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### Atlas Vertebra Realignment and Arterial Pressure in Hypertensive Patients: A Pilot Study.

The authors of this study, from the Department of Preventive Medicine, Rush University Hypertension Centre, Chicago, contend that anatomical abnormalities of the cervical spine at the level of the Atlas vertebra are associated with relative ischaemia of the brainstem circulation and increased blood pressure (BP). Furthermore they suggest that manual correction of this mal-alignment has been associated with reduced arterial pressure.

Their pilot study tests the hypothesis that correcting mal-alignment of the Atlas vertebra reduces and maintains a lower BP. Using a double blind, placebo-controlled design at a single center, 50 drug naïve (n=26) or washed out (n=24) patients with Stage 1 hypertension were randomized to receive a National Upper Cervical Chiropractic (NUCCA) procedure or a sham procedure. The authors claim that the “sham intervention” was designed to be indistinguishable to the patient from an authentic alignment, possible only because of the delicacy of the procedure.

Patients received no anti hypertensive meds during the 8-week study duration. The primary end point was changed in systolic and diastolic BP comparing baseline and week 8, with a 90% power to detect an 8/5 mm Hg difference at week 8 over the placebo group. The study cohort had a mean age 52.7 9.6 years, consisted of 70% males.

The authors report that at week 8, there were differences in systolic BP (-17.9 mm Hg, NUCCA versus -3.11 mm Hg, placebo;  $P < 0.0001$ ) and diastolic BP (-10.11 mm Hg, NUCCA versus -2.7 mm Hg;  $P = 0.002$ ). Lateral displacement of Atlas vertebra (1.0, baseline versus 0.04° week 8, NUCCA versus 0.6, baseline versus 0.5°, placebo;  $P = 0.002$ ). Heart rate was not reduced in the NUCCA group (-0.3 beats per minute, NUCCA, versus 0.5 beats per minute, placebo). No adverse effects were recorded.

The authors state,

“The mechanism as to why this improvement in blood pressure occurs is unknown and cannot be determined by this study, The data presented, however, raise a number of important questions including: a) How does misalignment of C1 affect hypertension?; and b) If there is a cause and effect relationship between C1 misalignment and hypertension, is malposition of C1 an additional risk factor for the development of hypertension?”

The authors conclude that restoration of Atlas alignment is associated with marked and sustained reductions in BP similar to the use of two-drug combination therapy.

Reference: Bakris G, Dickholtz M Sr, Meyer PM, Kravitz G, Avery E, Miller M, Brown J, Woodfield C, Bell B. Atlas vertebra realignment and achievement of arterial pressure goal in hypertensive patients: a pilot study. *J Human Hypertension*. 2007 Mar 2; [Epub ahead of print]

## Determining the Relationship between Cervical Lordosis and Neck Complaints.

The objective of this study was to investigate the presence of a “functionally normal” cervical lordosis and identify if this, and the amount of forward head posture, are related to neck complaints.

Using the posterior tangent method, an angle of cervical lordosis was measured from C2 through C7 vertebrae on 277 lateral cervical x-rays. Anterior weight bearing was measured as the horizontal distance of the posterior superior body of the C2 vertebra compared to a vertical line drawn superiorly from the posterior inferior body of the C7 vertebra. The measurements were sorted into 2 groups, cervical complaint and non-cervical complaint groups. The data were then partitioned into age by decades, sex, and angle categories.

The authors found that patients with lordosis of 20° or less were more likely to have cervicogenic symptoms ( $P < .001$ ). The association between cervical pain and lordosis of 0° or less was significant ( $P < .0001$ ). The odds that a patient with cervical pain had a lordosis of 0° or less was 18 times greater than for a patient with a non-cervical complaint. Patients with cervical pain had less lordosis and this was consistent over all age ranges.

The authors conclude that,

“We found a statistically significant association between cervical pain and lordosis <20° and a “clinically normal” range for cervical lordosis of 31° to 40°. Maintenance of a lordosis in the range of 31° to 40° could be a clinical goal for chiropractic treatment.”

Reference: McAviney J, Schulz D, Bock R, Harrison DE, Holland B. Determining the Relationship between Cervical Lordosis and Neck Complaints. *J Manipulative Physiol Ther* 2005; 28:187-93.

## A Survey of Medical Student Attitudes Toward CAM in the Curriculum and in Practice.

The purpose of this survey was to assess attitudes toward complementary and alternative medicine (CAM) and its place in the medical school curriculum and medical practice among preclinical students at Georgetown University School of Medicine (GUSOM), Washington, DC.

