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Editorial Staff

Quantitative feedback vs. standard training for cervical and thoracic manipulation.

John Triano, DC, PhD; Carolyn Rogers; Sarah Combs MS, DC; David Potts, DC; Kenneth Sorrels, DC

Objective: To quantify elements of spinal manipulation therapy (SMT) performance, and to test the strategy of combined rehearsal and quantitative feedback as a means of enhancing student skill development for cervical and thoracic manipulative procedures.

Design: Randomized, controlled study.

Setting: Chiropractic college.

Subjects: Thirty-nine chiropractic student volunteers entering the manipulation technique training course.

Methods: Student performance of cervical and thoracic spinal manipulation therapies was quantified at the beginning, middle and end of a trimester using a Leander 900 "Z" series manipulation table embedded with an AMTI force plate. Passive loads acting through the targeted (C2 or T7) functional spinal units were estimated using inverse dynamics. Participating students rehearsed the index transverse (C2) and single pisiform-transverse (T7) procedures following the standard curriculum alone or a modified curriculum adding the Dynadjust training aid, as assigned on a randomized basis. Student "t" and chi-square tests were used to explore and describe biomechanical parameter changes over time as the semester progressed.

Results: Significant changes in performance between the standard curriculum and modified curriculum (with the Dynadjust) were observed for several (but different) biomechanical parameters of cervical and thoracic procedures.

Conclusion: This project used a rehearsal program that provided quantitative feedback on an empirically defined schedule that was self-administered by the student. Results demonstrated significant changes in performance of spinal manipulation by students using the Dynadjust instrument versus those who did not. Using quantitative feedback provided from training aids and biomechanical measurement systems, future training programs may be optimized and tested.

Key indexing terms: Chiropractic manipulation; training; skill; biomechanics.

Increasing the cervical lordosis with CBP-seated combined extension-compression and transverse load cervical traction with cervical manipulation: Non-randomized clinical control trial.

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Holland, PhD; Christopher Colloca, DC; Jason Haas, DC

Background: Cervical lordosis has been shown to be an important outcome of care; however, few conservative methods of rehabilitating sagittal cervical alignment have been reported.

Objective: To study whether a seated, retracted, extended and compressed position would cause tension in the anterior cervical ligament, anterior disc, and muscle structures, and thereby restore cervical lordosis or increase curvature in patients with loss of cervical lordosis.

Study design: Nonrandomized, prospective, clinical control trial.

Methods: Thirty preselected patients, after diagnostic screening for tolerance to cervical extension with compression, were treated for the first three weeks of care using cervical manipulation and a new type of cervical extension-compression traction (vertical weight applied to the subjects' foreheads in the sitting position, with a transverse load at the area of kyphosis). Pre- and posttreatment visual analogue pain rating scales were compared, along with pre- and posttreatment lateral cervical radiographs analyzed with the posterior tangent method for changes in alignment. Results were compared to a control group of 33 subjects, receiving no treatment, matched for age, sex, weight, height and pain.

Results: Control subjects reported no change in visual analogue pain scale ratings and had no statistical significant change in segmental or global cervical alignment on comparative lateral cervical radiographs (difference in all angle means < 1.3i), repeated an average of 8.5 months later. For the traction group, visual analogue ratings were 4.1 pretreatment and 1.1 posttreatment. On comparative lateral cervical radiographs repeated after an average of 38 visits over 14.6 weeks, 10 angles and two distances showed statistically significant improvements, including anterior head weight-bearing (mean improvement of 11 mm); Cobb angle at C2-C7 (mean improvement of -13.6i); and the angle of intersection of the posterior tangents at C2-C7 (mean improvement of 17.9i). Twenty-one (70%) of the treatment group subjects were followed for an additional 14 months; improvements in cervical lordosis and anterior weight-bearing were maintained.

Conclusions: CBP technique's extension-compression two-way cervical traction, combined with spinal manipulation, decreased chronic neck pain intensity and improved cervical lordosis in 38 visits over 14.6 weeks, as indicated by increases in segmental and global cervical alignment. Anterior head weightbearing was reduced by 11 mm; Cobb angles averaged an increase of 13i-14i; and the angle of intersection of posterior tangents on C2 and C7 averaged 17.9i of improvement.

Key indexing terms: Cervical vertebrae; lordosis; traction; posture; X-ray; kyphosis; rehabilitation.

The use of electromagnetic tracking technology for measurement of passive cervical range of motion: A pilot study.

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Objective: To investigate the use of electromagnetic tracking technology for measurement of passive cervical range of motion (ROM).

Design: Passive cervical ranges of motion, from one extreme to the other in three planes (transverse, frontal and sagittal), were measured using an electromagnetic tracking system (ETS),

a cervical range of motion device (CROM) and by visual estimation (VE) with two blinded examiners, using a repeated measures design.

