

UPPER CERVICAL AND UPPER THORACIC THRUST MANIPULATION VERSUS NONTHRUST

MOBILIZATION IN PATIENTS WITH MECHANICAL NECK PAIN:
A MULTICENTER RANDOMIZED CLINICAL TRIAL

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FROM ABSTRACT:

THIS IS A RANDOMIZED CLINICAL TRIAL TO COMPARE THE SHORT-TERM EFFECTS OF UPPER CERVICAL AND UPPER THORACIC HIGH-VELOCITY LOW-AMPLITUDE (HVLA) THRUST MANIPULATION TO NONTHRUST MOBILIZATION IN PATIENTS WITH NECK PAIN.

ALTHOUGH UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION AND NONTHRUST MOBILIZATION ARE COMMON INTERVENTIONS FOR THE MANAGEMENT OF NECK PAIN, NO STUDIES HAVE DIRECTLY COMPARED THE EFFECTS OF BOTH UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION TO NONTHRUST MOBILIZATION IN PATIENTS WITH NECK PAIN.

PATIENTS COMPLETED THE NECK DISABILITY INDEX [NDI], THE NUMERIC PAIN RATING SCALE, THE FLEXION-ROTATION TEST FOR MEASUREMENT OF C 1-2 PASSIVE ROTATION RANGE OF MOTION, AND THE CRANIOCERVICAL FLEXION TEST FOR MEASUREMENT OF DEEP CERVICAL FLEXOR MOTOR PERFORMANCE. FOLLOWING THE BASELINE EVALUATION, PATIENTS WERE RANDOMIZED TO RECEIVE EITHER HVLA THRUST MANIPULATION OR NONTHRUST MOBILIZATION TO THE UPPER CERVICAL (C 1-2) AND UPPER THORACIC (T 1-2) SPINES.

PATIENTS WERE REEXAMINED 48-HOURS AFTER THE INITIAL EXAMINATION AND AGAIN COMPLETED THE OUTCOME MEASURES. THE EFFECTS OF TREATMENT ON DISABILITY, PAIN, C 1-2 PASSIVE ROTATION RANGE OF MOTION, AND MOTOR PERFORMANCE OF THE DEEP CERVICAL FLEXORS WERE EXAMINED.

107 COMPLETED THE STUDY:

HVLA THRUST MANIPULATION: N = 56:

NONTHRUST MOBILIZATION: N = 51.

THE PATIENTS WITH MECHANICAL NECK PAIN WHO RECEIVED THE COMBINATION OF UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION EXPERIENCED SIGNIFICANTLY GREATER REDUCTIONS IN DISABILITY (50.5%) AND PAIN (58.5%) THAN

1

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THOSE OF THE NONTHRUST MOBILIZATION GROUP (12.8% AND 12.6%, RESPECTIVELY) FOLLOWING TREATMENT.

IN ADDITION, THE HVLA THRUST MANIPULATION GROUP HAD SIGNIFICANTLY GREATER IMPROVEMENT IN BOTH PASSIVE C 1-2 ROTATION RANGE OF MOTION AND MOTOR PERFORMANCE OF THE DEEP CERVICAL FLEXOR MUSCLES AS COMPARED TO THE GROUP THAT RECEIVED NONTHRUST MOBILIZATION.

CONCLUSION: THE COMBINATION OF UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION IS APPRECIABLY MORE EFFECTIVE IN THE SHORT TERM THAN NONTHRUST MOBILIZATION IN PATIENTS WITH MECHANICAL NECK PAIN.

KEY POINTS FROM THESE AUTHORS:

1) ABOUT 54% OF INDIVIDUALS HAVE EXPERIENCED NECK PAIN WITHIN THE LAST 6 MONTHS.

2) “THE ECONOMIC BURDEN ASSOCIATED WITH THE MANAGEMENT OF PATIENTS WITH NECK PAIN IS HIGH, SECOND ONLY TO LOW BACK PAIN IN ANNUAL WORKERS’ COMPENSATION COSTS IN THE UNITED STATES.”

3) THERE IS CONSIDERABLE EVIDENCE FAVORING THE EFFECTIVENESS OF THORACIC HVLA THRUST MANIPULATION IN PATIENTS WITH ACUTE AND SUBACUTE NECK PAIN IN BOTH THE SHORT AND LONG TERM AS BEING SUPERIOR OVER:

- **THORACIC NONTHRUST MOBILIZATION**
- **INFRARED RADIATION THERAPY**
- **TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION**
- **SOFT TISSUE MASSAGE**
- **PLACEBO MANIPULATION**

4) THE C 1-2 ARTICULATION HAS A HIGH FREQUENCY OF INVOLVEMENT IN PATIENTS WITH NECK PAIN AND HEADACHES.