Two-hundred sixty-six first-year ( $n=111$ ) and second-year ( $n=155$ ) medical students rated their attitudes toward CAM and 15 CAM modalities in terms of personal use, inclusion in the curriculum, and use/utility in clinical practice.

Nearly all (91%) students agreed that

“CAM includes ideas and methods from which Western medicine could benefit.”

More than 85% agreed that

“knowledge about CAM is important to me as a student/future practicing health professional”; and More than 75% felt that CAM should be included in the curriculum.

Among all students, the most frequently indicated level of desired training was “sufficient to advise patients about use,” for 11 of the 15 modalities. The greatest level of training was wanted for acupuncture, chiropractic, herbal medicine, and nutritional supplements.

The descriptions of CAM in future clinical practice that occurred most frequently were endorsement, referral, or provision of acupuncture, biofeedback, chiropractic, herbal medicine, massage, nutritional supplements, prayer, and meditation.

The authors conclude that,

“Interest in and enthusiasm about CAM modalities was high in this sample; personal experience was much less prevalent. Students were in favour of CAM training in the curriculum to the extent that they could provide advice to patients; the largest proportions of the sample planned to endorse, refer patients for, or provide 8 of the 15 modalities surveyed in their future practice.”

Reference: Chaterji R, Tractenberg RE, Amri H, Lumpkin M, Amorosi SB, Haramati A. A large-sample survey of first- and second-year medical student attitudes toward complementary and alternative medicine in the curriculum and in practice.

Altern Ther Health Med. 2007; 13:30-5.

### **Predicts Recurrence of Lumbar Disc Herniation after Surgical Discectomy?**

The reported prevalence of unsatisfactory results after discectomy is between 5% and 20%. Recurrent herniation is one of the most common reasons for an unsatisfactory outcome and occurs in 5%-11% of surgically treated patients. Several quite different conditions have been described as “recurrent disc herniation”: (a) recurrence at the same disc level and side as the primary herniation, (b) contralateral disc herniation at the same level, and (c) a new herniation at a different level.

The purpose of a recently published study(1) was to retrospectively evaluate if the degree of disc degeneration and disc herniation volume, as measured via magnetic resonance (MR) imaging, were risk factors for recurrent disc herniation.

MR imaging findings, obtained before initial discectomy in 30 patients (mean age, 42.8 years) with recurrent disc herniation (study group) and 30 patients (mean age, 42.2 years) without recurrence for at least 2 years after surgery (control group), were compared. Disc degeneration was assessed on T2- weighted sagittal MR images with a five-point grading system (grade I indicated no degeneration and grade V, collapsed hypointense disc). Disc herniation was classified as representing protrusion, extrusion, or sequestration. The volume of both the affected intervertebral disc and the herniated disk material was measured. Qualitative and quantitative analyses were performed by two readers. The  $\chi^2$  test was used for comparison of categorical variables. For comparison of disc degeneration and volumes between patients with and those without recurrence, a paired two-tailed t test was used. Odds ratios based on the extent of disc degeneration were calculated for the entire sample.

The authors report that advanced disc degeneration (grades IV and V) was significantly less frequent in the study group than in the control group ( $P < .006$ ). The risk of recurrent disc herniation decreased by a factor of 3.4 for each increase in grade of disc degeneration. No significant difference was found in the mean disc herniation volume as a percentage of intervertebral disc volume between the study and control group.

The present study did not reveal any significant differences between patients with and those without recurrence with regard to either disk volume or relative herniated volume. The observation that patients with only minor disc degeneration have an increased risk of recurrent disc herniation is clinically relevant. A normal intervertebral disc (grade II at MR imaging) in an adult has a 6.8-fold increase in the risk of recurrent herniation as compared with the risk of a disc with advanced degeneration (grade IV). This is important to consider when patients are informed about the potential outcome after discectomy.

“.....only minor degeneration, and not herniation volume, represents a risk factor for recurrent disc herniation after surgical discectomy.”

The authors conclude,

Reference -

1. Dora C, Schmid MR, Elfering A, Zanetti M, Hodler J, Boos N. Lumbar disk herniation: do MR imaging findings predict recurrence after surgical discectomy? *Radiology* 2005; 235:562-7.

### **Correlation between Symptoms and General Health Status in patients with Low Back Pain**

Low back pain (LBP) is the main symptom of most lumbar spine diseases. This symptom, due to physical, psychological and social factors, is correlated to a real disability which can affect the quality of life (QoL.)

