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Editorial Staff

Editor's note: Due to space constraints, not all abstracts from the March 2006 issue of *JMPT* are reprinted below. To review the complete table of contents from the March issue, visit www.mosby.com/jmpt.

Intensity mapping of pain referral areas in sacroiliac joint pain patients.

Peter van der Wurff, PT, PhD; Evert J. Buijs, MD; Gerbrand J. Groen, MD, PhD

Objective: To identify differences in pain referral areas, using intensity maps, between responders and nonresponders to a double diagnostic sacroiliac joint injection with a short- and long-acting local anesthetic in patients with chronic low back pain.

Methods: From a group of 140 consecutive patients with chronic low back pain, 60 patients who met clinical criteria were included in the study. Twenty-seven demonstrated a positive response to a double diagnostic fluoroscopically guided intra-articular sacroiliac joint block and were compared with 33 patients with a negative response. Each patient's pre-injection pain diagram was used to determine areas of pain referral. The summation of these pain referral zones for both groups was used to construct intensity maps.

Results: No major differences were observed between responders and nonresponders with regard to mean size and distribution of referral pain areas. Intensity maps, however, showed differences in pain referral at the buttock in the areas overlying the sacroiliac joint (100% of the responders vs. 80% of the nonresponders) and the ischial tuberosity (10% of the responders vs. 100% of the nonresponders).

Conclusion: Overall referred pain maps appeared not to be useful to discriminate patients with an identified sacroiliac joint pain from chronic low back pain patients with pain from other sources. Differences were only found using intensity maps. By implementing these data, it could be concluded that patients with sacroiliac joint pain are less likely to experience pain in both the "Fortin" and "tuber" areas. This knowledge can be used as additional selection criterion for putative sacroiliac joint patients, next to sacroiliac joint pain provocation tests.

Dimensionality, internal consistency, and item analysis of the National Health and Nutrition Examination Surveys (NHANES) activities of daily living instrument among patients with report of low back pain.

Chad E. Cook, PT, PhD, MBA; Jan K. Richardson, PT, PhD; Ricardo Pietrobon, MD, PhD

Objective: To measure selected psychometric properties of individual item responses from the National Health and Nutrition Examination Surveys (NHANES) activities of daily living (ADL) instrument among a population of patients with low back pain (LBP).

Methods: The study group consisted of 926 individual attendees of a traditional medical appointment. All subjects had self-reported LBP and completed questions within the NHANES ADL instrument, a 16-item questionnaire designed to represent the internal latent construct of ADL. Data analyses included exploratory factor analysis, internal consistency measures, and polytomous (graded) item response theory.

Results: The NHANES ADL instrument is a unidimensional and internally consistent measure of ADL. Graded item response theory analyses indicated that although some variability exists, all 16 single items were sensitive measures of the latent construct of ADL. Most item responses demonstrated high discrimination.

Conclusion: Individual use of selected items of the NHANES ADL instrument may further improve the capacity of the health care provider in measuring and recording dysfunction associated with LBP.

The effect of sacroiliac joint manipulation on feed-forward activation times of the deep abdominal musculature.

Paul Marshall, PG Dip Sci; Bernadette Murphy, DC, PhD

Objectives: To determine the incidence of delayed feed-forward activation (FFA) times in a group of healthy young males; to retest those subjects who showed delayed FFA after six months to determine the reliability of the measure in the absence of treatment or injury in the intervening period; and to determine the effect of sacroiliac joint manipulation on delayed FFA times.

Methods: Ninety young males were assessed for the FFA of their deep abdominal muscles in relation to rapid upper limb movements. Those who met the criteria for delayed FFA (failure of deep abdominal activation within 50 milliseconds of deltoid activation) were then reassessed six months later. These subjects then underwent sacroiliac joint manipulation on the side demonstrating decreased joint movement during hip flexion and lateral flexion. Feed-forward activation times were then reassessed after joint manipulation.

