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CERVICAL SPINE CASE 2 CERVICAL RADICULOPATHY

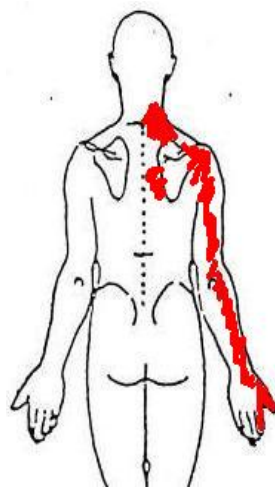
A.J. Lievre, PT, DPT, OCS, CMPT
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Orthopaedic Manual Physical Therapy Series
Charlottesville 2017-2018



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Body Chart



Body Chart – Initial Hypothesis:

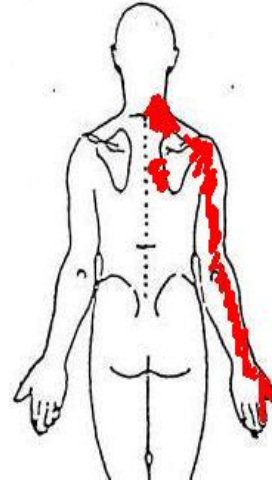


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Subjective History

- 43 y/o male contractor with R sided cervical spine, scapular and UE symptoms
- 2 week hx of symptoms after painting ceilings in his house
- R sided neck ache while painting, difficulty sleeping that night and R UE symptoms the following day
- Worsening in last 2 weeks, now occasional tingling in his thumb and index finger.
- Previous history of localized neck pain with work, 1st episode of UE symptoms

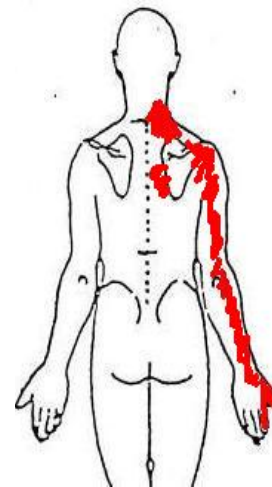


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Subjective *Asterisks* Signs/Symptoms: (Aggravating/Easing factors, Description/location of symptoms, Behavior, Mechanism of injury):

- Symptom Behavior:
 - Constant, variable, deep R sided cervical and scapular pain described as burning/sharp
 - Intermittent, variable, deep R lateral arm burning radiation with tingling into thumb and index finger
- Symptoms related
- Currently not working, has to commute 1 hr
- Aggs: Sitting > 10 mins, turning to R while driving immediately, lying supine < 2 pillows, R side-lying, R UE overhead activities (neck + arm symptoms)
- Eases: changing positions (takes 2-3 mins to ease), rest supine with > 2 pillows, L rotation, certain positions of support of arm (overhead vs. across body)

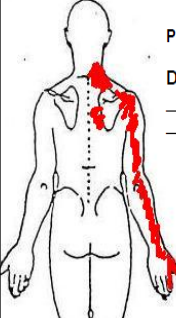


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STRUCTURE at Fault:


Joints in/refer to the painful region	Myofascial tissue in/refer to the painful region	Non Contractile tissue in/refer to the painful region	Neural tissue in/refer to the painful region	Other structures that must be examined – non MSK
C5-7, T4-7 Facet Scapulothoracic GH Elbow Wrist/Hand	C5-7, T4-7 paraspinals and multifidus, Post RC, Triceps, Wrist Ext, 1st and 2nd forearm compartment muscles	C5-7 Disc C5-7 Capsule GH Bursae Cervical Ligs Labrum Humerus (Fx)	C5-7 nn Root Radial Nerve PIN	Visceral Spondylo- arthropathy?


 Primary HYPOTHESIS after Subjective Examination: _____
 Differential List (Rank/List in order to rule out): _____

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Somatic vs. Radicular Pain

- Somatic (Referred/Non-Referred) vs. Radicular Pain
 - Somatic – nociceptive input from structures not related to nervous system (ligaments, facets, IVD, mm, dura, etc.)
 - Radicular – nociceptive input from structures related to nervous system (spinal nerve, nerve root, peripheral nerve)
- Somatic pain quality: Deep, Ache, Diffuse, Dull and Poorly Localized
- Radicular pain quality: Intense, Radiating, Severe, Sharp, Darting, Lancing, and Well Localized


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➤ **Rate your assessment of Severity & Irritability**
 Justify your assessment with examples from the Subjective Exam &/or Objective Exam

○ Severity Non Min **Mod** → **Max**

Constant symptoms, Sharp/Burning description, Not working, Sleep and positional disruption, NDI = 44%


○ Irritability Non Min **Mod** Max

Aggravated within 10 mins, takes 2-3 mins to ease, distal symptoms with daily activities (reaching overhead, etc)

➤ **Stage & Stability?**


○ Acute Subacute Chronic **Acute on chronic**

○ Stable Improving **Worsening** Fluctuating Red Flags

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Physical Exam *Asterisks* Signs/Symptoms (Special tests, Movement/Joint Dysfunction, Posture, Palpation, etc)

- Standing in waiting room, arm overhead
- Cervical spine held in subtle L SB and Flexion
- Cervical ROM: (+) R rotation 45 deg, Extension 10 deg, (+) Quadrant/Spurling's Test
- (+) Compression/Distrraction Testing
- (+) Neuro Exam with Biceps Jerk 1+, C6 myotome = 4-/5, decreased C6 sensation
- (+) ULPT 1 (Median Nerve Bias)
- (+) R Shoulder Quadrant (due to ND irritability)
- (+) PPIVMs/PAIVMs R C5/6 and 6/7 into Extension
- Neck Disability Index = 44% perceived disability

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➤ Are the relationships between the areas on the body chart, the interview, and physical exam consistent?
 "Do the features fit" a recognizable clinical pattern? **Yes** No

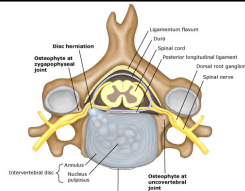
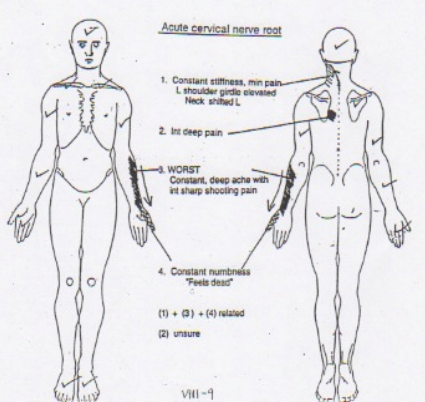
Please explain areas that may need clarification _____

_____ **C6 Cervical Radiculopathy** _____

Zygapophyseal Joints		Intervertebral Disc
Synovitis/hypomobility	→ Dysfunction ←	Circumferential Tears
Continuing degeneration	→ Herniation ←	Radial Tears
Capsular laxity	→ Instability ←	Internal Disruption
Subluxation	→ Lateral Nerve Entrapment ←	Disc Resorption
Enlargement of Articular Processes	→ One Level Stenosis ←	Osteophytes
	→ Multilevel Spondylosis and Stenosis ←	

Bezell

Cervical Radiculopathy

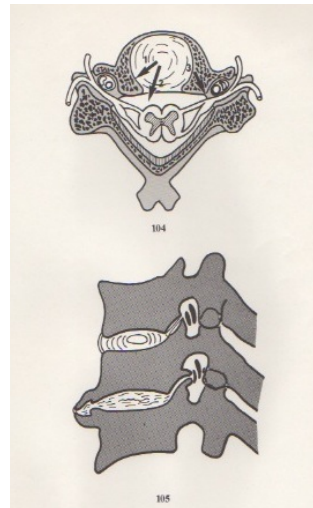
- Disorder of the cervical nerve root
- Commonly caused by osteophytic changes or other space-occupying lesions
 - Less likely due to disc herniation
- Results in nerve root inflammation, impingement or both
- Incidence 83.2/100,000 people
- Increased prevalence in 5th to 6th decade of life
- C6 and C7 most commonly involved

