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The impact of non-injury related factors on disability secondary to whiplash associated disorder type II: A retrospective file review.

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Background: There is evidence to suggest that whiplash associated disorders (WADs) are influenced by physical trauma and psychosocial factors, as well as by medicolegal and compensation systems.

Objective: To investigate the impact of non-injury-related variables on self-reported disability at initial assessment among patients presenting with WAD type II injuries.

Design and setting: We reviewed a total of 1,101 consecutive files of patients presenting to a single chiropractor's office in British Columbia, Canada. We included those who met the inclusion criteria. We extracted demographic variables and non-injury-related information from 33 eligible patient files. We calculated correlations between variables, and created a multivariable linear regression model to evaluate their relative associations with NDI scores on presentation.

Results: Higher NDI scores on initial assessment correlated with female gender ($r = 0.40$, $p = 0.02$), a greater number of subsequent treatments ($r = 0.44$, $p = 0.01$), a higher number of providers seen before presentation ($r = 0.40$, $p = 0.02$), and most strongly with the involvement of a lawyer ($r = 0.73$, $p < 0.01$). A multivariable linear regression model found that only female gender ($p = 0.03$) and the involvement of a lawyer ($p = 0.01$) remained significantly associated with higher NDI scores on presentation (adjusted $R^2 = 0.68$ for the model). Female gender was associated with a 10-point increase in NDI scores on presentation (beta coefficient = 10.5; 95 percent confidence interval [CI] 2.8-18.2), and involvement of a lawyer was associated with a 15-point increase in NDI scores on presentation (beta coefficient = 14.9; 95 percent CI 5.0-24.7).

Conclusion: Our analysis of WAD type II patients in receipt of compensation found that higher self-reported disability on initial assessment was associated with female gender, and in particular, by retaining a lawyer. Large prospective studies are needed to establish the validity of these findings.

Key indexing terms: Whiplash associated disorders; disability; chiropractic; epidemiology.

The inter-examiner reproducibility of physical examination of the cervical spine.

Jan Pool, PT; Jan Hoving, PhD; Henrica de Vet, PhD; Henk van Mameren, MD, PhD; Lex Bouter, PhD

Objective: To assess the inter-examiner reproducibility of physical examination of the cervical spine.

Methods: Two physiotherapists independently judged the general mobility and the inter-segmental mobility (segments C0-T2) of the neck, and the pain that was provoked. Percentage agreement and Cohen's kappa expressed agreement of dichotomous variables, limits of agreement expressed agreement of continuous variables and intraclass correlation coefficients (ICCs) expressed the reliability of continuous variables.

Results: Agreement for general mobility shows kappas between 0.05 and 0.61, and for the intersegmental mobility it shows kappas between 0.09 and 0.63. Agreement for provoked neck pain within one point of an 11-point numerical rating scale (NRS) varies between 46.9 percent and 65.7 percent for general mobility, and between 40.7 percent and 75.0 percent for intersegmental mobility. The ICCs varied between 0.36 and 0.71 for general mobility and between 0.22 and 0.80 for intersegmental mobility.

Conclusions: Despite the use of a standardized protocol to assess general mobility and intersegmental mobility of the cervical spine, it is difficult to achieve reasonable agreement and reliability between two examiners. Likewise, the patients are not able to score the same level of provoked pain in two assessments with an interval of 15 minutes.

Key indexing terms: Agreement; cervical spine; mobility; reliability; reproducibility.

The reliability of quantifying upright standing postures as a baseline diagnostic clinical tool.
Nadine Dunk; Yin Yin Chung; Diana Sullivan; Jack Callaghan, PhD

Objective: To assess the reliability of posture across and within subjects, specifically the repeatability of spinal angles determined by digitization of images in the anterior, posterior and sagittal views.

Design: A repeated measure design was used in which subjects were required to attend three sessions, each consisting of three trials. Photographs of the anterior, posterior and lateral views of normal, relaxed upright standing were taken during each trial. Landmarks were digitized and cervical, thoracic and lumbar angles were calculated with respect to a vertical reference line.

Subjects: Fourteen healthy and active subjects (seven males and seven females) were recruited from a university student population. All were free of low back pain during the previous six months.

Results: When comparing mean angles, no significant differences were detected for any angle in any view. However, large variability within subjects was observed, likely leading to the lack of significance found with respect to the main factors in the ANOVA. Large CVs reflect the substantial intrasubject variability as well as poor to moderate agreement indicated by ICCs. There were no apparent trends indicating that gender affected repeatability of posture.

