

ADVANCED CERVICAL SPINE ASSESSMENT POST-CONCUSSION



Cervical Spine Mobility & Palpation

IMPORTANCE OF ASSESSMENT & TREATMENT OF C/S POST-CONCUSSION

- Due to the forces sustained during a concussion, it is common that the **cervical spine** may be injured as well¹
- After sustaining a concussion, **neck pain** is one of the top reported symptoms amongst patients¹
- Disturbances in **cervical afferent input of the upper cervical joints** may result in *cervicogenic headache, cervicogenic dizziness, visual disturbances, altered cervical proprioception, and head and eye movement control*
- The **myofascial system** may also be a source of headaches (HAs) and/or neck pain¹
- The diagnostic criteria for CGH include HA with neck pain and stiffness and with dysfunction in the upper cervical spine
- Rotation is significantly reduced in patients with CGH compared to other HAs and the asymptomatic population
- **Cervicogenic dizziness** is described as a sensation of unsteadiness or disequilibrium that occurs together with pain and/or stiffness of the cervical spine and is triggered by neck movements or positions.²
- It is important to consider the cervical spine following concussion to *confirm or negate* its involvement as there may be a **concurrent injury** to the cervical spine and the brain.

PRIOR TO MANUAL SPINE EXAMINATION, ALWAYS SCREEN FOR RED FLAGS

Screen for red flags using:

- a. **SCAT5/CRT 5**
- b. **Canadian CT Head Rules**
- c. **Canadian C-Spine Rules**
- d. **IFOMPT Framework for vascular pathologies**
- e. **Neuro scan:** UMN, CN, peripheral nerves (dermatomes, myotomes, deep tendon reflexes), coordination

***Proceed to next steps if no red flags are present**

ACTIVE RANGE OF MOTION (AROM) C/S

- a. Patient in seated position
- b. Instruct the patient to actively move their head and neck in the following directions:

- i. **Craniovertebral (CV) flexion:** In the sagittal plane, have the patient tuck their chin into their throat
- ii. **CV Extension:** In the sagittal plane, have the patient poke their chin forward and up
- iii. **CV side-flexion + contralateral rotation:** Have the patient tuck their ear into the ipsilateral side of their neck as they poke their chin out in the contralateral direction. Repeat for the opposite side.
- iv. **Mid-cervical flexion:** In the sagittal plane, have the patient actively flex their neck by asking the patient to touch their chin down to their chest.
- v. **Mid-cervical extension:** In the sagittal plane, have the patient actively extend their neck by asking the patient to move their head back so that they are looking at the ceiling
- vi. **CV & mid-cervical rotation:** In the transverse plane, have the patient actively rotate their neck to one side by asking the patient to turn their head as if they are looking over their shoulder. Repeat for the opposite side.
- vii. **Mid-cervical side-flexion:** In the frontal plane, have the patient actively perform side-flexion with their neck to one side by asking the patient to touch their ear to the ipsilateral shoulder. Repeat for the opposite side.
- viii. **Combined movements**

- c. Observe and record:

- i. **Pain** (and location of pain)
- ii. **Limited/decrease ROM**
- iii. **Deviations in movement patterns**
- iv. **Reproduction of symptoms** such as headache and/or dizziness
- v. **Reproduction of radiculopathy sx's**

*The literature suggests that cervical AROM can be a valuable tool for establishing a clinically meaningful diagnosis such as cervicogenic headache, cervical radiculopathy and clinically important cervical spine injuries.¹

**When doing repeated testing of the cervical AROM for left and right rotation, individuals with C/S pain show decreased AROM.²

***ROM can be measured roughly by observation or more accurately using an inclinometer or a universal goniometer.

CV & MID-CERVICAL STABILITY TESTING¹

- a. **CV pain provocation:** compression, axial traction
C0-C1, C1-C2
- b. **CV directional translation:** anterior, posterior,
lateral C0-C1
- c. **Alar ligament:** rotary stability C0-C2
- d. **Transverse ligament:** anterior translation C1-C2
- e. **Mid-cervical pain provocation:** compression,
axial traction C2-C7
- f. **Mid cervical directional translation:** anterior,
posterior, lateral, torsion C2-C7

PALPATION/TRIGGER POINTS

- Throughout this test, the HCP must continually ask the patient if there is any pain, tenderness or provocation of symptoms when palpating the different structures of the C/S
 1. To begin palpation assessment, the patient should be in a seated position or lying prone or supine.
 2. The HCP should ask and record if there is any:
 - Tenderness when palpating each structure
 - Pain provoked by palpation
 - Exacerbation of symptoms such as headache, dizziness, numbness/tingling
 3. The HCP should palpate the following structures:

- Central spinous processes
- Zygapophyseal joints (bilaterally)
- 1st and 2nd costotransverse (CT) joints (bilaterally)
- Paraspinal muscles (bilaterally)
- Suboccipital area and muscles
- Deep neck flexors and segmental spinal muscles (to feel for muscle tone/atrophy)
- Upper Fibers of Trapezius (UFT) muscles (bilaterally)
- Sternocleidomastoid (SCM) muscles (bilaterally)
- Scalene muscles - anterior, middle, posterior (bilaterally)
- Levator scapulae muscles (bilaterally)
- Any other muscles of the neck with active trigger points

MANUAL PASSIVE MOBILITY TESTING

a. Passive manual joint movement in the posterior to anterior (PA) direction¹ → *supine or prone*

