Functional Assessment, Treatment & Rehabilitation of the Cervical Spine

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HOMO-SAPIAN TO HOMO-SEDENTARIUS

Somewhere, something went terribly wrong
CERVICAL SPINE PAIN MANAGEMENT

- Diagnosis Triage

- Step-Ladder Approach
  - Imaging indications/options
  - Medication indications/options
  - Injection indications/options
  - Surgery indications/options
INITIAL EXAMINATION

- Neuro-ortho evaluation is necessary, but not sufficient
  - Rule out red flags
  - Differentiate nerve root, rheumatologic, fracture, etc.

- Functional evaluation is required to establish functional targets of care (i.e. Activities of Daily Life, sport, etc..)
DIAGNOSIS TRIAGE

- If “red flags” are not present - the patient should be reassured that the prognosis is good
- If “red flags” are present - the patient should be referred for further tests or treatments
FIRST VISIT

- Identify Activity Intolerances (AI)
  - (subjective) which activities produce the cc?

- Identify Mechanical Sensitivities (MS)
  - (objective) ortho/functional tests produce cc?

- Identify Abnormal Motor Control (AMC)
  - (daily or exercise habits that are biomechanically wrong; i.e. gait, posture)
IDENTIFY ACTIVITY INTOLERANCES

- AI: Activities (daily or sports) that reproduce the patient’s chief complaint. This is the patient’s subjective findings

- “the goal of care should shift from relief of pain to reduction of Activity Intolerances associated with pain”
ASSESSMENT OF MECHANICAL SENSITIVITY (MS)

- Tests that produce the CC: ROM, ortho tests, functional tests (Scapulo-humeral rhythm, arm abduction, breathing, etc.)

- “If we can find the movements or positions which reproduce the patient’s pain then we should be able to find movements and positions which relieve the pain” Robin McKenzie
THE PATIENT SHOULD EXPERIENCE THE RESULTS!

- Perform ongoing reassessment of the patient’s MS to identify the palliative care”

- Within-session reassessment was shown to predict between-session improvement

- If post-tx audit of MS showed improvement those pts were at least 3.5X more likely to have between session improvement. Hahne A, Keating JL, Wilson S. Australian. Journal of Physiotherapy 2004;50:17-23.
ASSESSMENT OF ABNORMAL MOTOR CONTROL (AMC)

- The first sign of progress is that the patient’s MS is reducing
- To progress the patient shift the focus to AMC findings (MS is gone or reduced)
- AMC: movements that the patient CAN perform without pain but are NOT functionally correct (posture, exercise, Breathing)
CLINICAL PRESENTATION

- Inflammatory - everything is MS (usually acute)
  - Typically worse w/ any movement

- Mechanical - something is MS (hurts with some movements)

- Sensitization - nothing is MS (usually chronic)
  - *Hurts constantly, no change w/ movement*
Mechanical muscle, joint, nerve

Relaxation

Central/global

Stress

PsycTx

CNS drugs

General strengthening

Loaded vs. unloaded

McKenzie

Stabilization

Soft tissue

Functional exercise

End-range loading

Distraction/traction

Chemical

Nutrition

TENS

Acupuncture

RICE

Medication

Injections

Sleep

Awake

Cardio

Acupuncture

RICE

Chiropractic
INFLAMMATORY BEHAVIOR OF SYMPTOMS

- Minimal exercise Rx
- Acupuncture
- Sparing strategies more important
- Supplements/NSAIDs
  - EFA’s – Omega Pure 600
  - Ginger, Curcumin, Boswellia, Bromelain
- Good prognosis
ACUTE PATIENTS REQUIRE SIMPLE INFORMATION

- Reassurance that they do not have a serious disease
- Encouragement that gradual resumption of normal activities is safe and effective
- Basic biomechanical advice

SENSITIZATION BEHAVIOR OF SYMPTOMS

- Primary Audit is AMC
  - Exercise Rx based on AMC only
- Guarded prognosis – long-term goal is reduction is AI
  - Stress is a factor
- Combined psychological, mechanical, nutritional approach
- Inflammatory supplements + Adrenal support
- Psycho-social approach
MECHANICAL BEHAVIOR OF SYMPTOMS