Conclusions: The poor repeatability of postures documented using the studied method brings into question the validity of this postural analysis approach for either diagnostic usage or tracking changes in response to treatment. Users of such postural analysis tools should interpret postural deviations from a vertical reference with caution, as there are many inherent factors that can contribute to the variability of these measured postures.

Key indexing terms: Spine; posture; reliability; precision; repeatability.

Reliability of the motor evoked potentials elicited through magnetic stimulation at three sites.
Richard Lefebvre, PhD; Andre Pepin, PhD; Pierre-Felix Louis, DC; Jean Boucher, PhD

Background: Motor-evoked potentials (MEPs) obtained from magnetic stimulation (MS) allow the measurement of the excitability of motor nerve cells. Although this technique is becoming widely used, its reliability has yet to be established.

Objective: To determine the MEPs reliability and evaluate their stability.

Design: Subjects received MS at 3 different sites: cranial, cervical and peripheral. Three stimulations were given at each site. Stimulations were given under 4 conditions: eyes open or closed; and with or without controlled mental activity.

Setting: The study was performed in a research laboratory setting.

Participants: Nine healthy subjects (mean age = 21 years \pm 0.9), asymptomatic of any neural or musculoskeletal dysfunctions.

Main outcome measures: Normalized peak-to-peak amplitude of MEPs at the opponens pollicis muscle.

Results: Intraclass correlations were high for all conditions ($R > 0.90$). The amplitude of the MEPs elicited from the transcranial site during the controlled mental activity condition was increased by 26.6 percent ($p = 0.017$). No other significant differences ($p > 0.05$) were obtained among the other conditions.

Conclusion: Intraclass correlation results reveal that MEP measurements are highly reliable in a controlled environment. The increase of MEPs during the controlled mental activity condition could be attributed to an elevation of neural activity of different non-motor areas of the brain, increasing corticospinal excitability.

Key indexing terms: Motor-evoked potential; electromyography; muscles; transcranial magnetic stimulation.

An exploratory study of provocation testing with padded wedges: Can prone blocking demonstrate a directional preference?

Anthony Lisi, DC; Robert Cooperstein, MA, DC; Elaine Morschhauser, DC

Background: Currently, no traditional chiropractic examination method to determine a spinal listing offers demonstrated guidance in treatment decisions for LBP patients. Development of an examination that bypasses the difficulty of accurately and reliably identifying a listing, yet provides guidance on manipulative vectors, could be very valuable to clinicians and patients.

Objective: To explore 2 potential protocols for provocation testing and assessment of directional preference using padded wedges.

Methods: Two groups of 20 subjects were examined while lying prone on various positions of padded wedges. In the first group, pain pressure threshold (PPT) was measured at 4 anatomic points; in the second group, tenderness was measured at 1 anatomic point. We investigated whether either method could demonstrate a directional preference response.

Results: When tenderness was measured at 1 anatomic point, 70% of subjects demonstrated a directional response, and only one subject exhibited an increase in baseline tenderness at the end of the procedure. When PPT was measured at 4 anatomic points, 40% of subjects demonstrated a directional response, but 12 subjects exhibited decreased PPT at the end of the procedure.

Conclusion: Measuring changes in tenderness at 1 anatomic point in response to various padded wedge patterns appears promising as an examination procedure to determine directional preference.

Key indexing terms: Chiropractic; physical examination.

Stability of paraspinal thermal patterns during acclimation.

John Hart, DC; Edward Owens Jr, DC

Background: Paraspinal thermography has been used by chiropractors since 1924. One method of its interpretation is with the use of pattern analysis a method that assesses temperature differentials (patterns). This in turn theoretically provides information about nervous system function. When a warm back is exposed to the cooler air in the examining room, the skin temperature, in general, drops, but the differentials could remain fairly constant.

Objective: To determine what changes occur in paraspinal heat patterns when the back is exposed to room temperature.

Study design: Observational; measures repeated at 5-minute intervals for 31 minutes.

Methods: Thirty subjects were scanned with digital infrared thermographic instrumentation every 5 minutes over a 31-minute period, for a total of 7 readings. A computerized calculation of percent similarity between consecutive comparisons of the readings was then performed to determine if and when the pattern stabilized.

Results: Cervical spine temperatures remained constant while lower back temperatures in general decreased for the entire 31-minute recording period. Although the results varied among subjects, on the average, the patterns stabilized after 16 minutes.