5) “FOLLOWING UPPER CERVICAL HVLA THRUST MANIPULATION, IMMEDIATE AND SIGNIFICANT IMPROVEMENTS IN C 1-2 ROTATION ASYMMETRY HAVE BEEN DEMONSTRATED.”

6) “DISTURBANCES IN JOINT MOBILITY IN THE UPPER THORACIC SPINE MAY BE AN UNDERLYING CONTRIBUTOR TO MUSCULOSKELETAL DISORDERS IN THE CERVICAL SPINE.” DECREASED MOBILITY IN THE CERVICOTHORACIC JUNCTION (C7-T2) IS ASSOCIATED WITH MECHANICAL NECK PAIN.

7) “THE MOST RECENT LITERATURE SUGGESTS THAT PRE-MANIPULATIVE CERVICAL ARTERY TESTING MAY BE UNABLE TO IDENTIFY INDIVIDUALS AT RISK OF VASCULAR COMPLICATIONS FROM CERVICAL HVLA THRUST MANIPULATION AND THAT ANY SYMPTOMS DETECTED DURING PRE-MANIPULATIVE TESTING MAY BE UNRELATED TO CHANGES IN BLOOD FLOW IN THE VERTEBRAL ARTERY, SO THAT A NEGATIVE TEST MAY NEITHER PREDICT THE ABSENCE OF ARTERIAL PATHOLOGY NOR THE PROPENSITY OF THE ARTERY TO BE INJURED DURING

CERVICAL HVLA THRUST MANIPULATION, WITH TESTING BEING NEITHER SENSITIVE OR SPECIFIC.”

8) THE MANIPULATIONS PERFORMED IN THIS STUDY WERE BY 7 PHYSICAL THERAPISTS THAT HAD AN AVERAGE OF 12.5 YEARS OF CLINICAL EXPERIENCE, AND ALL HAD COMPLETED A 60 HOUR POSTGRADUATE CERTIFICATION PROGRAM THAT INCLUDED PRACTICAL TRAINING IN THE USE OF UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION.

9) “THE PRIMARY OUTCOME MEASURE USED IN THIS STUDY WAS THE PATIENT’S PERCEIVED LEVEL OF DISABILITY AS MEASURED BY THE NDI. THE NDI IS THE MOST WIDELY USED CONDITION-SPECIFIC DISABILITY SCALE FOR PATIENTS WITH NECK PAIN AND CONSISTS OF 10 ITEMS ADDRESSING DIFFERENT ASPECTS OF FUNCTION, EACH SCORED FROM 0 TO 5, WITH A MAXIMUM SCORE OF 50 POINTS. HIGHER SCORES REPRESENT INCREASED LEVELS OF DISABILITY. THE NDI HAS BEEN DEMONSTRATED TO BE A RELIABLE AND VALID OUTCOME MEASURE FOR PATIENTS WITH NECK PAIN.”

10) PATIENTS WERE RANDOMLY ASSIGNED TO RECEIVE EITHER THE HVLA THRUST MANIPULATION OR NONTHRUST MOBILIZATION PROCEDURES. PATIENTS IN BOTH GROUPS WERE TREATED FOR 1 SESSION AND THEN RETURNED 48 HOURS LATER TO COMPLETE OUTCOME MEASUREMENTS.

11) FROM THE PICTURE AND DESCRIPTION, THE C1-C2 MANIPULATION APPEARED TO BE A STANDARD ROTARY-LATERAL FLEXION MANEUVER CONTACTING THE POSTERIOR ARCH OF C1. THE THORACIC MANIPULATION APPEARED TO BE A STANDARD AP THORACIC ADJUSTMENT AT T1-T2. FOR EACH MANIPULATION THE THERAPIST TRIED TO ELICIT AN AUDIBLE RELEASE, BUT TRIED TO DO SO NO MORE THAN TWICE. THE DESCRIPTIONS AND PHOTOGRAPHS APPEARED TO SHOW A STANDARD JOINT CAVITATION CHIROPRACTIC ADJUSTMENT TO THESE REGIONS.

12) THE NONTHRUST MOBILIZATION CONSISTED OF A 30-SECOND UNILATERAL GRADE IV MOBILIZATIONS USING MAITLAND’S TECHNIQUES.