- McKenzie
- Buttler
- Functional Exercise
- Soft Tissue (ART, MRT, Graston)
- Magnesium, MSM
- Good Prognosis
HELPFUL SUPPLEMENTATION

- Holy Basil Octimum Santum (stress, adrenal)
- Rhodiola/Ginseng (Performance, adrenal)
- Magnesium & B-complex (general)
- DJD Factors (Glucosamine/MSM)
- Omega 3 EPA (Fish Oil) (anti-inflammatory)
- Boswellia serrata, Curcumin (tumeric), Bromelaine (anti-inflammatory)
CASE STUDY

- Chief Complaint:
  - Right arm numbness/tingling

- Concern:
  - Works as an accountant & sits a lot

- Activity Intolerance:
  - Sitting at computer
  - Sleep
MECHANISM OF INJURY (MI) & PAST HISTORY
NEURO SIGNS & RED FLAGS

- MI: insidious onset, sitting on job
- Past History: recurrent stiff necks & headaches. 2 past mild automobile accidents
- Red Flags: none
- Neuro Signs:
  - Triceps weakness 4/5
  - Bakody’s sign positive
MECHANICAL SENSITIVITIES (MS) (ROM, ORTHO, TRP)

- Neck flexion
- Neck Rotation
- Foraminal compression sign +
- + 3 tenderness in Scalenes, UT, LS
ABNORMAL MOTOR CONTROL (AMC)

- Faulty scapulo-humeral rhythm
- Chest breather
- Slump posture
HOME EXERCISE & CARE LIST

- Prone sphinx w/ chin tuck
- Brugger micro-break
- T4 mobilizations
- Home traction & ice
- Chiro Manipulation
- Soft tissue posterior cervical muscles
CAUSES OF INJURY

- \[ I \text{ (injury)} = L \text{ (load or force)} \times T \text{ (time)} \]

- 1) Trauma (high L, short T)
- 2) Repetitive Strain (low L, high T)
- 3) Static Strain (low L, high T)
TRAUMA

- Pain is due to overload of tissues
- Acute injury like a whiplash is due to a sudden, forceful overload
REPETITIVE AND STATIC STRAIN

- Most spinal pain and athletic injuries are usually from gradual, less forceful overload that is repeated over & over again.
How to dispel the myth that rest is best?

- What type of strain causes injury?
- Too much or too little of anything!

*Figure 1: Relationship of injury to history of spinal load (after McGill, 1999).*
STEPS OF CARE

- Sparing strategies
- Mobilization techniques (McKenzie, Buttler’s Nerve “flossing”, Soft Tissue)
- Stabilizing & Functional training exercises
- Nutritional, herbs, Meds
- Psychological advice (reassurance, reactivation)
"My physical therapist says this is the worst possible position you can lie in."
SPARING STRATEGIES

- According to prof. Karel Lewit, “the first treatment is to teach the patient to avoid what harms them”

- According to prof. Stewart McGill “the most common mechanism of injury is too much or too little activity”

- Prescribe ergonomic and posture sparing advice
POSTURAL EXPERIMENT: IS UPRIGHT POSTURE REALLY IMPORTANT?

- **Respiration**
  - Slump & breath in
  - Perch & sit up & breath in
  - When is lung capacity greater?

- **Mobility**
  - Slump & extend your neck
  - Perch, sit up & extend your neck
  - When is mobility greater?
SPARING EXERCISES

1. Ergonomics
   - Workstation
   - Sleep/pillow
   - Carrying

2. Micro-breaks
   - Bruegger’s Position
TISSUE SPARING ADVICE

- “the first treatment is to teach the patient to avoid what harms them.”
  - Karl Lewit

Figure 1: Slumped posture contributing to stemosymphysial syndrome.
Why
- Spare the spine from repetitive strain due to end-range flexion loading when sitting or standing

When
- Acute or chronic neck pain
- Prevention of neck pain

How
- Explain to patient why it is being prescribed (to spare the spine)
SLEEP ERGONOMICS
CARRYING ERGONOMICS

