

A comparison of the effectiveness of spinal manipulative therapy for low back pain patients with and without spondylolisthesis

Mierau D, Cassidy JD, McGregor M, Kirkaldy-Willis WH.
JMPT 1987; 10(2): 49-55

The effectiveness of spinal manipulative therapy for low back pain is compared between two groups of patients: a small group (25) of patients with lumbar spondylolisthesis and a larger group (260) of patients without spondylolisthesis. This data, which was collected from a previously published study on the effectiveness of manipulation for chronic low back pain, shows that the results of manipulative treatment are not significantly different in those patients with or without lumbar spondylolisthesis.

KEY WORDS: Low back pain, spinal manipulative therapy, spondylolisthesis.

Correction of sacroiliac fixation by low force sustained pressure method.

Gemmell HA, Heng BJ. Am. Chiropractor 1987; Nov: 28-32

In this study a chiropractic technique using a sustained pressure of low force was used to demonstrate the forceful manual manipulation of a fixation or restriction of the sacroiliac articulation is not needed to restore normal joint mobility. The effectiveness of this method of spinal correction was measured by the use of motion palpation of the sacroiliac joint. Tukey's Honestly Significant Difference Test was significant, $p < .05$. The hypothesis that any apparent difference between the control and treatment group posttest means was due to chance was rejected. The hypothesis that any apparent difference between the control group pretest and posttest grades was due to chance was also rejected.

KEY WORDS: Sacroiliac fixation, motion palpation, toftness spinal correction, chiropractic.

Blocked atlantal nerve syndrome in babies and infants (Ger)

Gutmann G. Manuelle Medizin 1987; 25: 5-10

Three case reports are reviewed to illustrate a syndrome that has so far received far too little attention, which is caused and perpetuated in babies and infants by blocked nerve impulses at the atlas. The clinical picture ranges from central motor impairment and development through diencephalic impairments of vegetative regulatory systems to lowered resistance to infections, especially to ear-, nose- and throat-infections. The theoretical background to this syndrome is indicated. The main factor in the causation concerns the neurophysiological connections between the area of the atlanto-occipital joint and centres in the brain stem. In addition to the case history (birth trauma etc.) and the paediatrician's diagnosis, chiropractic and radiological examination are of decisive importance for the diagnosis of this syndrome. If the indica-

tions are correctly observed, chiropractic can often bring about amazingly successful results, because the therapy is a casual one.

KEY WORDS: Babies; infants; atlas, blocked nerves; dysregulation, motor, vegetative; impaired development, motor, vegetative; resistance, lowered to infection; diagnosis and therapy, chiropractic.

Segmental motion and instability

Stokes IAF, Frymoyer JW. Spine 1987; 12(7): 688-91

Seventy-eight patients were categorized as having degenerative instability in the lumbar spine, based on clinical symptoms and radiologic signs. Biplanar radiography was used to measure the angular and translational intersegmental motion components of flexion and extension of the lumbar spine. A comparison was made between this measured motion, the clinical symptoms, response to facet joint injection of anesthetic, and radiologic appearance of disc space and facets. The magnitude of the flexion motion and the magnitude of the anteroposterior (AP) shear motion accompanying the flexion was slightly less at symptomatic compared with nonsymptomatic levels. In most patients the AP shear motion at all levels was less than 3 mm (maximum 7 mm). The amount of forward shear motion correlated positively with the amount of flexion motion ($r = 0.3$). The shear - flexion ratio was significantly reduced at symptomatic levels of patients. Although this group of patients, taken as a whole, showed a tendency toward abnormal intersegmental motion of the lumbar spine, it was found that flexion - extension biplanar radiography was not useful in the diagnosis of lumbar instability.

KEY WORDS: Segmental instability, lumbar spine, biplanar radiography, spinal motion, low-back pain, facet joints.

Some upper cervical spine norms

Monu J, Bohrer SP, Howard G. Spine 1987; 12(6): 515-9

Lateral cervical spine films from 175 normal examinations of adults performed in the emergency room of North Carolina Baptist Hospital were analyzed to establish some norms and relationships in the upper cervical spine. The predens angle was found to be between 0° - 13° (mean 5.57°) in neutral position and 0° - 18° (mean 9.27°) in flexion in most persons. Nine-two percent of persons have angles greater than 3° in flexion. A V-shaped predens space is not indicative of injury to the cruciate ligament. Virtually every person has posterior slanting or tilting of the dens and the range of values is up to 35° (mean 17.43°). Ninety-eight percent of persons have an angle greater than 6°. A tilted dens does not indicate acute or remote trauma. No relationship was identified between the predens angle and the dens tilt angle. The posterior arch of the atlas can be found at any position between the occiput and spinous process of C2 in all positions of the head and neck. Hence, fanning or widening of the C1 - C2 interspinous distance is not a reliable index of ligamentous injury in the upper cervical spine.