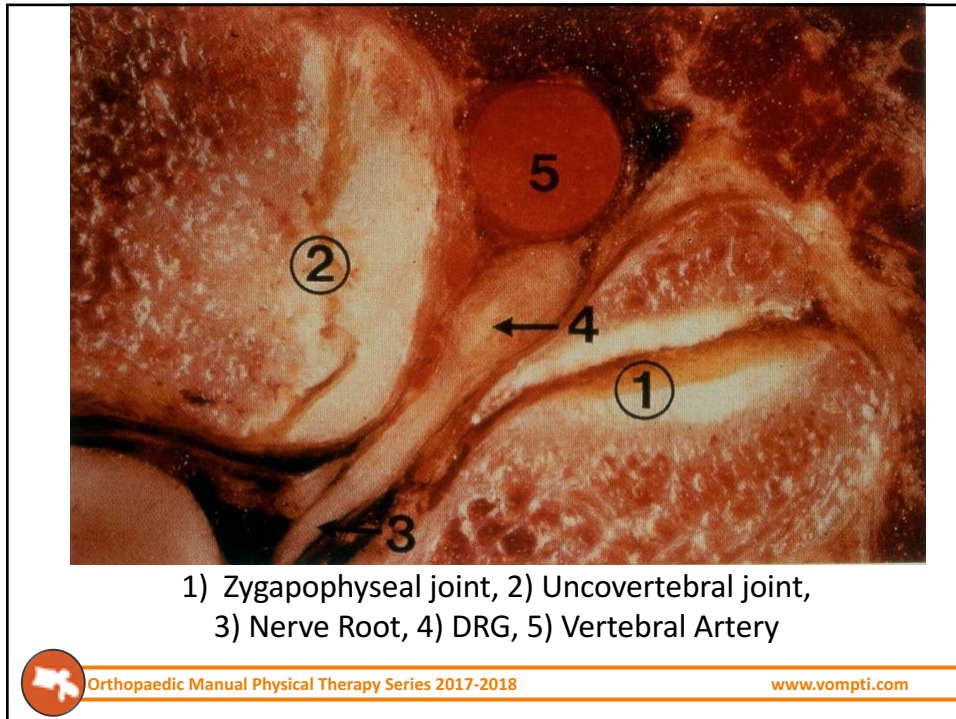
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Relationship of Nerve Root to Foramen

- Disc prolapse is rare in the cervical region as the discs cannot escape posterior-laterally because of the uncinete processes of vertebral body
- If prolapse occurs it is more central than in the lumbar region and tends to be more severe with regards to cord compression
- Root compression in the cervical region is more commonly caused by OA of the U-Jt
- Note close relationship of nerve root in foramen to both the articular process and U-Jt
- Osteophytes arise from both U-Jt > Z-Jt and narrow foramen





Identify any potential risk factors (Yellow, Red flags, non MSK involvement, biopsychosocial)

— **None, but need to R/O Cervical Myelopathy**

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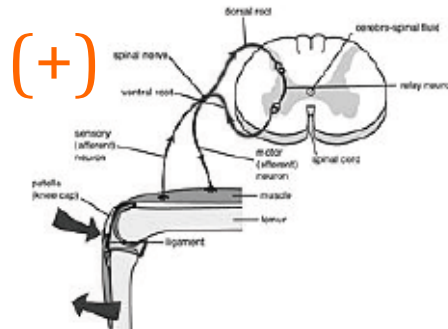
Neurological Screen

- When to perform:
 - Symptoms distal to the AC joint or in the medial scapular border (due to possible discogenic origin)
 - Subjective reports of paresthesia or numbness
 - Subjective reports of UMN type pathology



Neurological Screen – Reflex Testing

Reflex	Root Level
Biceps	C5-6
Brachioradialis	C5-6
Triceps	C7-8
FDP	C8-T1



Hypo-reflexia = LMN Lesion
Hyper-reflexia = UMN Lesion



Neurological Screen - Myotomes

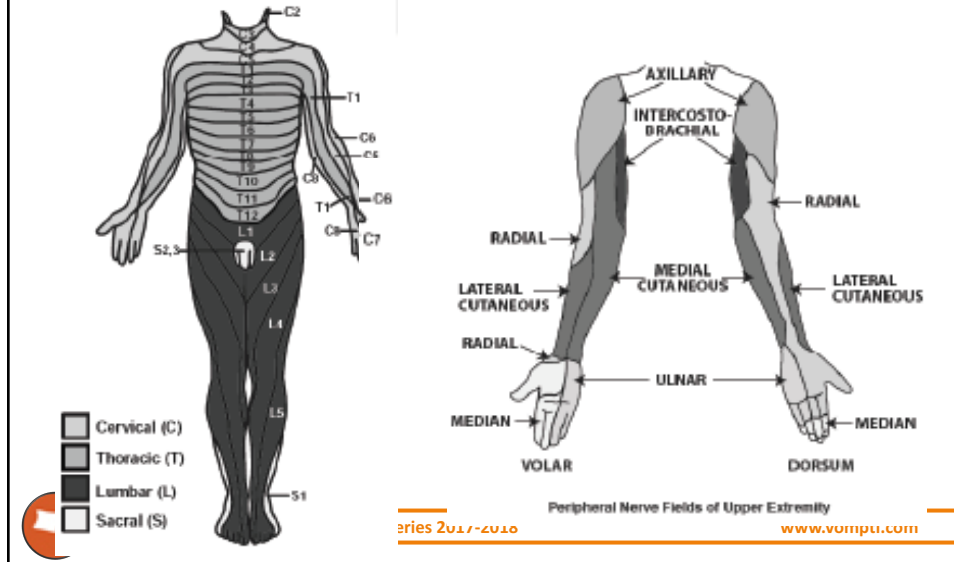
Action	Nerve Root	Peripheral Nerve
Cervical Flexion	C1-2	Roots
Cervical Side Bending	C3	Roots
Shoulder Shrug	C2-4 CN XI	Spinal Accessory
Shoulder Abduction and ER	C5	Axillary and Suprascapular
Elbow Flexion	C5-6	Musculocutaneous
Wrist Extension	C6	Radial (+)
Elbow Extension	C7	Radial
Wrist Flexion	C7	Median
Thumb Opposition	C8	Median
Thumb Extension (EPL)	C8	Radial - PIN
Finger Abduction	T1	Ulnar
DIP Flexion (FDP)	C8/T1	Median and Ulnar

Neurological Exam Findings

- Myotomal Testing
 - Maximal contraction tested and retested to determine fatigueability
 - Radiculopathy
 - Segmental fatigueable weakness
 - Radiculitis
 - No appreciable weakness
 - Neuropathy (Peripheral Lesion)
 - Fatigueable weakness of muscles innervated by effected nerve
 - Myelopathy
 - Multisegmental fatigueable weakness