- Flexing wrist
- Mountain climber reflex
BRÜGGER’S RELIEF POSITION

- Drop your arms
- Turn hands out (supinate)
- Spread fingers (abduct fingers)
- Blow breathe out as if you are making a candle flicker

- Perform 1-2X for every 30 minutes of sitting throughout the day
BRÜGGER’S RELIEF POSITION

- Perch at the edge of your chair
- Abduct & externally rotate your legs
- Lift your sternum slightly
- Tuck your chin in & look straight ahead
- Supinate your arms as you exhale actively
- Repeat 1-2 x for every 30 min of sitting
BRÜGGER’S

- Why?
  - Break repetitive strain cycle from prolonged sitting
  - Improve posture

- When?
  - Prolonged sitting
  - Poor posture

- How?
  - Explain to patient why it is being prescribed (to spare the spine, nourish the tissues)
  - Give hand-out
MOBILIZATION

Goal: Find out what & who needs mobilization vs. what & who needs stabilization

Goal: Find out what & who needs Chiropractic manipulation vs. what & who needs McKenzie
MOST LIKELY TO BENEFIT FROM NECK MANIPULATION
LIKELIHOOD THAT A PARTICULAR MANIPULATION
TECHNIQUE WILL REDUCE DISABILITY

1. Initial scores on Neck Disability Index < 11.5
2. Bilateral involvement pattern
3. Not performing sedentary work > 5 hrs per day
4. Feeling better while moving the neck
5. Without feeling worse while extending the neck
6. Spondylosis without radiculopathy
   - > 4: 90% probability of immediate response
   - > 3: 80% probability of immediate response
   - 2: 67% probability of immediate response

TREATMENT HIERARCHY

- Directional Preference signs always take precedence over Manipulation or Stabilization signs

- Treat Directional Preference first since we must CENTRALIZE the symptoms

- Failure to centralize the symptoms is an indication for Medrol dose pack, imaging, & epidurals
CENTRALIZATION <> PERIPHERALIZATION
“If you adopt certain positions or perform certain movements that cause your back to ‘go out’, then if we understand the problem fully we can identify other movements and other positions that, if practiced and adopted, can reverse the process. You put it out - you put it back in.”

McKenzie treatment was superior at both 3 weeks and 6 months follow-up periods to either:

- General exercise
- Ultrasound

Early active intervention with McKenzie treatment was superior to standard care - soft collar, initial rest, gradual mobilization.

At 6 months post-accident, significant symptoms were present in
- Only 10% of McKenzie patients
- >50% of patients receiving standard passive care

Kyphotic Antalgia
Aka Posterior Derangement

Flexion:
- possible
- pain during motion
  - end range pain

Sustained or dynamic flexion results in:
- peripheralization
  - increased pain
  - further loss of extension
SYMPTOMATIC RESPONSE
A CLOSER LISTEN

- Monitor for symptomatic responses
  - During motion (mid range)
  - Peripheralization
  - Centralization
  - After End Range

- AT End Range
CERVICAL KYPHOTIC ANTAGIA
OBVIOUS POSTERIOR DERANGEMENT

- Monitor symptomatic response
- Traction: maintained throughout
  - Retraction: flexes upper, extends lower cervical spine
  - Retraction → let go of retraction to extend
  - Mini-rotations at End Range to extend more
Traction
Traction - Retraction
Traction-Retraction (let go)-Extension
RETRACTIONS REDUCE ROOT COMPRESSION
ABDULWAHAB 2000

- Neck & Radicular Pain
  - Sustained Flexion
    - ↑ peripheral pain
    - ↑ root compression
  - Repeated Retractions
    - ↓ peripheral pain
    - ↓ root compression
CERVICAL POSTERIOR DERANGEMENT
SELF-TREATMENT

- Correcting sitting posture
  - Overcorrect - relax
  - Stand - sit

- Cervical retraction

- Cervical retraction, extension

- Retraction, extension, mini-rotation
  - Sitting vs. supine

- Towel, belt
Extension from Protruded Position
Extension From Neutral Position
Extension From Retracted Position
MCKENZIE PRAYER
POSTERIOR DERANGEMENT MGMT.