The aim of this study is to evaluate the QoL and the disability in patients with LBP and to correlate them to clinical symptoms.

In this prospective multidimensional study, 108 patients underwent the following protocol:

1. collection of patient-oriented and disability data with the use of SF-36 and North American Spine Society (NASS);
2. collection of clinical, anamnestic and instrumental data (MRI, CT) with the use of DOVAC files; 3. assessment of disability with the use of Barthel index (BI) and deambulation index (DI).

The authors report that -

\*A significant correlation was found between disability, as measured by the Barthel Index, and physical health status, as measured by the SF-36's physical composite score (PCS).

\* However, no significant correlation was noticed between disability, as measured by the Barthel Index, and mental health status, as measured by the SF-36's mental composite score (MCS).

\* Disability, as measured by the Deambulation Index, was not correlated to General Health Status, as measured by the SF-36.

\* A positive Lasegue and the absence of the osteo-tendinous reflexes are significantly correlated to the disability and QoL.

The authors conclude,

“This study shows that there is no simple, linear correlation between QoL and disability. It is therefore necessary to evaluate each patient through disability scales without leaving aside personal experience and literature guidelines.”

Reference -

- 1.) Rabini A, Aprile I, Padua L, Piazzini DB, Maggi L, Ferrara PE, Amabile E, Bertolini C. Assessment and correlation between clinical patterns, disability and health-related quality of life in patients with low back pain. *Eura Medicophys*. 2006 Oct 3; [Epub ahead of print].

## Palpation Identification of Spinous Processes in the Lumbar Spine

In a recent systematic review of spinal palpation tests (1) argue that symptom provocation is a more sensitive indicator for within and between therapist palpation reliability tests and that spinal landmark identification by soft tissue and SP palpation is neither reliable nor valid. Although the non-invasive reliability studies suggest that palpation reliability is not high and that identification inaccuracy exists, it is surprising there is no research which has tested the accuracy and validity of lumbar spinal palpation against a criterion-based gold standard of radiological identification of lumbar vertebrae.

The purpose of a more recent study (2) was to determine the accuracy of manipulative physiotherapists in palpating radiologically identified lumbar spinous processes (SPs).

The study was a quasi-experimental, cross-sectional study. Five experienced manipulative physiotherapists were each allocated a cohort of 15 consecutive low back pain (LBP) patients presenting for X-rays and were asked to use surface palpation to identify the L1, L3 and L5 SPs. The physiotherapists had postgraduate manipulative physiotherapy qualifications attained in either Australia or New Zealand and were experienced in postgraduate manipulative physiotherapy education at a tertiary level. Although all were experienced clinicians only two still maintained their own clinical caseload. They also had a minimum of 10 years' experience since gaining their Australian or New Zealand undergraduate qualification in physiotherapy.

Spherical radio-opaque markers were taped to the skin over these palpated points and standard lateral radiographs taken. Measurements were made to determine the proximity of these nominated markers to identified SPs.

Forty-seven percent (47%) were accurately placed over the nominated SPs. Seventy-two percent (72%) of markers were either placed accurately over the nominated SP or consistently within one SP of the nominated level. A greater SP height at L3 and L5, and decreased soft tissue thickness over L5, were associated with an increase in palpation accuracy levels, yet the patient variables of age, sex and body mass index (BMI) had no effect. The strongest effect on accuracy was between-therapist variability.

Although a number of clinical procedures were used by the physiotherapists for locating SPs, including palpation of the iliac crest (87%), passive physiological intervertebral movement PPIVM (75%), passive accessory intervertebral movement PAIVM (53%), PSIS (37%) and 12th rib (24%) of subjects, further regression analysis revealed no evidence for either a given clinical procedure or a mix of procedures having any predictive influence on palpation accuracy ( $P>0.05$ ).

The authors conclude,

“The need for accurate identification of lumbar SPs and by association lumbar vertebral levels is not limited to the physiotherapy profession. Future research may include other health professionals who require surface palpation of spinal surface landmarks for diagnostic and/or intervention purposes. However, palpation is an integral component of the examination and therapeutic skills of manipulative physiotherapists. The manipulative physiotherapists used in this study appear to be moderately successful in either palpating a nominated SP or being no more than one spinal level in error. Further research will focus on the choice of palpation procedure and a larger sample.”

### References:

1. Seffinger MA, Najm WI, Mishra SI, Adams A, Dickerson VM, Murphy LS, et al. Reliability of spinal palpation for diagnosis of back and neck pain. *Spine* 2004; 29: E413-23.
2. Harlick JC, Milosavljevic S, Milburn PD. Palpation identification of spinous processes in the lumbar spine. *Manual Therapy* 2007; 12:52-6.