13) “THE MOST RECENT AND ROBUST EVIDENCE FOR THE RISK OF VERTEBROBASILAR STROKE AND CERVICAL HVLA THRUST MANIPULATION COMES FROM THE CASE CONTROL STUDY BY CASSIDY ET AL. CONTRARY TO TRADITIONALLY HELD VIEWS, CASSIDY ET AL FOUND NO EVIDENCE OF EXCESS RISK OF VERTEBROBASILAR STROKE ASSOCIATED WITH CERVICAL HVLA THRUST MANIPULATION AS COMPARED TO PRIMARY MEDICAL PHYSICIAN CARE. MOREOVER, A RECENT SYSTEMATIC REVIEW CONCLUDED THAT THERE HAS BEEN NO STRONG EVIDENCE LINKING THE OCCURRENCE OF SERIOUS ADVERSE EVENTS WITH THE USE OF CERVICAL MANIPULATION OR MOBILIZATION IN ADULTS WITH NECK PAIN.”

14) THE NECK DISABILITY INDEX SHOWED THAT THE HVLA THRUST MANIPULATION GROUP EXPERIENCED LOWER DISABILITY LEVELS (10.8 POINTS) THAN THE NONTHRUST MOBILIZATION GROUP (18.4 POINTS) AT 48 HOURS FOLLOWING TREATMENT.

15) THE HVLA THRUST MANIPULATION GROUP EXPERIENCED SIGNIFICANTLY GREATER DISABILITY REDUCTION THAN THE NONTHRUST MOBILIZATION GROUP FOLLOWING TREATMENT.

- 16) “THE HVLA THRUST MANIPULATION GROUP EXPERIENCED A SIGNIFICANTLY GREATER PERCENTAGE IN DISABILITY REDUCTION (50.5%) THAN THE NONTHRUST MOBILIZATION GROUP (12.8%) FOLLOWING TREATMENT.”**
- 17) “SIGNIFICANTLY MORE PATIENTS IN THE HVLA THRUST MANIPULATION GROUP (51.8%) ACHIEVED A SUCCESSFUL OUTCOME (GREATER THAN OR EQUAL TO 50% IMPROVEMENT IN DISABILITY, AS MEASURED BY THE NDI AT 48-HOUR FOLLOW-UP) COMPARED TO THE NONTHRUST MOBILIZATION GROUP (7.8%).”**
- 18) THE HVLA THRUST MANIPULATION GROUP EXPERIENCED SIGNIFICANTLY GREATER PAIN REDUCTION THAN THE NONTHRUST MOBILIZATION GROUP FOLLOWING TREATMENT.**
- 19) “THE HVLA THRUST MANIPULATION GROUP EXPERIENCED A SIGNIFICANTLY GREATER PERCENTAGE IN PAIN REDUCTION (58.5%) THAN THE NONTHRUST MOBILIZATION GROUP (12.6%) FOLLOWING TREATMENT.”**
- 20) THE HVLA THRUST MANIPULATION GROUP EXPERIENCED SIGNIFICANTLY GREATER INCREASES IN PASSIVE C 1-2 ROTATION ROM AS COMPARED TO THE NONTHRUST MOBILIZATION GROUP.**
- 21) “PATIENTS RECEIVING A SINGLE SESSION OF UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION EXPERIENCED SIGNIFICANTLY GREATER IMPROVEMENTS IN MOTOR PERFORMANCE OF THE DEEP CERVICAL FLEXORS AS COMPARED TO THE NONTHRUST MOBILIZATION GROUP.”**
- 22) NO MAJOR ADVERSE EVENTS (DEATH, STROKE OR PERMANENT NEUROLOGICAL DEFICITS) WERE REPORTED FOR EITHER GROUP.**
- 23) “A SINGLE SESSION OF HVLA THRUST MANIPULATION DIRECTED TO BOTH THE UPPER CERVICAL AND UPPER THORACIC SPINES RESULTS IN GREATER IMPROVEMENTS IN DISABILITY, PAIN, ATLANTOAXIAL JOINT ROM, AND MOTOR PERFORMANCE OF THE DEEP CERVICAL FLEXOR MUSCLES THAN NONTHRUST MOBILIZATION DIRECTED TO THE SAME REGIONS.”**
- 24) “PERHAPS THE COMBINED EFFECT OF BOTH UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION, AS COMPARED TO THORACIC HVLA THRUST MANIPULATION ALONE, EXPLAINS THE GREATER REDUCTION IN DISABILITY (NDI) FOUND IN OUR STUDY THAN IN THAT FOUND BY” OTHERS.**
- 25) THE AUTHORS PROPOSE 4 EXPLANATIONS FOR THE SUPERIORITY OF JOINT MANIPULATION OVER JOINT MOBILIZATION:**
- IMPROVED BIOMECHANICAL SPINAL SEGMENTAL FUNCTION.**
 - ACTIVATION OF THE DESCENDING INHIBITORY PAIN PATHWAY.**
 - A NEUROPHYSIOLOGICAL RESPONSE INVOLVING TEMPORAL SENSORY SUMMATION AT THE DORSAL HORN OF THE SPINAL CORD.**