- Two main factors for success or failure
  1. Maintenance of Lordosis
     - Sitting, ADLs & transitions, Sleeping
     - Avoid flexion: “cut finger”
     - Counteract flexion with extension ERL
  2. Achieve Extension End Range Loading
Lordotic Antalgia

OBVIOUS anterior derangement

Extension:
- possible.
- pain during motion.
- end range pain

Sustained or dynamic extension results in:
- peripheralization
- increased pain.
- further loss of flexion.
Lordotic Antalgia

OBVIOUS anterior derangement

Flexion:
- obstructed.
- no pain during motion.
- end range pain.

Sustained or dynamic flexion results in:
- centralization
- decreased pain
- recovery of flexion
- less pain with extension.
SPINAL LORDOTIC ANTALGIA MGMT.

- Avoid extension End Range
- Lose lordosis
- Flexion End Range Loading
- Later: introduce extension End Range to evaluate for:
  - Elimination of anterior derangement
  - Adaptive shortening
Torticollis/Scoliotic Antalgia

OBVIOUS posterolateral derangement; Example: Left Antalgia

Flexion or Left Lateral Flexion:
- pain during motion
- end range pain

Sustained or dynamic flexion or LLF:
- peripheralization
- increased pain
- further loss of extension and RLF
Torticollis/Scoliotic Antalgia

OBVIOUS posterolateral derangement; Example: Left Antalgia

Extension:
- Obstructed.
- end range pain

Sustained or dynamic extension:
- peripheralization
- increased pain
- further loss of RLF
Torticollis/Scoliotic Antalgia

OBVIOUS posterolateral derangement

Right Lateral Flex/Rot:
- obstructed
- end range pain

Sustained or dynamic contra Lateral Flex/Rot:
- centralization
- decreased pain
- recovery of contra LF/R

Then proceed as for ”Fixed Kyphosis”
TORTICOLLIS: SUPINE MOB

- Monitor symptomatic response
- Traction – maintained throughout
- Step-wise recovery of lateral flexion
  - Rotation in same direction if not tolerated
    - To unlock lateral flexion
- Unilateral technique
- Self treatment strategies
- Therapist
- Progress to kyphotic protocols
Retraction – Lateral Movements
SUMMARY: OBVIOUS DERANGEMENTS

- Antalgias (obvious derangements)
  - Easy to recognize
  - Easy to fix
  - Mechanics dictate
    - reverse the mechanics
  - Main Symptoms
    - respect centralization
BUTLER NEURAL “MOBILIZATION”
AKA MCKENZIE: ADHERENT NERVE ROOT OR NERVE ENTRAPMENT

- Increasing root tension: spinal flexion
  - Cervical
    - Cervical flexion, Shoulder depression
    - Cervical contra lateral flexion

- Decreasing root tension: opposite of above
  - “Flossing”:
    - backing tension off @ the last moment
      - giving “slack,” “letting out the line”
WHEN NEURAL MOB MAY BE OK

- Dysfunction (nerve entrapment):
  - Behaves like short tissue
  - Intermittent
  - End Range only
  - Flexion deviates to side of symptoms
  - Does not remain worse after provocations
  - Old & Cold
When to Avoid Neural Mobilizations
intradiscal or radiculitis origins of pain, NOT entrapment

- Young & Hot
  - derangement requiring reduction
  - inflammation requiring rest

- Constant Pain

- Symptoms worsen during motion (mid range)

- Worsens and stays worse after loading
When to Avoid Neural Mobilizations intradiscal or radicular origins of pain

- “Intradiscal” provocation of extremity complaints
  - Cervical: flexed elbow; contralateral neck flexion

- Radicular provocation of extremity complaints
  - Extension and/or flexion to side of symptoms
NEURAL PROVOCATION TEST – UPPER LIMB TENSION TEST (ULTT)

- Median nerve/brachial plexus test
- “the straight leg raise test” of the upper extremity
UPPER LIMB TENSION TEST