Conclusions: Once the patient's back is exposed to cooler room temperature, the skin temperature decreases constantly for 31 minutes; however, the pattern becomes stable after 16 minutes. Readings taken for the purpose of pattern analysis during this 16-minute period may be unreliable for some patients. Therefore a 16-minute acclimation period is recommended. Further research is needed to not only verify this finding with the same equipment in a separate experiment, but to verify it as well with other types of temperature instrumentation.

Key indexing terms: Chiropractic; assessment; thermography; equilibration.

Does the adjustment cavitate the targeted joint? An investigation into the location of cavitation sounds.

Roberto Beffa, MTech; Robert Mathews, MTech, CCFC (SA)

Background: The cavitation sounds heard during chiropractic adjustments of the spine are common phenomena, yet their location relative to the technique used is relatively untested.

Objective: The purpose of this study was to locate the cavitation sounds during the L5 spinous hook adjustment and a lower sacroiliac adjustment. The sounds were analyzed for significant difference in location relative to the two techniques.

Methods: Thirty asymptomatic volunteers were randomly divided into two equal groups. Each group represented either the spinous hook adjustment or lower sacroiliac adjustment. Subjects had eight microphones taped to their skin, over the relevant facet and sacroiliac joints. Radiographic confirmation was used to ensure optimal placement of the microphones. Sound signals produced during the adjustments were digitized, recorded and analyzed statistically.

Results: The results indicated that no statistically significant correlation existed between the anatomical location of cavitation sounds and the adjustment technique selected.

Conclusion: Location of cavitation sounds does not appear to have a relationship with type of manipulative technique selected. Further studies using other techniques need to be performed.

Key indexing terms: Cavitation sounds; chiropractic manipulation; lumbar facet joint; sacroiliac joint; biomechanics.

Far-lateral disc herniation: case report, review of the literature and a description of nonsurgical management.

Richard Erhard, DC; William Welch, MD, FACS; Betty Liu, MD; M. Vignovic

Objective: To review the history and examination of a far-lateral lumbar intervertebral disc herniation (FLLIDH), as well as the treatment and outcomes of a nonsurgical approach.

Clinical features: A 60-year-old healthy male had a three-week history of right buttock and calf pain. He presented initially with a left lateral list and asymmetrical pelvic landmarks. ROM of the lumbar spine revealed full and pain-free lumbar flexion, right-sided pain with lumbar extension and left side bending, and painful and restricted left side bending. Neurologic exam was unremarkable.

Intervention and outcome: The patient was treated with a lumbar epidural and nerve root injection, as well as manipulation. Physical therapy consisted of dewatering treadmill, autotractor, and strengthening exercises. Outcomes were measured by using the Modified Oswestry Questionnaire, as well as a numerical pain rating scale. His initial Oswestry was 73 percent, pain 9/10 at presentation. Upon discharge, the Oswestry was 0 percent and pain was rated as 0/10.

Conclusion: A significant decrease was noted in both the Oswestry Questionnaire, as well as the pain rate. The patient returned to running on alternate days for a minimum of 30 minutes, which was his primary goal. This case demonstrated a positive outcome using a multidisciplinary approach in a patient diagnosed with a FLLIDH. He obtained his goals and his function was fully restored.

Key indexing terms: Disc herniation; lumbar vertebrae; chiropractic manipulation; traction; exercise.

Deforming lipoblastomatosis of the lower extremity.

Claude Pierre-Jerome, MD, PhD; Deborah Brahee, DC; Norman Kettner, DC

Objective: Lipoblastomatosis is a rare disorder in infants and children, and nonexistent in adults. We discuss a case of a newborn child with lipoblastomatosis extensively involving the pelvis and lower extremities. The clinical and radiological characteristics of the disorder are discussed.

Clinical features: A 2-month-old male had an enlarging deformity of the pelvis and lower extremities, with progression of the condition from birth. There was no family history related to the disease. No other clinical abnormalities were present.

Intervention and outcome: Lipoblastomatosis is initially treated with surgical excision of the lipomatous neoplastic tissue. The postsurgical outcome is satisfactory; however, the likelihood of recurrence has been reported.

Conclusion: We present the features of lipoblastomatosis, an uncommon disorder affecting infants and children. The clinical and radiologic manifestations of the disease are assessed, with emphasis on magnetic resonance imaging.

Key indexing terms: Lipoblasto- matosis; radiography; computed tomography; magnetic resonance imaging; pediatrics.

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