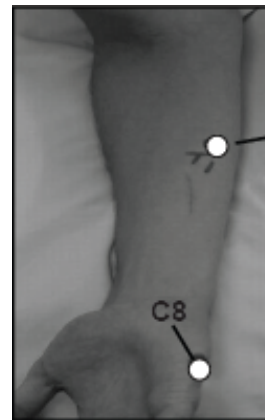
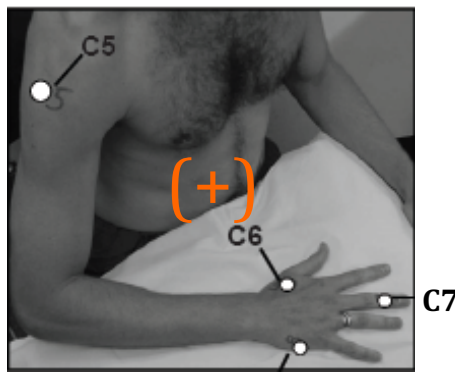


Neurological Screen – Somatosensory Function



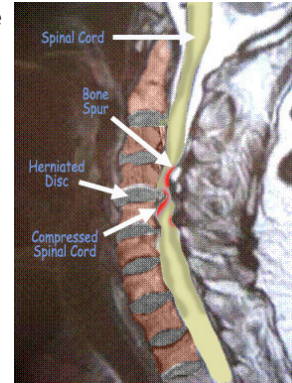
Neurological Screen – Somatosensory Function

- Key Dermatomal Testing Areas



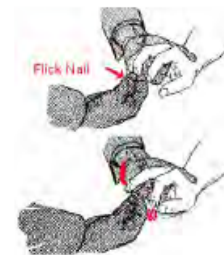
Cervical Myelopathy

- Causes:
 - Spinal cord compression in the spinal canal due to osteophyte, and/or disc degeneration
- Symptoms:
 - Hyperreflexia UE and LE
 - Sensory changes in nonsegmental pattern, common in 1 or both hands/feet
 - (+) Clonus
 - (+) Hoffman's Reflex
 - (+) Babinski
 - (+) Inverted Supinator Reflex/Sign
 - General weakness below level of compression
 - Gait changes, tripping/falling for no reason



Upper Motor Neuron Testing

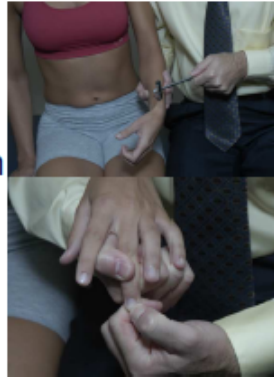
- Hoffman's Reflex
 - Sung and Wang (Spine, 2001)
 - (+) result in 16 asymptomatic patients, MRI confirmed cord compression from HNP (15/16), remaining patient had T5/6 thoracic disc with compression
 - Very Specific Test!
- Babinski
- Clonus UE/LE
- Inverted Supinator Sign/Test
 - C7 response to C6 reflex



Clinical Predictor Rule: Cervical Myelopathy

N = 249 patients with cervical pain: 88 with CSM

- Age >45 years
- + Hoffmann's Sign
- + Inverted Supinator Sign
- + Babinski Test
- + Gait Abnormality



(-)

Cook et al. JMMT. 2010;18(4).



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Cervical Myelopathy Cluster

Clustered Results	Sensitivity (95% CI)	Specificity (95% CI)	+ Likelihood Ratio (95% CI)	- Likelihood Ratio (95% CI)	Posttest Prob of CSM (%)
1 of 5 positive tests	.94 (.89-.97)	.31 (.27-32)	1.4 (1.2-1.4)	0.18 (0.12-0.42)	43
2 of 5 positive tests	.39 (.33-.46)	.88 (.84-.92)	3.3 (2.1-5.5)	0.63 (0.59-0.79)	64
3 of 5 positive tests	.19 (.15-.20)	.99 (.97-.99)	30.9 (5.5-181.8)	0.81 (.79-.87)	94
4 of 5 positive tests	.09 (.06-.09)	1.0 (.98-1.0)	Inf (3.9-Inf)	0.91 (0.90-0.95)	99+

NOTE. Five tests are included in the rule: (1) Gait deviation; (2) +Hoffmann's test; (3) Hyperreflexia of the brachioradialis; (4) +Babinski test; and (5) age >45 years. The associated posttest probability values are based on a pretest probability of 35%.

Pathophysiology and Natural History of Cervical Spondylotic Myelopathy

SPINE Volume 38, Number 22S, pp S21-S36

Spyridon K. Karadimas, MD, PhD,* W. Mark Erwin, DC, PhD,† Claire G. Ely, BS,‡ Joseph R. Dettori, MPH, PhD,§ and Michael G. Fehlings, MD, PhD, FRCSC¶

Moderate-strength evidence related to the natural history of CSM suggests that 20% to 60% of patients will deteriorate neurologically over time without surgical intervention. Finally, there is low-strength evidence indicating that the area of circumferential compression is associated with deteriorating neurological symptoms.

Conclusion. CSM has unique pathobiological mechanisms that mainly remain unexplored. Although the natural history of CSM can be mixed, surgical intervention eliminates the chances of the neurological deterioration.

Evidence-Based Clinical Recommendations.

Recommendation. Evidence concerning the natural history of CSM suggests that 20% to 60% of patients will deteriorate neurologically over time without surgical intervention. Therefore, we recommend that patients with mild CSM be counseled regarding the natural history of CSM and have the option of surgical decompression explained.



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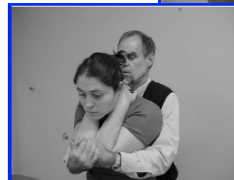
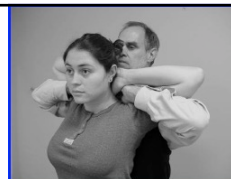
Intermittent Cervical Traction and Thoracic Manipulation for Management of Mild Cervical Compressive Myelopathy Attributed to Cervical Herniated Disc: A Case Series

J Orthop Sports Phys Ther • Volume 34 • Number 11 • November 2004

David A. Browder, PT, MS, OCS¹
Richard E. Erhard, PT, DC, FAAOMPT²
Sara R. Phva, PT, MS, OCS, FAAOMPT³

Patient	Upper Extremity Distal Symptoms	Upper Extremity Hypoesthesia	Headache	Dizziness	Hoffmann's Reflex	Hyperreflexia	Hyporeflexia	Weakness
1	No	No	No	No	Yes	T ¹ , BB [*] , BR [*] , Q [*] , P [*]		
2	Unilateral	Unilateral	No	No	Yes	Right T, BB [*] , BR [*] , C [*] , Q [*]	Left T	Left C7
3	No	No	Yes	Yes	Yes	Left BB, BR		
4	Unilateral	Unilateral	Yes	No	Yes	Left BB, BR	Left T	Left C7
5	Bilateral	Bilateral	No	Yes	Yes	T ¹ , BB [*] , BR [*] , Q [*] , C [*] , P [*]		
6	No	No	No	Yes	Yes	T ¹ , BB [*] , BR [*] , P [*]		
7	Bilateral	Bilateral	Yes	Yes	Yes	T ¹ , BB [*] , BR [*] , Q [*] , C [*]		Left C5

Patient	Upper Extremity Distal Symptoms	Upper Extremity Hypoesthesia	Headache	Dizziness	Hoffmann's Reflex	Hyperreflexia (See Key)	Hyporeflexia	Weakness
1	No	No	No	No	Yes	T ¹ , BB [*] , BR [*] , Q [*] , P [*]		
2	Unilateral	Unilateral	No	No	Yes	T ¹ , BB [*] , BR [*] , C [*] , Q [*]	Resolved	Resolved
3	No	No	Resolved	Resolved	Yes	Left BB, BR		
4	Unilateral	Unilateral	Decreased	No	Yes	Left BB, BR	Resolved	Resolved
5	Bilateral	Bilateral	No	Yes	Yes	T ¹ , BB [*] , BR [*] , Q [*] , C [*] , P [*]		
6	No	No	No	Resolved	Resolved	T ¹ , BB [*] , BR [*] , P [*]		
7	Resolved	Resolved	Resolved	Resolved	Resolved	T ¹ , BB [*] , BR [*] , Q [*] , C [*]		Resolved