- **“HIGH-VELOCITY DISPLACEMENT OF VERTEBRAE WITH IMPULSE DURATIONS OF LESS THAN 200 MILLISECONDS MAY ALTER AFFERENT DISCHARGE RATES BY STIMULATING MECHANORECEPTORS IN THE ZYGAPOPHYSEAL JOINT CAPSULE, SPINAL LIGAMENTS, INTERVERTEBRAL DISC, AND PROPRIOCEPTORS IN THE MUSCLE SPINDLES AND GOLGI TENDON ORGANS WITHIN THE MUSCLE BELLY AND TENDON, THEREBY CHANGING ALPHA MOTOR NEURON EXCITABILITY LEVELS AND SUBSEQUENT MUSCLE ACTIVITY.”**

26) “WE DIRECTED TREATMENT TO THE ATLANTOAXIAL JOINTS, BECAUSE THE C1-2 ARTICULATION HAS BEEN FOUND TO HAVE A HIGH FREQUENCY OF SYMPTOMATIC INVOLVEMENT IN PATIENTS WITH NECK PAIN AND HEADACHES AND PREVIOUS STUDIES HAVE DEMONSTRATED THAT THIS ARTICULATION IS WHERE THE MAJORITY OF CERVICAL ROTATION OCCURS.”

27) HVLA THRUST MANIPULATION MIGHT STIMULATE RECEPTORS IN THE DEEP PARASPINAL MUSCULATURE AND NONTHRUST MOBILIZATION MIGHT BE MORE LIKELY TO FACILITATE RECEPTORS IN THE SUPERFICIAL MUSCLES.

28) “THE RESULTS OF THE CURRENT STUDY DEMONSTRATED THAT PATIENTS WITH MECHANICAL NECK PAIN WHO RECEIVED THE COMBINATION OF UPPER CERVICAL AND UPPER THORACIC HVLA THRUST MANIPULATION, EXPERIENCED GREATER REDUCTION IN PAIN AND DISABILITY, SHOWED GREATER IMPROVEMENT IN PASSIVE C1-2 ROTATION RANGE OF MOTION, AND HAD GREATER INCREASES IN MOTOR PERFORMANCE OF THE DEEP CERVICAL FLEXOR MUSCLES, AS COMPARED TO THE GROUP THAT RECEIVED NONTHRUST MOBILIZATION AT A 48-HOUR FOLLOW-UP VISIT.”

29) “THE COMBINATION OF HVLA THRUST MANIPULATION PROCEDURES DIRECTED TO BOTH THE UPPER CERVICAL AND UPPER THORACIC ARTICULATIONS MAY ENHANCE THE OVERALL OUTCOMES OF PATIENTS WITH MECHANICAL NECK PAIN.”

COMMENTS:

NONTHRUST MOBILIZATION IS NOT WORTHLESS; IT CLEARLY HELPED THE PATIENTS IN THIS STUDY. HOWEVER, THRUST/CAVITATION MANIPULATIONS OF THE SAME SPINAL REGIONS (UPPER CERVICAL AND UPPER THORACIC SPINES) WAS SIGNIFICANTLY SUPERIOR TO MOBILIZATION IN:

- 1) OVERALL SUCCESSFUL OUTCOMES**
- 2) DISABILITY REDUCTION**
- 3) PAIN REDUCTION**
- 4) INCREASED CERVICAL RANGE OF MOTION**
- 5) IMPROVEMENTS IN MOTOR PERFORMANCE OF THE DEEP CERVICAL FLEXORS**

ALSO, THIS STUDY INDICATES THAT UPPER CERVICAL AND UPPER THORACIC SPINES ARE

BIOMECHANICALLY FUNCTIONALLY LINKED AND THAT THE SUPERIOR RESULTS ACHIEVED IN THIS STUDY AS COMPARED TO OTHER STUDIES IS AS A CONSEQUENCE OF ADJUSTING BOTH REGIONS.