Setting: Swinburne University of Technology, Australia.

Intervention: Four studies were undertaken: (1) Measurement of ROM using three methods: the CROM, the ETS and VE. Two examiners conducted measurements. (2) Measurement of ROM with the CROM and the ETS simultaneously by one examiner. (3) Measurement of ROM with the ETS by two examiners. (4) Measurement of medium-term reliability of ROM using the ETS over a 24-hour period by one examiner.

Main outcome measure: The intraclass correlation coefficient [ICC(2,1)] was used to investigate the reliability within and between each method, and reliability of ROM over a 24-hour period.

Results: Study 1: Intrainstrument ICCs ranged from fair to high for the three measurement methods. The ETS performed best. Interinstrument ICCs were poor. Study 2: Direct comparison of the ETS and the CROM yielded high ICCs for rotation and flexion/extension, and fair for lateral flexion. Study 3: Inter-examiner ICCs using the ETS were high for rotation, good for lateral flexion and fair for flexion/extension; intra-examiner reliability was high for all planes. Study 4: 24-hour reliability of ROM using the ETS was good for rotation and lateral flexion and poor for flexion/extension.

Conclusion: The ETS used in this investigation was an accurate instrument and an efficient method for measurement and recording of passive cervical ROM. The ETS had high intraexaminer and fair-to-high interexaminer reliability for the measurement of extremes of ROM in three planes. It is probable that differences in the experience levels of examiners did affect inter-examiner reliability of the ETS. The ETS and the CROM compared well in rotation and flexion/extension.

Key indexing terms: Cervical spine; range of motion.

Dimensions of the lumbar intervertebral foramina as determined from the sagittal plane magnetic resonance imaging scans of 95 normal subjects.

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Objectives: This was a two-part study. Part one evaluated the reliability of measurements of the intervertebral foramina (IVFs) from magnetic resonance imaging (MRI) scans; part two developed a morphometric database of IVF dimensions from normal living subjects.

Design: Part one was a blinded reliability study using seven observers; part two developed a morphometric database using two teams of three observers, all blinded to each other's results.

Subjects: Ninety-five normal subjects (46 females, 49 males) were stratified by age (range 14-84 years, average 38.8 years).

Outcome measures: Part one: Interclass correlation coefficients were calculated for intra- and interobserver reliability for three dimensions of the lumbar IVFs. Part two: A database was developed using the same measures. In addition, the relationships between IVF dimensions and age, height, weight, sex, and left vs. right sides of subjects were evaluated.

Results: Part one: All ICCs were very high (> 0.94). Part two: 8,550 measurements were made and a morphometric database of 95 subjects, stratified by age and sex, was completed. Differences in IVF size associated with age, height, weight, sex, and side were described.

Conclusions: Measurements taken from MRI scans of IVFs were performed reliably. The morphometric database and IVF relationships should aid clinicians and researchers in the evaluation of patients with suspected foraminal stenosis, and help further the investigation of IVF pathology and treatment of such pathology.

Key indexing terms: Intervertebral foramina; spinal anatomy; spinal morphometry.

Calibration and electrical safety status of therapeutic ultrasound utilized by chiropractic physicians.

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Background: Ultrasonic therapy (UST) is a commonly used therapeutic modality in the chiropractic profession. Previous calibration studies of ultrasound units in physical-therapy practices in Scotland and Canada have shown that approximately two-thirds of units tested did not conform to minimum calibration standards. Similar failure rates may exist in the chiropractic profession and need to be addressed.

Objective: This study sought to determine whether ultrasound machines utilized by chiropractic physicians met established calibration and electrical safety standards and to assess frequency of UST utilization.

Design: This cross-sectional study tested 45 ultrasound units for ultrasonic output and electrical safety. Additionally, the doctors were asked to complete a short survey relating to education, usage and maintenance of their ultrasound equipment.

Results: Of the 45 machines tested, 44% failed calibration, electrical safety inspection, or both. Failure rate was age-dependent ($p=.05$). Of the 45 machines tested, only two had been safety-checked within the last year.

Conclusions: A large percentage of ultrasound machines in chiropractic physicians' offices deliver too much or too little dosage to the patient. Electrical safety inspections also revealed a significant failure rate. Chiropractic physicians must become more aware of the requirement for yearly calibration and safety inspections and understand that failure to maintain their equipment could result in loss in effectiveness of therapy, or pose a threat to the safety of their patients and staff.

Key indexing terms: Chiropractic; ultrasonic therapy; standards; equipment safety; physician's practice patterns; risk management.

Contribution of rib cage movement to thoraco-lumbar posteroanterior stiffness.