KEY WORDS: Upper cervical spine, roentgenographic findings, norms, dens tilt, predens "V".

A benefit of spinal manipulation as adjunctive therapy for acute low-back pain: a stratified controlled trial

Hadler NM, Curtis P, Gillings DB, Stinnett S.
Spine 1987; 12(7): 703-6

Fifty-four subjects volunteered to participate in a controlled study contrasting spinal manipulation with spinal mobilization without the rotational forces and leverage required to move facet joints. All suffered from regional low-back pain for less than 1 month, were ages 18-40, had never previously undergone any form of spinal manipulation, and denied a prior episode of backache within the previous 6 months. Randomization was stratified at outset into those who suffered for less than 2 weeks and those whose discomfort had persisted for 2-4 weeks. Outcome was monitored by a questionnaire assessing functional impairment. A treatment effect of manipulation was demonstrated only in the strata with more prolonged illness at entry. In the first week following manipulation, these patients improved to a greater degree ($P = .009$, t test) and more rapidly ($P < .025$, Wilcoxon rank-sum test).

KEY WORDS: Spinal manipulation, prospective randomized trial, acute low-back pain.

The biomechanical function of the iliolumbar ligament in maintaining stability of the lumbosacral junction

Leong JCY, Luk KDK, Chow DHK, Woo CW.
Spine 1987; 12(7): 669-74

The iliolumbar ligament is one of the three lumbopelvic ligaments. Recent study has shown that the ligament is not present at birth and is formed from metaplasia of the quadratus lumborum muscle at the end of the first decade. To study the biomechanical functions of this ligament, an apparatus was developed using linear variable differential transformers. Twenty fresh cadaveric specimens of the lumbosacral were tested. The flexibility of the intact lumbar segment was studied before and after the ligaments were divided. Flexion of L5 on S1 was mainly controlled by the posterior band and lateral bending by the anterior band of the ligament. When the L5-S1 disc was degenerated, total division of the ligaments reduced extension during loading. Its effect on torsion was not evident from this study.

KEY WORDS: Iliolumbar ligament, stability, lumbosacral junction.

A new clinical model for the treatment of low-back pain

Waddell G. Spine 1987; 12(7) 632-44

Because there is increasing concern about low-back disability and its current medical management, this analysis attempts to construct a new theoretic framework for treatment. Observations of natural history and epidemiology suggest that low-back pain should be a benign, self-limiting condition, that low-back disability as opposed to pain is a relatively recent Western epidemic, and that the role of medicine in that epidemic must be critically examined. The traditional medical model of disease is contrasted with a biopsychosocial model of illness to analyze success and failure in low-back disorders. Studies of the mathematical relationship between the elements of illness in chronic low-back pain

suggest that the biopsychosocial concept can be used as an operational model that explains many clinical observations. This model is used to compare rest and active rehabilitation for low-back pain. Rest is the commonest treatment prescribed after analgesics but is based on a doubtful rationale, and there is little evidence of any lasting benefit. There is, however, little doubt about the harmful effects - especially of prolonged bed rest. Conversely, there is no evidence that activity is harmful and, contrary to common belief, it does not necessarily make the pain worse. Experimental studies clearly show that controlled exercises not only restore function, reduce distress and illness behavior, and promote return to work, but actually reduce pain. Clinical studies confirm the value of active rehabilitation in practice. To achieve the goal of treating patients rather than spines, we must approach low-back disability as an illness rather than low-back pain as a purely physical disease. We must distinguish pain from disability, the symptoms and signs of distress and illness behavior from those of physical disease, and nominal from substantive diagnoses. Management must change from a negative philosophy of rest for pain to more active restoration of function. Only a new model and understanding of illness by physicians and patients alike makes real change possible.

KEY WORDS: Low-back pain, clinical model, treatment, psychosocial factors.

Mechanical stimulation of the dorsal root ganglia induces increased production of substance P: A mechanism for pain following nerve root compromise?

Badalamente MA, et al. Spine 1987; 12(6): 552-5

The undecapeptide, substance P, is known to be synthesized in cell bodies of dorsal root ganglia. This neuropeptide is also known to modulate sensory, nociceptive transmission postsynaptically on dorsal horn interneurons. In the animal model used in the current study, experimental mechanical stimulation of dorsal root ganglia and nerve roots increased the amounts of substance P, as well as substance P immunoreactivity in cell bodies of the dorsal root ganglia and in the substantia gelatinosa of the spinal dorsal horn that the cell bodies innervated. These results were determined by using both immunohistochemistry and radioimmunoassay. This study suggests that substance P may modulate nociception when lumbar nerve roots are stimulated mechanically.