## Immediate Effects of Thoracic Manipulation in Patients with Neck Pain: An RCT

Clinical experts have suggested that a thorough examination of the thoracic spine be included in the evaluation of patients with primary complaints of neck pain. Due to the biomechanical relationship between the cervical and thoracic spine, perhaps disturbances in joint mobility in the thoracic spine serve as an underlying contributor to the development of neck disorders. It has also been demonstrated that mobilization/ manipulation of joints remote to the patient's pain results in an immediate hypo-algesic effect. This is speculated to occur through the stimulation of descending inhibitory mechanisms.

Only scant evidence exists regarding the use of thoracic spine manipulation in patients with neck pain. Flynn and colleagues have reported preliminary data suggesting that thoracic spine manipulation results in an immediate reduction in pain and increases in cervical range of motion in individuals presenting with primary neck dysfunction. However, the lack of a comparison group in this study precludes establishing that a cause-and-effect relationship exists. In addition, Parkin-Smith and colleagues demonstrated that thoracic manipulation in addition to cervical manipulation in patients with neck pain was no more advantageous than cervical manipulation alone. Therefore, the purpose of this study was to further investigate the immediate effects of thoracic manipulation on neck pain in a randomized clinical trial.

Prior to randomization, patients completed several self-report measures and then received a standardized history and physical examination by a licensed physical therapist. Subjects also completed the Neck Disability Index (NDI) to measure perceived disability. The NDI was collected only at baseline to assess for differences in disability between groups. The NDI is scored from 0 to 50, with higher scores corresponding to greater disability. The score is then multiplied by two and expressed as a percentage. The NDI has been demonstrated to be a reliable and valid assessment of disability in patients with neck pain. A Visual Analog Scale (VAS) was used to record the patient's level of resting pain at baseline and immediately after treatment. Following the baseline examination, the examining therapist left the treatment room and notified a second licensed physical therapist blinded to the patient's demographic information and baseline levels of pain and disability that the subject was ready for thoracic spine segmental mobility examination and associated treatment based on group assignment. Segmental mobility testing was performed in the positions of thoracic spine flexion and extension according to the procedures described by. The specific level(s) and position of restriction was recorded. The intra-rater reliability of accurately identifying the specific level of segmental mobility restriction in the thoracic spine is poor (Kappa=.33). Following the segmental mobility examination, patients were randomly assigned to receive either thoracic spine manipulation or placebo manipulation.

Patients randomized to the manipulation group received thoracic manipulation interventions directed to the previously identified segmental mobility restrictions.

Baseline demographic and self-report measures of pain and disability were compared between groups using independent t-tests or Mann-Whitney U tests for continuous data, and w2 tests of independence for categorical data. A two-way repeated measures analysis of variance (ANOVA) was used to assess the change in pain intensity immediately after treatment.

Sixty-eight patients were screened for eligibility during a six-month period from January 2003 to June 2003. Sixteen patients (24%) did not satisfy the inclusion and exclusion criteria for the study. Sixteen eligible patients (31%) elected not to participate because of preferring not to receive manipulation interventions (n=11) or specifically requesting manipulation (n=5). The remaining 36 patients, mean age equal to 36 (SD=9.8) (27 female), were randomized to receive thoracic spine manipulation (n=19) or placebo manipulation (n=17).

No differences in key demographic variables or baseline levels of pain and disability were detected between the groups at baseline ( $P>.05$ ). The repeated measures ANOVA demonstrated a significant Intervention\*Time interaction ( $P<0.001$ ), suggesting that patients

receiving thoracic spine manipulation experienced immediate improvements in pain compared to patients in the placebo group. The change in pain in the group receiving thoracic spine manipulation was 15.5mm (SD 7.7) (95% CI: 11.8, 19.2), compared to a change in the group receiving placebo manipulation of 4.2mm (SD 4.6) (95% CI: 1.9, 6.6).

The precise mechanism by which thoracic spine manipulation improves neck pain remains elusive. It has been suggested that reductions in neck pain from thoracic spine manipulation interventions may be attributable to a restoration of more normal biomechanics to this region, potentially lowering mechanical stresses and improving the distribution of joint forces in the cervical spine. The theory that a biomechanical link between the thoracic and cervical spine may lead to abnormal distribution of forces in the cervical spine has only recently been investigated.