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Objective: To investigate whether thoracolumbar PA stiffness differs between two conditions of rib-cage movement: unconstrained and constrained, and whether the effect of rib-cage constraint on PA stiffness varies according to where the PA force is applied.

Design: Two-factor within-subjects design.

Setting: Spinal Mechanics Laboratory, The University of Sydney.

Intervention: A convenience sample of 41 subjects asymptomatic for back pain participated. PA stiffness at T12-L4 was measured in the unconstrained and constrained rib-cage conditions using a mechanical device. For the constrained condition, a clamping device was used to apply a force to the subject's lower thorax to reduce movement.

Main outcome measures: PA stiffness at T12-L4 under both ribcage conditions.

Results: PA stiffness at T12-L4 significantly increased when the rib cage was constrained ($p < 0.05$). However, the effect of ribcage movement did not depend upon the location of the PA force.

Conclusion: These findings suggest that the properties of the rib cage influence measures of PA stiffness in the thoracolumbar (T12-L4) spine uniformly. Variations in PA stiffness between segments T12-L4 may reflect the properties of the intervertebral joints.

Key indexing terms: Thoracic spine; lumbar spine; stiffness; rib cage.

Abdominal aortic aneurysm: an illustrated narrative review.

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Objective: To present a descriptive review of abdominal aortic aneurysm (AAA), including a review of risk factors for, and case finding in, AAA for chiropractors as primary-contact health-care practitioners.

Data sources: Clinical and scientific literature identified through various sources, including MEDLINE and citation tracking.

Data synthesis: Selective narrative review of relevant literature.

Results: AAA may be asymptomatic; however, back pain is a common presenting feature. Risk factors include male gender; increasing age; cigarette smoking; hypertension; chronic obstructive airways disease; claudication; and AAA in a first-degree relative. AAA should be considered in the differential diagnosis of older white patients, especially males, with low-back pain. Estimated prevalence for AAAs in older males is in the order of 3% to 5%; rupture accounts for 1.7% of deaths in men 65-75 years of age. Elective surgical resection of AAAs (prior to rupture) offers low operative mortality and good prognosis.

Conclusion: AAA should be considered in the differential diagnosis of older patients presenting with low-back pain and those with risk factors for AAA. Chiropractors, as primary contact health care practitioners, have a responsibility to refer patients suspected of having AAA for appropriate imaging and, where indicated, vascular surgical opinion.

Key indexing terms: Abdominal aneurysm; chiropractic; diagnosis; low-back pain.

Spondylolysis of twins.

Young; Koning

Objective: To discuss the presence of spondylolysis at L2 in identical twins.

Clinical features: Twin 61-year-old brothers reported insidious low-back pain of relatively recent onset. Both engaged in running as their main form of exercise. One had spondylolisthesis and history of significant traumatic incident; the other had no spondylolisthesis, but a much more strenuous running regimen.

Intervention and outcome: Both patients underwent a course of chiropractic treatment for mechanical low-back pain; both reported a 50% overall improvement in symptoms.

Conclusions: Spondylolysis at L2 is uncommon, and although a familial component regarding weakness of the pars interarticularis has been demonstrated in the literature, spondylolysis at L2 in twins is extremely rare. Questions remain regarding the etiology of spondylolisthesis in spondylolytic patients.

Key indexing terms: Spondylolysis; spondylolisthesis; twins; lumbar spine; chiropractic.

A structural chiropractic approach to the management of diffuse idiopathic skeletal hyperostosis (DISH).

Stephan Troyanovich, DC; Mark Buettner, DC

Objective: To discuss a unique method of treatment for a patient with DISH and the long-term result of this treatment.

Clinical features: The patient had a long-standing history of low-back pain and stiffness secondary to DISH. Co-existing conditions consisted of right-hand paresthesia secondary to a thalamic stroke; osteoporosis; Barrett's esophagus; thyroid and parathyroid disease; and hypercholesterolemia.

Intervention and outcome: The patient received chiropractic manipulation and drop-table adjustments; range-of-motion exercise; extension exercise; and standing lumbar extension-traction. The magnitude of lumbar lordotic alignment and Ferguson's angle improved with treatment. The patient's subjective perception of pain significantly improved as documented with the use of numerical rating scales. Flexibility and activities of daily living were also improved. The effect was maintained for 19 months following termination of the active rehabilitative treatment period.

Conclusion: A paucity of literature exists regarding the chiropractic management of patients with a diagnosis of DISH. Chiropractors should be encouraged to report on their clinical experiences in treating patients with varied conditions and pathology.

Key indexing terms: Hyperostosis; diffuse idiopathic skeletal hyperostosis; rheumatic diseases; chiropractic manipulation; traction.

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