KEY WORDS: Pain, nerve root stimulation, substance P, immunohistochemistry, radioimmunoassay.

Methodologies in clinical back pain trials

Block R. Spine 1987; 12(5): 430-2

Criteria are presented to assist in the critical appraisal of investigations into the efficacy of therapy for low-back pain. Potential sources of statistical noise and experimental bias are identified in the selection of subjects, the application of therapy, and the evaluation of outcomes. When these criteria were applied to a series of recent articles, published in this journal, only two valid randomized controlled trials and four properly controlled cohort studies were found out of 147 reports.

Electromyographic analysis of two techniques for squat lifting

Delitto RS, Rose SJ, Apts DW. Phys Ther 1987; 67(9): 1329-34

The purpose of this study was to examine the effects of two different alignments of the lumbar spine and three different loads on electromyographic activity of the erector spinae (ES) and oblique abdominal (OA) muscles during squat lifting. Nineteen healthy subjects (8 men, 11 women) participated in this study. Each subject performed squat lifts both with the lumbar spine aligned in "back-bowed-in" (BBI), or normal, lordosis and with the lumbar spine aligned in "back-bowed-out" (BBO), or relatively less, lordosis. Based on total duration, the lift was divided into two equal phases. Electromyographic activity of each muscle was quantified for each half of the lift and normalized to the total EMG produced by the muscle during a maximal voluntary isometric contraction. A three-way analysis of variance for repeated measures was used to analyze the effects of position of the lumbar spine, timing, and load on the amount of EMG activity during lifting. For all loads, ES muscle activity was greater during the first half of BBI lift, whereas OA muscle activity was greater during the first half of the lift, regardless of the lifting style ($p < .01$). The greater ES and OA muscle activity

occurring during the crucial initial period on the BBI lift may provide the best protection for the lumbar spine.

KEY WORDS: Biomechanics, lumbosacral region, muscle performance, physical therapy.

Muscle pressure effects on motoneuron excitability

Kukulka CG, et al. Phys Ther 1987; 67(11): 1720-26

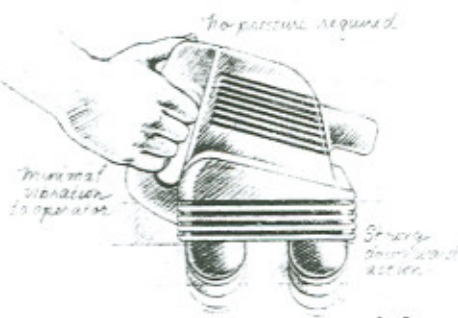
The purpose of this communication is to report on the analysis of the effects of muscle pressure on altering motoneuron excitability. Motoneuron excitability was assessed by measuring changes in the H-reflex in 30 neurologically healthy individuals. The results indicate that muscle pressure is excitatory, but of such low intensity as to be of dubious therapeutic benefit. Methodological limitations specific to muscle pressure stimulation limit the interpretation of our results. These limitations are discussed, and a suggestion is made for an alternative approach to evaluate the effects of muscle pressure on motoneuron excitability.

KEY WORDS: Motor neurons, muscle tonus, physical therapy.

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A prospective of analysis of stress and fatigue in recurrent low-back pain

Feuerstein M, Carter RL, Papciak AS. Pain 1987; 31: 333-44

The purpose of the present study was to determine whether patients with recurrent low-back pain display a different pattern of mood fluctuations across days than matched healthy controls and whether these mood states are related to pain occurrence and/or magnitude using a prospective design. The questions addressed are whether mood states prior to a pain episode are associated with the episode or whether mood relates to pain as a secondary reaction. Similarly, the relationship between mood state recorded prior to, during or following pain and magnitude of pain experienced was investigated. Thirty-three ambulatory chronic low-back pain patients and an equivalent group of asymptomatic controls matched for age, sex, socioeconomic status, and reported activity level monitored mood state (anxiety, tension, depression, anger, vigor, fatigue, confusion) and pain before breakfast, at 4 p.m. and at bedtime for 14 consecutive days. Groups were successfully matched. Analyses revealed significantly higher levels of tension, anxiety and fatigue and lower levels of vigor in the pain cases. No mood state was predictive of pain onset but fatigue was associated with pain 24 hr following pain, indicating fatigue as secondary to pain. While mood state recorded prior to or following pain was unable to predict magnitude of pain, fatigue was associated with the level of pain experienced during the pain episode itself. The findings reveal a pattern of anxiety, tension and fatigue where fatigue is associated with increased pain during the pain episode and is increased 24 hr following pain. This fatigue-pain relationship is superimposed upon a continuous elevation of anxiety and tension. These findings suggest the importance of pain management efforts directed at decreasing patients' fatigue levels, and increasing functional endurance while simultaneously reducing anxiety. The results also question the role of negative mood states in the initiation or exacerbation of pain and highlights the influence of physical mood states such as fatigue on pain in low-back pain.