- ULTT is a reliable test with greater diagnostic accuracy
  - All patients had suspected cervical radiculopathy or carpal tunnel syndrome

- EMG used as “gold standard” for diagnosis

UE NEURAL MOBILIZATION

- Median N.
  - Above horizontal
  - Below horizontal

- Radial nerve
  - Waiter’s tip

- Ulnar nerve
  - Hear no evil
Median Nerve
above the horizontal
Median Nerve
below the horizontal
Ulnar Nerve
Radial Nerve
BUTLER MEDIAN NERVE SLIDER
ADD ULNAR NERVE GLIDE SLIDE
ADD RADIAL NERVE GLIDE SLIDE
Modern lifestyle is very sedentary with prolonged, constrained postures being the norm for ADL’s

Postural muscles are over-activated with resultant loss of flexibility, stability, and strength
PREDICTABLE MUSCLE IMBALANCES

- Certain muscles have a tendency to become hypertonic, while other have the opposite tendency towards hypotonicity. These muscles are predictable.
QUIZ

- Are myofascial problems in the upper trapezius & levator scapulae very common?

- Can they be improved w/ a combination of adjustments & soft tissue work?

- Do they frequently recur?
PERPETUATING FACTORS OF MYOFASCIAL PAIN SYNDROMES

- Faulty posture
- Joint dysfunction
- Altered movement patterns
- The solution is to take a holistic approach
UPPER CROSS SYNDROME

Weak deep neck flexors

Tight upper trapezius and levator scapula

Tight pectorals

Weak lower trapezius and serratus anterior
UPPER CROSS SYNDROME

- Mid & lower trapezius X levator scapulae & upper trapezius
- Serratus anterior X pectoralis minor
- Longus coli & longus capitus X suboccipitals, SCM
- Diaphragm (breathing) X Scalenes
SCALENES
UPPER TRAP MYOFASCITIS
SCM MYOFASCITIS
VISUAL POSTURE CLUES

- Head forward posture – T4 kyphosis, psoas
- Round shoulders - pecs
- Internal humeral rotation - pecs, lats, subscapularis
- Shrugged shoulders - upper traps, lev scap
- Winged scapulae - weak serratus anterior
WHAT YOU SEE...

WHAT YOUR CHIROPRACTIC DOCTOR SEES...

Low Shoulder
Uneven Hips
Knock Knees
Foot Turns In

Do You Know Someone Who Could Benefit From Chiropractic Care?
FUNCTIONAL (DYNAMIC) TESTS

- Evaluate quality of movement in the upper quarter and cervico-thoracic region:
  - Respiration
  - T-4 Mobility screen
  - Push-up
  - Arm abduction
RESPIRATION

- Most common faulty movement pattern

- Dysfunctional respiration usually occurs with vertical chest breathing predominating over lower abdominal and lower rib cage horizontal breathing

- Scapulohumeral & upper traps overactivity & poor abdominal function result from faulty breathing
RESPIRATION
RESPIRATION

Test A:

- seated

P/F criteria:

- Failure if during normal inhalation
- Observe if clavicles or shoulders elevate
- Palpate if lower rib cage does not widen in the horizontal plane
SUPINE - TEST

P/F criteria:

- Failure if during normal inhalation:
  - Chest breathing predominates over abdominal breathing (minor dysfunction)
  - if during inhalation the abdomen moves in, rather than out (paradoxical respiration – major dysfunction)
IF + TREATMENT

- General relaxation training w/ belly breathing supine on floor or foam (vertical)
- Brugger active exhalation (navel in)
- Relax/treat scalenes, upper trapezius, levator scapulae
- T-spine CMT
- Practice breathing & bracing with all core exercises
  - Exertional respiration training
JANDA’S NECK FLEXION TEST

- Slowly raise head up from table towards chest
- Alternative test:
  - Clinician pre-positions head 1 cm off table
  - Patient instructed to hold position steady
Fail if:
- Chin protrusion
- SCM overactivity
- Shaking