SPINE Volume 28, Number 1, pp 52-62
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Reliability and Diagnostic Accuracy of the Clinical Examination and Patient Self-Report Measures for Cervical Radiculopathy

LtCol Robert S. Wainner, PhD, PT, OCS, ECS,* Julie M. Fritz, PhD, PT, ATC,†
James J. Irrgang, PhD, PT, ATC,† Michael L. Boninger, MD,‡
Anthony Delitto, PhD, PT, FAPTA,‡ and COL Stephen Allison, PhD, PT, ECS§

Positive Spurling test
Positive distraction test
Positive upper-limb tension test
Presence of $<60^\circ$ of cervical rotation range of motion to the involved side

Figure 3.
Criteria in the cervical radiculopathy clinical prediction rule.¹³

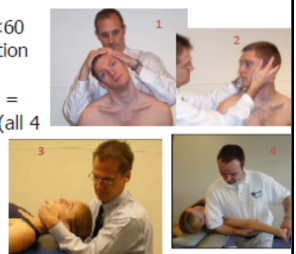
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CPR for Cervical Radiculopathy


- 3/4 findings (+), pretest probability increases 23% to 65%
- 4/4 findings (+), +LR = 30.3 and probability 90%
- ULTT = Sn = 97%, - LR = 0.12 (If Negative, most likely to rule out Radiculopathy)
 - Importance of order of testing


(+)

- Spurlings, ROM <60 degrees, Distraction test, and ULTT
- Sens = 24, Spec = 99, LR+ = 30.3 (all 4 tests positive)
- QUADAS = 10



Wainner et al. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. *Spine*. 2003;28(1):52-62. 553

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J Res Med Sci. 2013 March; 18(Suppl 1): S35-S38.

The value of provocative tests in diagnosis of cervical radiculopathy


[Majid Ghasemi](#), [Khodavar Golabchi](#), [Seved Ali Mousavi](#), [Bahador Asadi](#), [Majid Rezvani](#),¹ [Vahid Shavqannejad](#), and [Mehri Salari](#)

- Assessed Shoulder Abduction Test (SAT), Spurling's Test (ST), Upper Limb Tension Test (ULTT) on 97 patients and results compared to EMG findings
- SAT and ST more specific tests (85%)
- ULTT more sensitive (60% in acute and 35% in chronic)
- Concluded:
 - ULTT is suitable for screening CR (SnNout)
 - SAT and ST can support diagnosis (SpPin)

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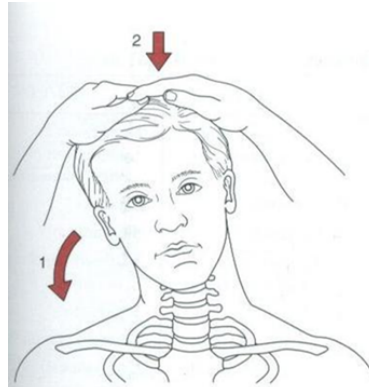
Objective Examination Modification

- **Typical Cervical Sequence**
 - Active/Passive/Resisted Testing
 - Provocation Testing
 - Neurological Testing
 - Neurodynamic Testing
 - Biomechanical Exam
- **Cervical Radiculopathy**
 - APR
 - Esp. Rotation, Extension
 - Quadrant
 - Spurling's
 - Provocation
 - Compression/Distraction
 - Neurological
 - Neurodynamic
 - ULPT 1
 - Biomechanical?

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Spurling's Test

- Foraminal compression (Spurling's)
 - Sidebend (may add extension)
 - Compression through the head
- Designed to test for cervical radiculopathy
- Specific test: 92%
 - (+) LR = 4.87
 - Not as sensitive (11-39%)
- PT positioning?



Spurling's Test

(+)



(+)

Compression



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Distraction

(+)



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Distraction in Flexion vs. Extension



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Cervical Distraction Test - Supine

(+)



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The Influence of Cervical Traction, Compression, and Spurling Test on Cervical Intervertebral Foramen Size

Hiroshi Takasaki, PT, MSc,*† Toby Hall, PT, MSc, FACP,† Gwendolen Jull, PT, PhD, FACP,‡
Shouta Kaneko, OT,* Takeshi Iizawa, PT, BSc,* and Yoshikazu Ikemoto, MD, PhD*

- C4-T1 intervertebral foramen cross-sectional area and shape with MRI
 - Distraction 120% of control at all levels except C7/T1
 - Spurling's Test 70% of control
 - Most significant at C4/5 and C5/6 levels
- Clinical significance of Spurling's/Compression

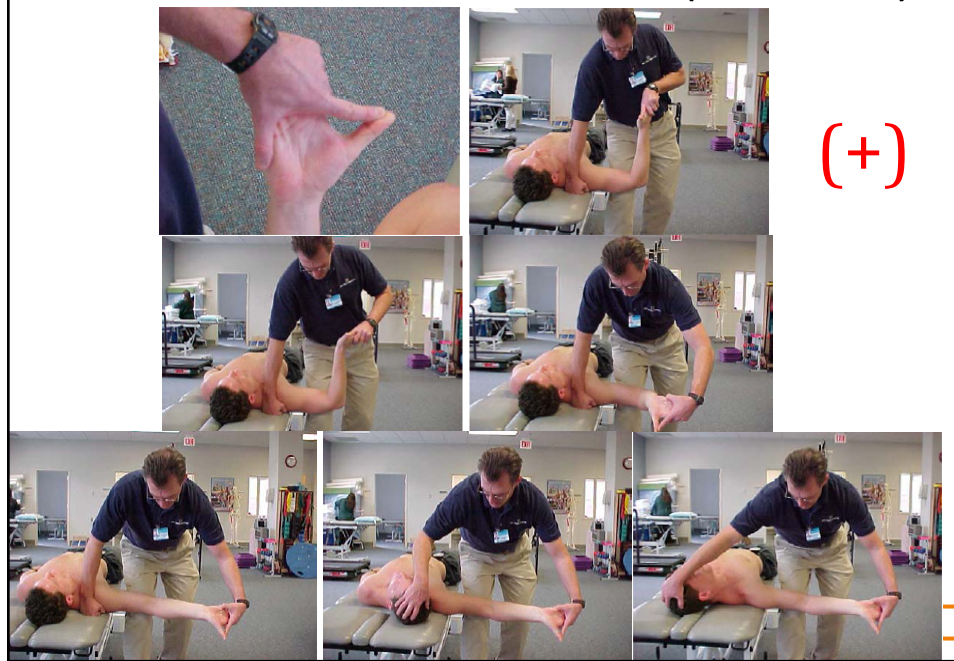


Neurodynamic Testing

- Upper Limb "Tension" Testing (Provocation)
 - "SLR of the Upper Extremity"
 - Not disorder specific except for a (-) test to rule out cervical radiculopathy
 - Biased to the terminal branches of the brachial plexus based on their anatomy
 - Median nerve (ULTT 1 and 2a)
 - Radial nerve (ULTT 2b)
 - Ulnar nerve (ULTT 3)
 - Sensitivity 72-97%
 - Specificity 22-33%
- Reproducible neurogenic pain (burning or lightning-like pain, tingling sensation, according to dermatome pattern if nerve root pathology) in neck and arm;
 - Increased/decreased symptoms with structural differentiation; and
 - Difference in painful radiation between right and left sides.