- Centrally (PA)
- Unilaterally (PA)
- Shear movement laterally
 - HCP should manually detect and record joint dysfunction +/- concomitant onset of or change in dizziness or headache at 1 or more levels

b. Passive Physiological Intervertebral Motions (PPIVMs)² → *supine*

- OA & AA flexion PPIVM
- OA & AA extension PPIVM
- OA Side-flexion/contralateral rotation PPIVM
- AA rotation PIVM
- Mid-cervical bilateral flexion PPIVM
- Mid-cervical bilateral extension PPIVM
- Side-flexion/contralateral rotation PPIVM

c. Passive Accessory Intervertebral Motions (PAIVMs)² → *supine*

- OA bilateral anterior glide
- OA bilateral posterior glide
- OA & AA unilateral anterior glide
- OA & AA unilateral posterior glide
- Mid-cervical inferior-medial-posterior glide (IMP)
- Mid-cervical superior-anterior-lateral glide (SAL)

***Assessment from lists b. and c. require advanced manual therapy training, and techniques should not be utilized unless HCP possesses competency in manual therapy.**

SPECIAL TESTS - MANUAL SPINE EXAM (MSE)¹

TEST OBJECTIVE

- These battery of tests are used to detect the presence or absence of suspected cervical facet joint dysfunction in individuals with ongoing neck pain

CLINICAL UTILITY

- When assessing patients with persistent neck pain referred for diagnostic facet joint blocks, these tests have moderate to excellent intra- and inter-rater reliability

***Throughout these tests, the HCP must continually ask the patient if pain is provoked and record the patient's pain intensity**

a. **Extension Rotation Test (ER)** → *seated*

- HCP asks the patient to **extend** then **rotate** their head to one side as far as possible

b. **Palpation for segmental tenderness (PST)** → *prone*

- The HCP palpates the **segmental muscles** overlying the facet joints from C2-3 to C6-7 (bilaterally)

c. **Manual Spinal Exam (MSE)** → *prone*

- The HCP applies a **PA directed force** over the **articular pillars** from C2-3 to C6-7 (bilaterally)
- The HCP records and rates any perceived resistance to motion as normal, slight, moderate or marked

- A **positive test** occurs when:
 - Familiar pain of 3/10 or greater is reproduced for all 3 tests
 - Resistance to motion is rated as moderate or marked (for MSE)

SPECIAL TESTS - FLEXION ROTATION TEST (FRT)¹

TEST OBJECTIVE

- This test assesses if there is any dysfunction of motion at the **C1-C2 segment** (the C1-C2 motion segment accounts for 50% of the rotation in the C/S)

CLINICAL UTILITY

- The Cervical FRT has been validated within the literature as an assessment tool for **cervicogenic headaches** with **good diagnostic accuracy of 91%**
- This test has a **sensitivity of 91%** and **specificity of 90%** to detect the presence or absence of cervical joint dysfunction in neck pain and headache patients

INSTRUCTIONS

- To begin this test, the patient is in a supine position with their head neutral
- The HCP fully flexes the lower and upper cervical spine with the patient's occiput resting against the HCP's abdomen
- While maintaining full flexion of the C/S, the patient's head is rotated to the left and then to the right
- Throughout the test, the HCP observes for limited range of motion and must record if the patient reports of any pain

POSITIVE TEST

- **A reduction in rotation of 10° or greater from expected range (normal range of rotation motion in end range flexion has been shown to be 44° to each side)**
- **A firm end feel**
- **Pain provoked by movements**

*Subjects suffering from HA with C1-C2 dysfunction tend to have an average of 17° less rotation.

INTERVENTION/ TREATMENT TECHNIQUES - CERVICAL & THORACIC SPINE MANUAL THERAPY

- Cervical spine physical therapy intervention, including manual therapy of the **cervical** and **thoracic** spines (both joint mobilisation and manipulation techniques), has been shown to have symptomatic and functional benefits in the multifaceted management of cervical dysfunction post-concussion.¹
- Evidence has found that sustained natural apophyseal glides (SNAGs), as described by Mulligan, improved symptoms and cervical ROM in individuals with cervicogenic dizziness when combined with a home mobilisation program, and the effects were maintained for 12 weeks post-treatment.²
- Passive joint mobilisation (PJM), as recommended by Maitland, also showed improvements in cervical ROM after treatment, but findings were inconsistent.²
- Manual therapy, including articular mobilization and high-velocity thrust techniques at the C/S, have also been shown to decrease local pressure pain thresholds in musculoskeletal pain, immediately following intervention.³
- In a large systematic review, authors found that in individuals with acute/subacute neck pain, thoracic manipulation provided short-term neck pain relief, and for those with acute and chronic neck pain, it further improved function when contrasted with an inactive control. For acute/subacute neck pain, multiple sessions of cervical manipulation provided better pain relief and functional improvement than were attained with certain oral medications such as varied combinations of NSAIDs, analgesics, opioids and muscle relaxants at immediate-, intermediate-, and long-term follow-up.⁴
- The results of another meta-analysis suggest that spinal manipulation therapy has a favorable neurophysiological effect on increasing the mechanical pain pressure threshold (PPT), or reducing pain sensitivity (hypoalgesia), when compared to other forms of intervention.⁵
- Manual therapy involving mobilisation, manipulation, and SNAG all have positive effects on patients with chronic neck pain.⁶
- Evidence suggests that a **combination of manual therapy AND exercise is more effective than passive modalities.**¹

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3. Voogt L, de Vries J, Meeus M, et al. Analgesic effects of manual therapy in patients with musculoskeletal pain: a systematic review. *Man Ther.* 2015;20(2):250-6. doi:10.1016/j.math.2014.09.001.

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