Several recent studies have demonstrated that manual therapy interventions directed at the spine can result in improvements in pain in regions distant to the area in which the treatment is directed.

Future research in this area should examine the long-term effects of thoracic spine manipulation in patients with neck pain on outcomes of care, patient satisfaction, and costs. Head-to-head clinical trials are also needed to determine if thoracic spine manipulation is most beneficial in isolation, or if it should in some combination as a supplement to manual therapy interventions directed to the cervical spine.

This study was limited to an immediate follow-up and the patient's perceived levels of pain, thus further research is needed to examine the longer-term effects of thoracic spine manipulation on patient-centered outcomes and determine if relevant subgroups of patients with neck pain exist who may particularly benefit from thoracic spine manipulation interventions.

He authors conclude,

“The results of this study suggest that thoracic spine manipulation in patients with a primary complaint of neck pain results in immediate improvements in their neck pain. Patients receiving thoracic spine manipulation demonstrated a mean change of 15.5mm (95% CI: 11.8-19.2) on the VAS, compared to only a 4.2mm (95% CI: 1.9-6.6) change among patients in the placebo group. Even if one presumes the lower bound of the 95% CI of 11.8 to be the point estimate for patients receiving thoracic spine manipulation, this magnitude of change still represents a clinically meaningful level of improvement.”

Reference:

- 1.) Cleland JA, Child JD, McRae M, Palmer JA, Stowell T. Immediate effects of thoracic manipulation in patients with neck pain: a randomized clinical trial. *Manual Therapy* 2005; 10:127-35.

### **The Validity of Manual Examination in Assessing Patients with Neck Pain**

Although manual therapists believe that they can diagnose symptomatic joints in the neck by manual examination, that conviction is based on only one study (1). That study claimed that manual examination of the neck had 100% sensitivity and 100% specificity for diagnosing painful zygapophyseal joints. However, the study indicated that its results should be reproduced before they could be generalized.

The study was conducted in a private practice located in a rural town. The practice specialized in musculoskeletal pain problems.

The present study (2) was undertaken to answer the call for replication studies. The objective was to determine the sensitivity, specificity, and likelihood ratio of manual examination for the diagnosis of cervical zygapophyseal joint pain.

The study sample was 173 patients with neck pain in whom cervical zygapophyseal joint pain was suspected on clinical examination, and who were willing to undergo controlled diagnostic blocks of the suspected joint or joints.

The validity of manual diagnosis was determined by calculating its sensitivity, specificity, and positive likelihood ratio.

Patients who exhibited the putatively diagnostic physical signs of cervical zygapophyseal joint pain were referred to a radiologist who performed controlled, diagnostic blocks of the suspected joint, and other joints if indicated. The results of the blocks constituted the criterion standard, against which the clinical diagnosis was compared, by creating contingency tables.

Manual examination had a high sensitivity for cervical zygapophyseal joint pain, at the segmental levels commonly symptomatic, but its specificity was poor. Likelihood ratios barely greater than 1.0 indicated that manual examination lacked validity. Although the results obtained were less favorable than those of the previous study, paradoxically they were statistically not different. These results place the evidence on manual examination in a new light. The one previous, but small, study (1) announced a positive result: it concluded that manual examination was valid for the diagnosis of painful zygapophyseal joints, and not only valid but perfectly so. The present, larger study (2) announces a negative result: it concludes that that manual examination is not valid for the diagnosis of painful zygapophyseal joints. The data on which these opposing conclusions were based are not statistically different. Methodologically, the present study is sound. It used a large sample size; it used comparative, controlled blocks as the criterion standard; it submitted its data to rigorous statistical analysis. Each of these measures serves to render its results more generalisable than those of the only previous study. The previous study (1) relied on single, diagnostic blocks as the criterion standard, but since its publication single blocks have been shown to carry a false- positive response rate of 27%. That factor alone undermines the perfect sensitivity and specificity scores claimed in the earlier study.

The present study found manual examination of the cervical spine to lack validity for the diagnosis of cervical zygapophyseal joint pain. It refutes the conclusion of the one previous study. The paradoxical lack of statistical difference between the two studies is accounted for by the small sample size of the previous study.

#### References:

1. Jull G, Bogduk N, Marsland A. The accuracy of manual diagnosis for cervical zygapophysial joint pain syndromes. *Med J Aust* 1988; 148:233-6.
2. King W, Lau P, Lees R, Bogduk N. The validity of manual examination in assessing patients with neck pain. *The Spine Journal* 2007; 7:22-6.