If + tx:
- SCM, suboccipitals, and upper trapezius relax
- T4-8 mobilization
- Breathing reeducation
- Cervico-cranial flexion motor retraining (nodding in supine, prone, sitting & standing positions)
T4 MOBILITY SCREEN

- Indications: poor posture in sagittal plane
- 2 lordosis should meet between T4-8
- When posture is compromised
  - Head forward posture >> Head/neck pain
  - Round shoulders >> Cervico-brachial pain
T4 – ARM OVERHEAD TEST

Procedure:
- standing with back against a wall or door
- instruct patient to raise their arms overhead

Failure if:
- Lumbo-Pelvic junction hyperextends
- Arms don’t reach vertical plane
- Thoracic kyphosis remains
T4 Mobility Screen

- **Test**
- **Stand vs. wall w/ arms externally rotated/supinated & feet slightly forward**
- **Try to flatten back**
- **Record**
  - Does back flatten
  - Where does pt. feel tension (mid-back, left or right side, neck)
PUSH-UP TEST

- Indications: winged scapulae, shoulder disorders
- Procedure: lower trunk from a push-up position
- Fail if:
  - Scapulae retracts
  - Scapulae wings
  - Shoulders shrug
IF POSITIVE

- Relax pecs, upper traps, lev scap
- Push-up plus, tripod, serratus punch
ARM ABDUCTION

- Shrugged shoulders
- Neck pain
- Headaches
- Rotator cuff disorders
SHRUGGED SHOULDERS
ARM ABDUCTION

- Increased upper scapulae muscle activity & decreased lower scapulae fixator activity during arm tasks

ARM ABDUCTION

- ↑ EMG activity of the upper trapezius is present in patients with cervicogenic headache while performing computer tasks requiring concentration.

ARM ABDUCTION

- ↑ activity of the SCM & anterior scalene muscles during low load repetitive upper limb tasks was found in whiplash or idiopathic neck pain patients.
- An EMG analysis of neck muscle activity during a repetitive upper limb task in patients with whiplash and idiopathic neck pain (submitted for publication) Bilenkij G, Falla D, Jull G.
ARM ABDUCTION TEST

- Scapulo-Humeral Rhythm
- During the “setting phase” – 1st 60° shoulder should not elevate
IF POSITIVE

- Mobilize kyphosis & posterior capsule
- ScapuloThoracic facilitations
- Relax upper traps, lev scap
- Scap depression training: pull downs, locomotor, wall wash, push/pull, sword, frisbee toss,
TREATMENT
BRUGGER’S (DIAPHRAGM)

- Perch at the edge of your chair
- Abduct & externally rotate your legs
- Lift your sternum slightly
- Tuck your chin in & look straight ahead
- Supinate your arms as you exhale actively
- Repeat 1-2 x for every 30 min of sitting
SHORT ADDUCTORS & INT ROTATORS
PECTORALIS STRETCH
PUSH-UP “PLUS” (SERRATUS ANT)
TRAINING DEEP NECK FLEXORS

- Nodding without chin retraction
- Below picture demonstrates the importance of also addressing thoracic kyphosis
CERVICAL BRACE (DEEP NECK)

COURTESY OF DONALD MURPHY DC, DACN
CERVICAL BRACE
COURTESY OF DONALD MURPHY DC, DACN
CERVICAL BRACE
COURTESY OF DONALD MURPHY DC, DACN
CERVICAL BRACE
COURTESY OF DONALD MURPHY DC, DACN
CERVICAL BRACE
COURTESY OF DONALD MURPHY DC, DACN
Have patient slowly lay back on ball & perform the back stretch w/ their head supported
- Progress to laying head back on the ball
- Hold for 30s with gentle rocking.
- Perform a few times/day.
Treatment – T4
TREATMENT – T4
TREATMENT – T4

- Yoga “Sphinx” to mobilize T4-8
TREATMENT: T-4
TREATMENT: LOWER TRAPEZIUS
LOWER/MIDDLE TRAPEZIUS
LOWER/MIDDLE TRAPS
LOWER/MIDDLE TRAPS
OUR GOAL IS RESTORE FUNCTION – EACH PATIENT IS DIFFERENT
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