Results: Seventeen (18.9%) of 90 subjects met the criteria of impaired FFA. Thirteen of 17 were available to be re-measured at six-month follow-up. The intraclass correlation coefficient for FFA at this time was greater than 0.70 for all movement directions. There was a significant improvement (38.4%) in FFA times for this group when re-measured immediately after the sacroiliac joint manipulation.

Conclusion: Delayed FFA is a highly reproducible measure at long-term follow-up. This technique appears to be a sensitive marker of the neural effects of sacroiliac joint manipulation. Future prospective studies are needed to determine if delayed FFA times are a marker for those at risk for developing back pain.

Intraexaminer reliability of identifying a dysfunctional segment in the thoracic and lumbar spine.

Louise Potter, BSc; Christopher McCarthy, PhD; Jacqueline Oldham, PhD

Objective: To examine the intrarater reliability of identifying a manipulable lesion in the lumbar and thoracic spine.

Methods: An experienced osteopath used dynamic and static examination to assess 12 asymptomatic subjects for signs of joint dysfunction in the thoracic and lumbar spine. The selected

segment was marked with an UV invisible mark. A second examiner visualized these marks with an UV lamp and recorded them on acetates for analysis; this process was then repeated an hour later. The distance from the marks to a fixed point was measured, and within-day intra-rater reliability was calculated using intraclass correlation coefficients (ICCs).

Results: The $ICC_{(1,1)}$ for the thoracic spine was 0.70 (95% confidence interval [CI], 0.27-0.90). In the lumbar spine the $ICC_{(1,1)}$ was 0.96 (95% CI, 0.87-0.99).

Conclusion: This study shows that the lumbar spine joint perceived to be the joint most likely to benefit from a high-velocity low-amplitude thrust can be identified with good within-day reliability in an asymptomatic sample using a defined examination protocol. However, the reliability in identifying a joint exhibiting signs of segmental dysfunction in the thoracic spine was poor.

Motion palpation of the lumbar spine - a problem with the test or the tester?

Birgitte Eskelund Hansen, MHSc; Trude Simonsen; MHSc, Charlotte Leboeuf-Yde, DC, MPH, PhD

Objectives: The purpose of this study is to investigate if it is possible to recognize whether a specific lumbar motion segment was manipulated or not by using motion palpation (MP) as a diagnostic tool in ordinary clinic patients and by using teams of practitioners with various levels of experience.

Methods: Two teams were created: Team A had an experienced doctor of chiropractic who palpated the patients and an inexperienced doctor who performed the treatment, whereas team B had the opposite composition. One chiropractor in each of the two teams identified a fixation with the help of MP and specified the treatment of his or her choice for this fixation. A few minutes later, the second chiropractor then randomly either manipulated or did not manipulate the indicated segment, according to the first chiropractor's instruction.

Blinded, the first chiropractor repalpated the segment and determined whether or not treatment was provided. Results were compared with (1) chance findings, (2) the clinicians' own pre hoc and specific expectations in relation to the treated cases, and (3) our expectation in relation to the untreated cases.

Results: Team A failed to reach its own standards in relation to treated segments, not even being better than chance, and was also unable to detect the untreated cases. The palpating chiropractor in team B was able to identify the manipulated segments in 87% of 15 cases ($P < .05$) and in 80% of 11 non-manipulated cases (not significant).

The successful palpator, therefore, reached the team's general standard of 85% success rate but not the specific standard of a 100% success rate. None reached our standard of identifying 100% of all untreated segments.

Conclusion: It is possible for some practitioners to identify treated segments using MP. Gold-standard palpators should therefore be used to calibrate other people's ability to perform MP, both in the clinical setting and in future research studies.

Sitting posture of subjects with postural backache.

Lauren Womersley, MSc; Stephen May, BSc

Objective: To test the construct validity of postural backache. To identify if individuals with

backache sit for longer periods of sustained sitting and have more flexed relaxed sitting posture than individuals in a no backache group.