ULPT 1 – Median Nerve Bias (Base Test)



CONCORDANCE OF UPPER LIMB NEURODYNAMIC TESTS WITH MEDICAL EXAMINATION AND MAGNETIC RESONANCE IMAGING IN PATIENTS WITH CERVICAL RADICULOPATHY: A DIAGNOSTIC COHORT STUDY

Journal of Manipulative and Physiological Therapeutics
Volume xx, Number

Martina Apelby-Albrecht, DN,^a Linda Andersson, DN,^a Ingrid W. Kleiva, DN,^a
Kristian Kvåle, DN,^b Eva Skillgate, DN, PhD,^b and Anna Josephson, MD, PhD^c

- n = 51
- ULNT (1-3 used combined) showed the highest sensitivity 0.97 and a specificity of 0.69
 - ULNT corresponded with MRI in 88.2% of cases
 - Most credible way to identify subjects with cervical radiculopathy
 - ULNT 1 (Median) showed the highest validity
 - ULNT 3 (Ulnar) had highest specificity compared with MRI
 - ULNT 2b (Radial) had lowest validity

Table 5. Validity of ULNT, separately and as a test composition

Variable	Sn (95% CI)	Sp (95% CI)	NPV (95% CI)	PPV (95% CI)	κ
ULNT	0.97 (0.85-1.00)	0.69 (0.41-0.89)	0.92 (0.62-1.00)	0.87 (0.73-0.96)	0.71
ULNT1 median	0.83 (0.66-0.93)	0.75 (0.48-0.93)	0.67 (0.41-0.87)	0.88 (0.72-0.97)	0.56
ULNT2a median	0.66 (0.48-0.81)	0.75 (0.48-0.93)	0.50 (0.29-0.71)	0.85 (0.66-0.96)	0.36
ULNT2b radial	0.43 (0.26-0.61)	0.75 (0.48-0.93)	0.37 (0.21-0.56)	0.79 (0.54-0.94)	0.14
ULNT3 ulnar	0.71 (0.54-0.85)	0.87 (0.62-0.98)	0.58 (0.37-0.78)	0.93 (0.76-0.99)	0.52



CI, confidence interval; Sn, sensitivity; Sp, specificity; ULNT, upper limb neurodynamic test.

Reflection To Help Improve Pattern Recognition

Identify the key subjective and physical features (i.e. **clinical pattern**) that would help you recognize this disorder in the future.

Subjective	Physical



Cervical Radiculopathy – Clinical Pearls

- **Profile:** Common in middle age and older population, especially in patients with established degenerative changes
- **Area:**
 - Dermatomal pattern, worse proximal > distal (chronic), worse distal > proximal (acute)
 - May have distal ache and/or N/T
 - If chronic may have Intermittent patchy symptoms
 - If acute may have constant chemical irritability
- **Aggs:** Sustained Flexion activities, movements which narrow foramen on involved side (Ext, SB, Rot), UE activities (if neurodynamic component)
- **Eases:** Rest with neck and arm supported
 - Arm overhead – C5 – Bakody Sign
 - Arm across body – C7
- **History:**
 - Current – Result of past acute radiculopathy that did not completely resolve
 - Past – May have had prior episodes of neck stiffness that resolved within days without treatment




What About Classification?

Journal of Orthopaedic & Sports Physical Therapy
Official Publication of the Orthopaedic and Sports Physical Therapy Sections of the American Physical Therapy Association

Proposal of a Classification System for Patients With Neck Pain

Maj John D. Childs, PT, PhD, MBA, OCS, FAAOMPT¹
 Julie M. Fritz, PT, PhD, ATC²
 Sara R. Piva, PT, MS, OCS, FAAOMPT³
 Julie M. Whitman, PT, DSc, OCS, FAAOMPT⁴




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TABLE 3. Overview of classification categories with key examination findings and proposed matched interventions.

Classification	Examination Findings	Proposed Matched Interventions
Mobility	<ul style="list-style-type: none"> Recent onset of symptoms No radicular/referred symptoms in the upper quarter Restricted range of motion with side-to-side rotation and/or discrepancy in lateral flexion range of motion No signs of nerve root compression or peripheralization of symptoms in the upper quarter with cervical range of motion 	<ul style="list-style-type: none"> Cervical and thoracic spine mobilization/manipulation Active range of motion exercises
Centralization	<ul style="list-style-type: none"> Radicular/referred symptoms in the upper quarter Peripheralization and/or centralization of symptoms with range of motion Signs of nerve root compression present May have pathoanatomic diagnosis of cervical radiculopathy 	<ul style="list-style-type: none"> Mechanical/manual cervical traction Repeated movements to centralize symptoms
Conditioning and increase exercise tolerance	<ul style="list-style-type: none"> Lower pain and disability scores Longer duration of symptoms No signs of nerve root compression No peripheralization/centralization during range of motion 	<ul style="list-style-type: none"> Strengthening and endurance exercises for the muscles of the neck and upper quarter Aerobic conditioning exercises
Pain control	<ul style="list-style-type: none"> High pain and disability scores Very recent onset of symptoms Symptoms precipitated by trauma Referred or radiating symptoms extending into the upper quarter Poor tolerance for examination or most interventions 	<ul style="list-style-type: none"> Gentle active range of motion within pain tolerance Range of motion exercises for adjacent regions Physical modalities as needed Activity modification to control pain
Reduce headache	<ul style="list-style-type: none"> Unilateral headache with onset preceded by neck pain Headache pain triggered by neck movement or positions Headache pain elicited by pressure on posterior neck 	<ul style="list-style-type: none"> Cervical spine manipulation/mobilization Strengthening of neck and upper quarter muscles Postural education



J Orthop Sports Phys Ther • Volume 34 • Number 11 • November 2004

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Centralization

Examination Findings

- Radicular/referred symptoms in the upper quarter
- Peripheralization and/or centralization of symptoms with range of motion
- Signs of nerve root compression present
- May have pathoanatomic diagnosis of cervical radiculopathy

Proposed Matched Interventions

- Mechanical/manual cervical traction
- Repeated movements to centralize symptoms



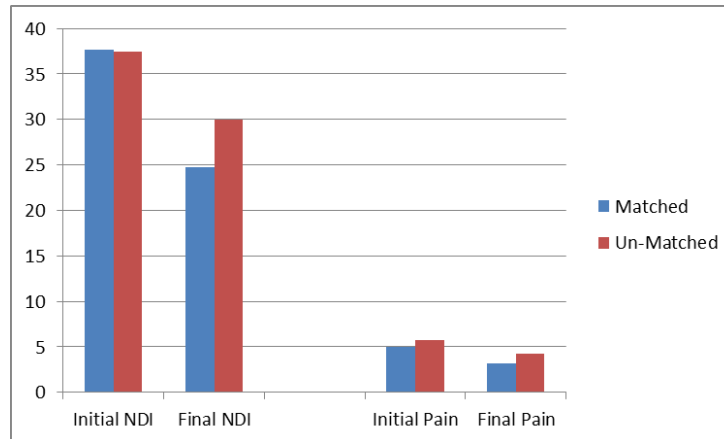
Research Report

Preliminary Examination of a Proposed Treatment-Based Classification System for Patients Receiving Physical Therapy Interventions for Neck Pain

Julie M Fritz, Gerard P Brennan



Centralization Results



How Does This Relate to Treatment?

