work thru

Diaphragmatic breathing:

The hook lying breathing and retractions

Dead bug beginner and advanced

Try a foam roller

Cervical retractions

Open Chain Variation

McGill Sit up with retraction

Patient supine with hands under back

Raise head and torso off ground



Seated cervical retractions

Patient seated

In tall posture then bring the chin back, creating double chins

Variations with resistance

Use hands

Use band



Cervical retractions - Prone

Patient on elbows

Based on patient's abilities can move the elbows in wider/narrower and superior and inferior

Progress to raising ribs and belly off table

Use a band for resistance



Cervical retractions prone

Variations for stiff spines

Knees and elbow plank variation

Also, my favorite serratus anterior

Push forearms into table

Rotate band out



Cervical rehab

Break into groups

McGill sit ups

Seated retractions: with and with out band

Prone retractions: try a variety of positions of the elbows and then with bands

Cervical rehab

Quadruped/table top retractions

Index fingers parallel

Slightly push hands into ground

Bring the chin straight back



Cervical spine rehab quadruped

Quadruped advancements

Bird dog - contralateral movement of the Arms and legs

Bear stance - lift the knees slightly off the ground



Cervical Spine Quadruped

Break into groups

Quadruped

Bird dogs

Bears

Cervical spine Rehab Standing

Wall retractions

-One foot length from wall, bring head and chin
Toward the wall

-Ball or towel can be used if excessive anterior head
carriage



Cervical spine rehab: standing

Advancement

- Wall angels
 - Elbows at side
 - Raise up to 90 deg with no ER
 - Rotate wrist and hands back
 - Slide down wall or reach hands overhead



Cervical spine rehab to performance

Deadlift

Barbell, Kettlebell, dumbbell

-Neck retracted

-shoulders retracted



Cervical spine rehab to performance

Shoulder press

Keep posture with neck retracted

Allow weights to go overhead

Train posture with no rib flare or neck protrusion



Cervical spine rehab to performance

Wall foam roller serratus anterior and lower trap

Band around wrist, supinate hands and raise hands over head by rolling on
foam roller



Cervical spine rehab to performance

Any exercise:

Maintain posture

good pressure in abdomen

Watch the exercise

Functional endurance

**Does anyone have an
exercise they would like
to go through?**

Cervical spine rehab to performance

Consistency of intensity

Exercises are training and practice, need to be done daily

Endurance holds 8-10sec, reps to quality

Reverse pyramid to build endurance

Strength training 2-3 x per week, old school rules apply

Cervical spine rehab

ULNT test positive :

HVLA to the upper spine reduces dynamic tension testing.

Posture exercises and send home with nerve flossing exercises

[J Manipulative Physiol Ther. 2018 May;41\(4\):332-341. doi: 10.1016/j.jmpt.2017.10.006. Epub 2018 Apr 16.](#)

[Immediate Effects of Thoracic Spine Thrust Manipulation on Neurodynamic Mobility.](#)

[Harstein A11, Leiva AJ2, Gomes JIC3, Hale S62.](#)

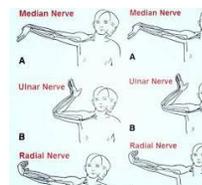
ULNT at home

Dealing with a nerve so be careful

-Start slow and build up, Error on the side of safety

-can use the tests with using the neck as tensioner

-think electric cables



Other nerve dynamic mobilizations

Median nerve: "no more dishes" arms extended out pushing alternate arms away

Ulnar nerve: "monocles" make OK with hands and rotate them over eyes to create "glasses"

Radial nerve: "waiters tip"

Thoracic spine Mobilizations

Wall or bench thoracic spine extension



Thoracic spine extensions

Side lying, knees at 90 degrees

Reach over hand, pull back like a bow and arrow



Cervical rehab: finishing up

Keep it simple for patients

3 exercises at a time

1. Posture/respiration
2. Motor control
3. mobilization/Strength

Exercises at beginning are brain retraining
These need to be done multiple times a day
Quality over quantity
Think stimulate not annihilate

Cervical rehab: finishing up

Have a professional to hand the patient off to for further performance

Questions?

Cervical spine: Case study 1

44 yo F, pain in the right sided neck and right forearm, 18 month duration, no MOI.

Prior Dx medial epicondylitis and neck pain

Physical therapy, chiropractic, medications and injections in elbow

PE: BP 130/73 mmHg, 13 resp, 60bpm, 98.8

Upper cross syndrome

Paradoxical breathing with difficulty learning diaphragmatic breath

Cervical spine: Case study 1

Power, reflexes and sensory normal

Mild loss with moderate pain of extension and right rotation of the cervical spine

Fail shoulder rock, shoulder abduction and cervical endurance tests

Severe pain with referral in the common flexor origin of the right forearm.

Trigger point pronator teres, subs scap, teres minor, pec minor and anterior scalenes

Cervical spine: Case Study 1

CMT to thoracic HVLA, Cervical spine manual traction and grade 3 mobilization

Started with posture

1. Wall posture with mini ball behind head 5 reps 3-4 x daily
2. Hook lying breathing 3-4 x daily
3. Thoracic spine side lying mobilizations

Cervical spine: Case Study 1

2 weeks re evaluation: patient was able to do exercise and clean house with less pain

Progressed to

1. Wall posture with band
2. Supine: dead bug isometrics with slight rolls
3. Serratus anterior: quadruped on elbows with band

Cervical spine: Case Study 1

4 weeks out

Patient able to carry groceries into house for first time in almost 2 years

No pain with driving, sleeping better, back to jazzercise

Less anxious and fearful of movement

HEP

1. Wall exercises with 90 abdd and 90 ER
2. Side plank with ER w green band
3. High oblique sits

Cervical spine: Case Study 2

36 yo Male

CC: Right shoulder pain and weakness, 3 years

MOI: snowboarding accident, head trauma

Emergency dept at time of injury, since then PCP, orthopedic shoulder, orthopedic neck, neurologist, physical therapy, acupuncture

Cervical spine: Case Study 2

Physical exam

Noticeable atrophy of the right bicep, tricep and deltoid compared to the left

Reflexes 0/2 on right bicep, tricep and brachioradialis

Power ½ deltoid and bicep on right

LE reflexes - ½ bilaterally for patellar and achilles, clonus test positive

Cervical spine: Case Study 2

RX: MRI of cervical spine and referral to neuro spine surgeon

Surgery was performed 2/2018

Post surgical rehab

1. Supine isometrics
2. Hooklying breathing
3. BFR bicep

Cervical spine: Case Study 2

Rehab has progressed

1. Neuro dynamic mobilizations
2. Deadbug
3. BFR with bicep

Cervical spine: case 3

15yo female, left shoulder pain

Pain has been ongoing for 6 weeks

No particular onset. Pain worse as day goes on

Ortho, neuro, range of motion unremarkable

CMT to thoracic, cervical spine

Dermal traction of AC joint with shoulder motion

Cervical spine: Case Study 3

HEP:

1. Wall posture
2. Serratus anterior in 1st position
3. McGill sit up with retraction

Complete resolution after 1 visit follow up at 2 weeks and 4 weeks continued

Workouts with trainer and young adult strength program

Thank you for your time!!

Additional info

<https://www.globalspinecareinitiative.org/>

<https://www.thelancet.com/series/low-back-pain>

My information

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