Methods: Following an initial questionnaire, student volunteers without a history of "serious" back pain were classified as either postural backache group or no backache group. With the use of an activity diary that plotted activity every five minutes over a three-day period, the average time spent in different postures was established. Relaxed sitting posture was evaluated using Dartfish software to analyze videotape after 10 minutes of sitting.

Results: The most common daytime activity of both groups was sitting, with average sitting time not significantly different between groups. Periods of uninterrupted sustained sitting and uninterrupted sustained studying were significantly longer, and the degree of flexion in relaxed sitting was significantly greater in the postural backache group (all $P < .024$).

Conclusion: In a group of student volunteers, half reported postural backache. The group with backache sat for longer periods without interruption and had a more flexed relaxed sitting posture than the no backache group. These findings appear to validate McKenzie's concept of a postural syndrome.

Plantar infrared thermography measurements and low back pain intensity.
Nina Zaproudina, MD; Zhiyong Ming, MD; Osmo O.P. Hänninen, DMSc, PhD

Objective: To study the skin temperature disorders in low back pain (LBP) patients compared with reference persons without LBP, and to evaluate the relationship between pain intensity and other clinical signs and temperature abnormalities.

Methods: Sixty-five patients with unilateral chronic LBP with or without referred nonradicular leg pain (29 men and 36 women; age range, 30-51 years), and 20 reference persons without LBP (seven men and 13 women; age range, 30-49 years), participated in this study. The pain level was recorded by the use of a visual analog scale (0-100). Questionnaires and a series of spinal mobility tests (the modified Schober, straight-leg-raising test, finger-floor distance, side-bending) were used. Thermographic images of the low back area and legs (anterior, lateral, and posterior surfaces, and the plantar surfaces of feet) were taken with an infrared video camera.

Results: The temperature changes in the plantar surface correlated with LBP intensity. The pain levels differed in the groups with the different types of temperature changes. There were significant lower extremity regional skin temperature alterations (at least one regional interside difference of more than 0.3°C) in most cases both in LBP patients and in reference persons, but plantar interside temperature difference was significantly higher in LBP patients.

Conclusion: Temperature changes of the plantar surface seem to be connected with LBP intensity. Temperature measurements may be useful as an adjunctive physiological test in the evaluation and documentation of autonomic dysfunction in LBP patients.

The effects of active release technique on hamstring flexibility: a pilot study.
James W.George, DC; Andrew C.Tunstall, DC; Rodger E.Tepe, PhD; Clayton D.Skaggs, DC

Objective: The aim of this study is to determine if active release technique (ART) significantly increases hamstring flexibility in healthy male participants.

Methods: Twenty physically active male participants with no current or previous history of lower

extremity injury received ART on the origins and insertions of the hamstrings and dorsal sacral ligament. The sit-and-reach test was used before and after treatment to determine hamstring flexibility. Summary statistics were calculated, and pre and post hamstring flexibility scores were compared using a related samples *t* test.

Results: There was a significant difference between the pre- and posttest groups (mean pre = 35.5 cm, *df* = 19, SD = 7.56; mean post = 48.3 cm, *df* = 19, SD = 7.07; *P* = .0015). All 20 participants increased their sit-and-reach scores following the application of ART.

Conclusion: This study demonstrated that a single ART treatment increased hamstring flexibility in a group of healthy, active male participants.

Manipulation in the presence of cervical spinal cord compression: a case series.
Donald R. Murphy, DC, DACAN; Eric L. Hurwitz, DC, PhD; Amy A. Gregory, DC

Objective: The purpose of this study is to present information from a series of patients with imaging findings of encroachment on the cervical spinal cord who were treated with chiropractic cervical manipulation.