CLINICAL PRACTICE GUIDELINES

PETER R. BLANPIED, PT, PhD • ANITA R. GROSS, PT, MSc • JAMES M. ELLIOTT, PT, PhD • LAURIE LEE DEVANEY, PT, MSc
DEREK CLEWLEY, DPT • DAVID M. WALTON, PT, PhD • CHERYL SPARKS, PT, PhD • ERIC K. ROBERTSON, PT, DPT

Neck Pain: Revision 2017

*Clinical Practice Guidelines Linked to the
International Classification of Functioning,
Disability and Health From the Orthopaedic Section
of the American Physical Therapy Association*

J Orthop Sports Phys Ther. 2017;47(7):A1-A83. doi:10.2519/jospt.20170302



Interventions: Neck pain with Radiating Pain

Acute

For patients with **acute** neck pain with radiating pain:

- C** Clinicians may provide mobilizing and stabilizing exercises, laser, and short-term use of a cervical collar.

Chronic

For patients with **chronic** neck pain with radiating pain:

- B** Clinicians should provide mechanical intermittent cervical traction, combined with other interventions such as stretching and strengthening exercise plus cervical and thoracic mobilization/manipulation.
- B** Clinicians should provide education and counseling to encourage participation in occupational and exercise activities.



Systematic Review

Effectiveness of manual physical therapy in the treatment of cervical radiculopathy: a systematic review

Robert Boyles, Patrick Toy, James Mellon Jr, Margaret Hayes, Bradley Hammer

Program of Physical Therapy, University of Puget Sound, Tacoma, WA, USA

Journal of Manual and Manipulative Therapy 2011 VOL. 19 NO. 3 135

- Only 4 studies met criteria (PEDro > 5)
- Manual therapy often part of multimodal approach (ther ex, traction, etc.)
- No clear cause and effect, however; results are “generally promising”
- Conclusion: Although a definitive treatment progression for treating CR has not been developed a general consensus exists within the literature that **using manual therapy techniques in conjunction with therapeutic exercise is effective** in regard to increasing function, as well as AROM, while decreasing levels of pain and disability. High quality RCTs featuring control groups are necessary to establish clear and effective protocols in the treatment of CR.



Manual Physical Therapy, Cervical Traction, and Strengthening Exercises in Patients With Cervical Radiculopathy: A Case Series

Joshua A. Cleland, DPT, OCS¹
 Julie M. Whitman, PT, DSc, OCS, FAAOMPT²
 Julie M. Fritz, PT, PhD, ATC³
 Jessica A. Palmer, MPT⁴

ies 2017-2018

STEVEN W. FORBUSH, PT, PhD¹ • TERRY COX, PT, DPT, OCS² • ERIC WILSON, PT, DSc, OCS, SCS, FAAOMPT³

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 41 | NUMBER 10 | OCTOBER 2011 |

Treatment of Patients With Degenerative Cervical Radiculopathy Using a Multimodal Conservative Approach in a Geriatric Population: A Case Series

FIGURE 2. High-velocity low-amplitude thrust manipulation using a cradle-hold technique. The technique is performed with either an up-glide (up-slope) or a down-glide (down-slope). Pictured here is the down-glide technique. (A) Side-glide to isolate the segment. (B) Rotation to localize the segmental level. (C) High-velocity low-amplitude thrust manipulation applied through the localized segment.

FIGURE 4. Soft tissue mobilization of the cervical and upper thoracic musculature. Kneading, performed in a seated position, was one technique used for the upper trapezius and cervical paraspinals. The patients in this case series were uncomfortable in prone.

FIGURE 5. Suboccipital pressure, with the intent of causing muscle relaxation, was performed with the fingers.

FIGURE 11. Intermittent mechanical cervical traction. (A) "Pistol grip" hand position, with contacts. (B) Hand and body position prior to high-velocity

Comparison of 2 Manual Therapy and Exercise Protocols for Cervical Radiculopathy: A Randomized Clinical Trial Evaluating Short-Term Effects

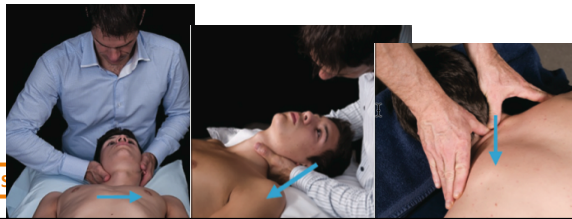
| JANUARY 2015 | VOLUME 45 | NUMBER 1 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

CONCLUSION

THE RESULTS OF THIS RCT SUGGEST that manual therapy and exercises are effective in improving pain, function, and ROM in patients with CR. The addition of manual therapy techniques and exercises thought to increase the size of the IVF corresponding to the affected nerve root yielded no significant additional benefits on neck and upper-limb function, neck pain, and ROM. Given the absence of a "no treatment" group, a spontaneous resolution of symptoms cannot be excluded. However, the magnitude of improvement would make spontaneous resolution unlikely. ©



Vs.



➤ What is your primary treatment Objective after initial evaluation?

- **Education:** _____ **Positioning and foraminal effects, discussion of expectations, medications, rest, comparison to surgery**
- **Manual Therapy:** (Specific Technique)
_____ **T/S Manipulation, Cerv Lateral Glides/STM, Man/Mech Traction, Cervical Mobilization (PPIVM/PAIVMs)**
- **Exercise Prescription:** (Specific)
_____ **Deep Cervical Flexors, Mid/Lower Traps, Serratus Anterior**

What are you going to re assess at subsequent visit **Cervical Q, ULPT, C5/6 myotomes, Shoulder Q, PAIVM testing**



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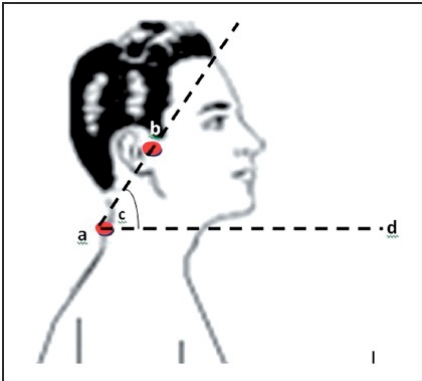
Article

CLINICAL REHABILITATION

Clinical Rehabilitation
26(4) 351-361
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DOI: 10.1177/0269215511419536
cre.sagepub.com
SAGE

The efficacy of forward head correction on nerve root function and pain in cervical spondylotic radiculopathy: a randomized trial

Aliaa A Diab and Ibrahim M Moustafa



- Significant difference at 10 weeks for craniocervical angle, pain, C6 and C7 dermatomal EMG output
- Postural corrective exercise, US and Infrared radiation

018 www.vompti.com

MORPHOLOGIC DIFFERENCES IN INTERVERTEBRAL FORAMINA: A RADIOGRAPHIC STUDY OF CERVICAL SPINE POSITIONS IN ASYMPTOMATIC MEN

Journal of Manipulative and Physiological Therapeutics
June 2013

Tomonori Sato, PhD,^a and Kenji Masui, PT^b

- Measured foraminal height on radiograph of C5/6, C6/7 in various positions (22-29 y/o asymptomatic men)
- Flexion + Lat Flex R + Rotation L increases the height of the cervical IVF (on L)
- Implications for treatment position and patient education
- Approaching manipulative position

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Spine
RANDOMIZED TRIAL

SPINE Volume 38, Number 4, pp 300-307
©2013, Lippincott Williams & Wilkins

Physical Function Outcome in Cervical Radiculopathy Patients After Physiotherapy Alone Compared With Anterior Surgery Followed by Physiotherapy

A Prospective Randomized Study With a 2-Year Follow-up

Anneli Peolsson, PhD, RPT,* Anne Söderlund, PhD, PT,† Markus Engquist, MD,‡§ Bengt Lind, MD, PhD,§¶ Håkan Löfgren, MD, PhD,|| Ludek Vavrouch, MD, PhD,|| Anders Holtz, MD, PhD,** Annelie Winström-Christersson, BSc,†† Ingrid Isaksson, BSc,†† and Birgitta Öberg, PhD, PT*

Key Points

- ❑ Compared with physiotherapy alone, anterior surgery with physiotherapy did not result in additional improvements in physical function outcome in patients with radiculopathy because of CDD.
- ❑ Despite improvements over time in several physical functions, patients continued to exhibit low functioning compared to normative values, especially in dorsal NME.
- ❑ We suggest that a structured program with neck-specific exercises and pain management, mediated by a specialized physiotherapist, should precede a decision of ACDF in patients with radiculopathy because of disc disease.