Case Series: There were 27 patients (18 females, nine males; age range, 23-65, mean age, 44.3 years) with neck and/or arm pain with findings of cervical spinal cord encroachment on magnetic resonance imaging. None of these patients had severe or acute myelopathy or advanced signal changes in the spinal cord indicative of myelomalacia. These patients were treated with a variety of approaches that included some form of cervical manipulation. The mean number of treatments that included manipulation was 12 (range, 2-32). Nineteen patients were treated with high-velocity, low-amplitude "thrust" manipulation, nine patients were treated with low-velocity muscle energy technique, and one patient was treated with both methods. The mean patient-rated subjective improvement at the last follow-up reexamination was 70.0% (range, 10%-100%).

From baseline to the last follow-up examination, the mean improvements in outcome measures were as follows: Bournemouth Neck Disability Questionnaire, 23.7 points (31%); Neck Disability Index, 6.4 points; and Numerical Pain Rating Scale, 3.9 points. In three patients, there was increased pain after manipulation that lasted from one to four days. There were no major complications, and in no patient did any increased pain after treatment last more than four days. No new neurologic symptoms or signs were seen in any of these patients.

Conclusion: The finding of cervical spinal cord encroachment on magnetic resonance imaging, in and of itself, should not necessarily be considered an absolute contraindication to manipulation. However, because radicular and myelopathic complications to cervical manipulation have been reported in the literature, great care should be taken in all cases, particularly those in which anatomic conditions such as cord encroachment are present.

Comparative study of hands-on therapy with active exercises vs. education with active exercises for the management of upper back pain.

Mary S. Pesco, MA; Etsuo Chosa, MD, PhD; Naoya Tajima, MD, PhD

Objective: The aim of this study was to compare hands-on therapy, including heat, massage, and active exercises, with postural education that emphasized increased self-efficacy and postural self-awareness along with education about the physiology of the disorder and prescribed daily active exercises.

Subjects: Twenty-four randomly selected women, 12 custodians and 12 students, with neck and shoulder pain and stiffness.

Methods: All subjects received a medical examination and X-ray before the study to rule out any pre-existing neurologic deficits and an evaluation that included history-taking and self-reporting of pain according to a numeric pain scale. Student participants received education and exercise instructions to be continued daily. The custodial workers received once-per-week, hands-on treatment.

Results: Data were compared using a nonparametric analysis (Wilcoxon signed rank test) and showed evidence of statistically significant reductions in neck, shoulder, and back stiffness and shoulder muscle tension for most of the study subjects.

Conclusion: Treatment of repetitive stress injuries that combines maintenance of daily active exercises prescribed and modeled by a professional therapist, which emphasize postural awareness to correct poor posture and provide a basic physiological understanding of the disorder, is as crucial to reducing upper back and neck pain and stiffness as hands-on therapy with active exercise provided in a clinical setting.

Gastroesophageal reflux disease in an 8-year-old boy: a case study.

Anna K. Jonasson, MSc; Simone F.C. Knaap, DC, MAppSc

Objective: To present the diagnosis and management of gastroesophageal reflux disease found in a pediatric patient; to discuss the importance of a detailed case history; and to bring forward some of the most important clues, both verbal and nonverbal, that can lead to the diagnosis.

Clinical Features: An 8-year-old boy was brought to a chiropractic clinic by his mother, complaining of headache and neck pain. Based on the history and physical examination, a diagnosis of cervicogenic headache was made.

Intervention and Outcome: Treatment consisting of chiropractic manipulation of the upper cervical spine in combination with cranial treatment was applied in addition to dietary advice. The headache returned and the patient was then referred to a colleague for a second opinion. Based on a detailed history, gastroesophageal reflux disease was diagnosed and the patient was referred to a specialist for suitable treatment.

Conclusion: Because of the position as first-line health practitioners, it is inevitable that doctors of chiropractic will be faced with complaints of a non-biomechanical nature. It is important to recognize conditions, such as gastroesophageal reflux, at an early stage and refer appropriately.

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