Orthopaedic M www.vompti.com

MARK D. BISHOP, PT, PhD¹ • PAUL MINTKEN, PT, DPT² • JOEL E. BIALOSKY, PT, PhD¹ • JOSHUA A. CLELAND, PT, PhD¹

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 43 | NUMBER 7 | JULY 2013

Patient Expectations of Benefit From Interventions for Neck Pain and Resulting Influence on Outcomes

SUMMARY: PATIENTS WITH NECK PAIN had high general expectations for physical therapy. Most patients specifically expected manual therapy and exercise to be beneficial treatments for neck pain. Patients with low general expectations for pain relief had worse outcomes at 6 months than patients who expected complete pain relief. Expectations for manipulation as a specific intervention provided during treatment increased short-term odds of success and long-term changes in disability in this study. ●

KEY POINTS

FINDINGS: High general expectation of benefit from treatment was related to better short-term outcomes. Low general expectation was related to worse long-term outcomes. These findings were independent of the interventions provided.

IMPLICATIONS: Patient expectations prior to starting treatment for neck pain are important to assess when planning interventions for neck pain.

CAUTION: These data were collected from patients willing to participate in a randomized trial of interventions.


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JOSPT Perspectives for Patients

JOSPT PERSPECTIVES FOR PATIENTS

Neck Pain
Manipulating the Upper Back Helps Lessen Pain and Improve Neck Motion

Neck Pain is very common. In the United States, about 10 million people experience neck pain every year. Although most people recover within a few weeks, some experience chronic neck pain. A recent study published in the March issue of JOSPT found that manipulation of the upper back can help reduce neck pain and improve neck motion.




KEY TAKEAWAYS

- Manipulation of the upper back can help reduce neck pain and improve neck motion.
- This technique is most effective when combined with exercise and manual therapy.

JOSPT PERSPECTIVES FOR PATIENTS

Neck Pain
Manipulation of Your Neck and Upper Back Leads to Quicker Recovery

Neck pain is very common, and frequently causes difficulty in daily activities. Current research shows that neck pain can be helped and even prevented by manipulation of the neck and upper back. A recent study published in the March issue of JOSPT found that manipulation of the neck and upper back can help reduce neck pain and improve neck motion.




KEY TAKEAWAYS

- Manipulation of the neck and upper back can help reduce neck pain and improve neck motion.
- This technique is most effective when combined with exercise and manual therapy.

JOSPT PERSPECTIVES FOR PATIENTS


Neck Pain
Combining Exercise and Manual Therapy for Your Neck and Upper Back Leads to Quicker Resolution in Pain

Neck pain is very common, and the pain can be very debilitating. A recent study published in the March issue of JOSPT found that combining exercise and manual therapy for the neck and upper back can help reduce neck pain and improve neck motion.



KEY TAKEAWAYS

- Combining exercise and manual therapy for the neck and upper back can help reduce neck pain and improve neck motion.
- This technique is most effective when combined with exercise and manual therapy.



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The Immediate Effects of a Cervical Lateral Glide Treatment Technique in Patients With Neurogenic Cervicobrachial Pain

Michel W. Coppieters, PT, PhD¹
Karel H. Stappaerts, PT, PhD²
Leo L. Wouters, PT³
Koen Janssens, PT⁴

J Orthop Sports Phys Ther • Volume 33 • Number 7 • July 2003

- Cervical Lateral Glides vs. Ultrasound
 - Subacute symptoms
- Measured ULPT elbow ROM, symptom distribution and pain intensity
- Significant differences in cervical lateral glide group
- Bob Elvey, PT (LV Technique)
- Referred or Radicular UE symptoms
- Assess Lat Glide in Neutral
- Assess Lat Glide with ULPT
- 2/3rd Rule
- Away vs. Towards



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Sonography assessment of the median nerve during cervical lateral glide and lateral flexion. Is there a difference in neurodynamics of asymptomatic people?

Manual Therapy 18 (2013) 216–219

Peter Brochwicz*, Harry von Piekartz, Christoff Zalpour

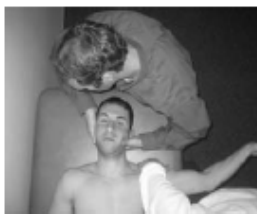
- Measured median nerve movement in forearm with cervical lateral glide vs lateral flexion
- Lateral Flexion = 2.3 mm of movement
- Lateral Glide = 3.3 mm of movement
- Relationship to treatment progression and stage



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ULND Positioning Techniques



The effect of cervical traction combined with neural mobilization on pain and disability in cervical radiculopathy. A case report

Christos Savva^{a,*}, Giannis Giakas^b



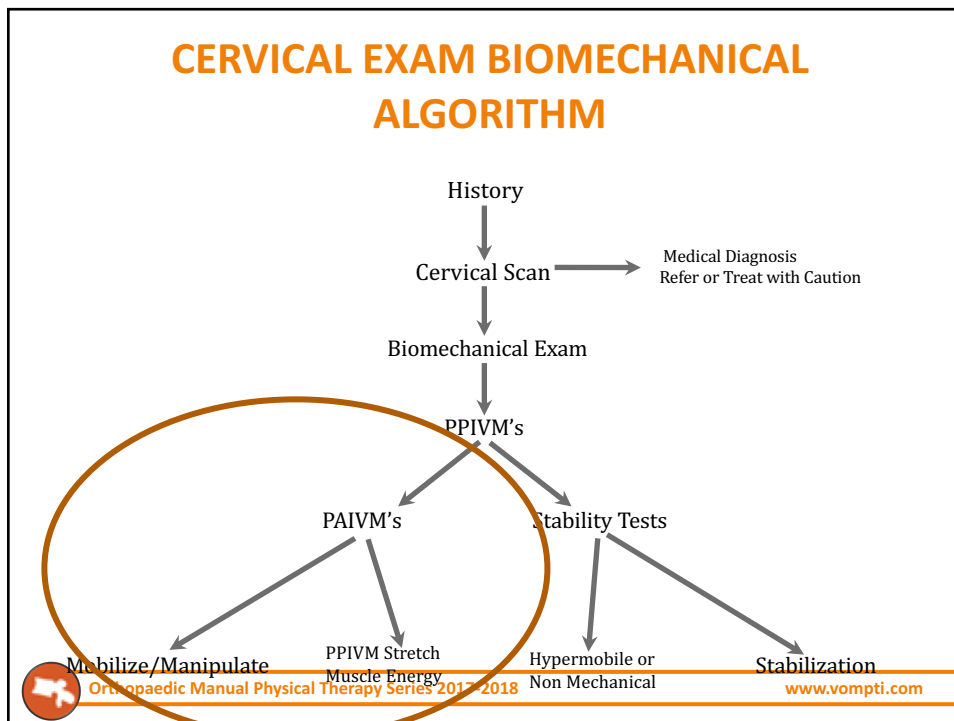
ROBERT J. NEE, PT, PhD² • BILL VICENZINO, PT, PhD¹ • GWENDOLEN A. JULL, PT, PhD¹
JOSHUA A. CLELAND, PT, PhD¹ • MICHEL W. COPPIETERS, PT, PhD¹

Baseline Characteristics of Patients With Nerve-Related Neck and Arm Pain Predict the Likely Response to Neural Tissue Management

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 43 | NUMBER 6 | JUNE 2013 |

- Predictors of improvement with NTM
 - Absence of neuropathic pain qualities
 - Older age
 - Smaller deficits in median nerve neurodynamic test ROM
- NTM = brief education, manual therapy, and nerve gliding exercises for 2 weeks (versus advice to remain active)

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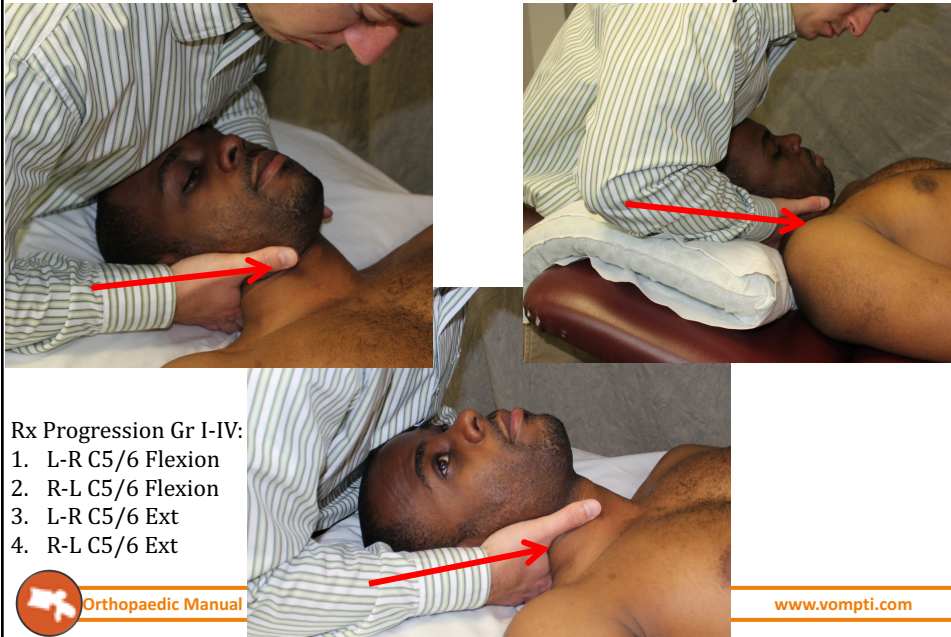
Combined Movement Treatment



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Cervical Treatment – SB PPIVM/PAIVM



Rx Progression Gr I-IV:

1. L-R C5/6 Flexion
2. R-L C5/6 Flexion
3. L-R C5/6 Ext
4. R-L C5/6 Ext



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Thoracic Manipulation Evidence

- Immediate changes in neck pain and AROM following T/S manipulation (Fernandez De-Las-Penas, 2007)
- Short term improvements in pain and disability with thoracic thrust vs non-thrust mobilization/manipulation (Cleland, et al., 2007)
- RCT, Immediate effects of thoracic manipulation - increased cervical rotation and decreased pain at end range rotation (vs. control group of rest)(Krauss, et al., 2008)
- T/S manipulation demonstrated superior benefits (versus TENs/Heat) for acute neck pain at 2 weeks and 4 week follow-up (Gonzalez-Igelsias, et al., 2009)
- Short-term improvement in lower trapezius strength following T/S manipulation (Cleland, et al., 2002)
- Short-term effects of T/S manipulation on patients with shoulder impingement syndrome (Boyles)
- CPR for patients with shoulder pain who respond to cervical and thoracic manipulation: Shoulder Elevation < 127, Shoulder IR < 53, (-) Neer's, No medication, symptoms < 90 days (Mintken, et al.)



Supine Upper and Mid-Thoracic AP HVLAT



Upper and Mid Thoracic AP Variations

- T3/4 and Above – “Loose Fist”
- Mid Thoracic – Flat Hand/“Dog” or Pistol
– Pistol De-Rotation



Figure 1. Seated thoracic spine distraction thrust manipulation used in this study. The therapist uses his or her sternum as a fulcrum on the subject's middle thoracic spine and applies a high-velocity distraction thrust in an upward direction.

rompti.com

Cervical Treatment – Manual Traction

C5/6 in Flexion



Orthopaedic

ti.com

Eur Spine J (2009) 18:382–391
DOI 10.1007/s00586-008-0859-7

ORIGINAL ARTICLE

Development of a clinical prediction rule to identify patients with neck pain likely to benefit from cervical traction and exercise

Nicole H. Raney · Evan J. Petersen · Tracy A. Smith · James E. Cowan · Daniel G. Rendeiro · Gail D. Deyle · John D. Childs

- Predictors for success
 - Age \geq 55yo
 - Positive shoulder abduction test
 - Positive ULTT A
 - Symptom peripheralization with central posterior–anterior motion testing at lower cervical (C4–7) spine
 - Positive neck distraction test
- Prediction of success
 - \geq 3 predictors
 - 79.2%
 - +LR 4.81
 - \geq 4 predictors
 - 94.8%
 - +LR 23.1



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JULIE M. FRITZ, PT, PhD, ATC¹ • ANNE THACKERAY, PT, MPH
 GERARD P. BRENNAN, PT, PhD, FAACPT² • JOHN D. CHILDS, PT, PhD, FAACPT³
JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 44 | NUMBER 2 | FEBRUARY 2014 |
Exercise Only, Exercise With Mechanical Traction, or Exercise With Over-Door Traction for Patients With Cervical Radiculopathy, With or Without Consideration of Status on a Previously Described Subgrouping Rule: A Randomized Clinical Trial

- N = 86 x 4 wks
- Assessed NDI and pain
- 4 weeks, 6 and 12 mo
- Exercise + Mech Tx
 - Lower NDI and pain
 - 6 and 12 mo follow-up
- Conclusion:
 - Adding mechanical traction to exercise for patients with CR resulted in lower disability and pain

Time Point	Exercise	Exercise plus Mechanical Traction	Exercise plus Over-Door Traction
Baseline	35	32	32
4 Weeks	12	10	11
6 Months	23	10	18
12 Months	21	11	18

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Predictors of Short-Term Outcome in People With a Clinical Diagnosis of Cervical Radiculopathy

December 2007 Volume 87 Number 12 Physical Therapy

Joshua A Cleland, Julie M Fritz, Julie M Whitman, Rachel Heath

- A 4-variable model identified subjects who were most likely to achieve success with PT interventions
 - Age < 54 yrs
 - Dominant arm not affected
 - Looking down does not worsen symptoms
 - Multimodal treatment including manual therapy, cervical traction and DNF muscle strengthening for at least 50% of visits
- 3/4 variables present: (+) LR 5.2 (Prob 85%)
- 4/4 variables present: (+) LR 8.3 (Prob 90%)

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WILLIAM OSWALD, DPT, Cert MDT⁶ • DAVE OLIVER, PT, Dip MDT⁷ • TROY MCGILL, PT, MS, Dip MDT⁸ • DENNIS L. HART, PT, PhD (deceased)⁹

Association Between Centralization and Directional Preference and Functional and Pain Outcomes in Patients With Neck Pain

CONCLUSION

DP IS A PREVALENT EVALUATION CATEGORY that, when combined with treatments consisting of matched exercises and manual techniques, can be used to predict changes in function, but not pain, in patients with neck pain. ●

KEY POINTS

FINDINGS: DP is a prevalent examination finding that predicts improvement in function when combined with treatments matched to the direction of the DP.

IMPLICATIONS: The evaluation of DP should be a component of the physical therapy examination of patients with neck pain and, when present, should inform intervention strategies.

CAUTION: Criteria for identifying and categorizing DP in patients with neck pain need further refinement.



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