KEY WORDS: Stress, fatigue, low-back pain.

The abdominal muscles and vertebral stability

Tesh KM, Dunn JS, Evans JH. Spine 1987; 12(5): 501-8

It has been suggested that the muscles of the anterolateral abdominal wall increase the stability of the lumbar region of the vertebral column by tensing the thoracolumbar fascia and by raising intra-abdominal pressure. In this report these new mechanisms are reviewed and their contribution to vertebral stability assessed. The thoracolumbar fascia consists of two principal layers of dense fibrous tissue that attach the abdominal muscles to the vertebral column. Each of these layers was dissected in fresh and fixed material and samples chosen for light and scanning electron microscopy to study the arrangement of the component fibers. Computed axial tomography in volunteers showed the changes in spatial organization that occur during flexion of the back and during the Valsalva maneuver. The fascia was then tensed experimentally in isolated unfixed motion segments. The results suggested that the stabilization action of the thoracolumbar fascia is less than had been

thought previously but was consistent with calculations based on the more accurate structural and mechanical information that had been derived from the current study. Abdominal muscle contraction was simulated in whole cadavers in both the flexed and lateral bending positions to compare the stabilizing effect of the thoracolumbar fascia and intra-abdominal pressure mechanisms. These definitive experiments showed that the resistance to bending in the sagittal plane offered by the abdominal muscles acting through fascial tension was of a similar magnitude to that offered by a raised intra-abdominal pressure, both being relatively small in the fully flexed position. The stabilizing influence of the middle layer of the thoracolumbar fascia in lateral bending was clearly demonstrated and warrants further study *in vivo*.

KEY WORDS: Thoracolumbar fascia, anatomy, microscopy, intra-abdominal pressure, biomechanics.

Posture dependent bilateral compression of L4 or L5 nerve roots in facet hypertrophy. A dynamic CT-myelographic study

Penning L, Wilmink JT. Spine 1987; 12(5): 488-500

In 12 patients with myelographic evidence of bilateral root involvement at the L3 - L4 or L4 - L5 levels postmyelographic computerized tomography (CT) studies were performed in flexion and extension. They showed concentric narrowing of the spinal canal in extension and widening with relief of nerve root involvement in flexion. This could be attributed to the presence of marked degenerative hypertrophy of the facet joints, narrowing the available space for dural sac and emerging root sleeves. In extension of the lumbar spine, bulging of the disc toward the hypertrophic facets causes a pincers mechanism at the anterolateral angles of the spinal canal with the risk of bilateral root compression. This mechanism is enhanced in these cases by marked dorsal indentation of the dural sac because of anterior movement of the dorsal fat pad in extension. The authors believe that the radiologically described mechanism forms the anatomic basis of neurogenic claudication and posture-dependent sciatica.

KEY WORDS: Lumbar spine, facet hypertrophy, CT myelography, nerve root compression, flexion-extension.

Spinal manipulation: does it work?

Curtis P. Spine: State of Art Rev 1987; 2(1): 31-44

The purpose of this chapter is to review the value of spinal manipulation in treating low-back pain. In spite of the growth and success of osteopathy and chiropractic, there is still little evidence (though it is increasing) by which to judge this form of treatment on purely scientific grounds. There is speculation that manipulation exerts a powerful placebo effect and that the particular therapeutic approach of chiropractic satisfies many expectations and psychological needs of the person suffering from low-back pain and other musculoskeletal problems. As an introduction to a discussion of the value of manipulative treatment, some knowledge of the development, theoretical basis, diagnostic methods, and techniques of osteopathy and chiropractic is important.

Mobilization of the cervical spine in chronic headaches

Turk Z, Ratkolb O. *Manual Medicine* 1987; 3: 15-7

The headache still represents a great therapeutic problem in modern medicine. Various specialists including rheumatologists are engaged in the treatment of headache since no less than 40 percent of all headaches are caused by degenerative processes of the cervical spine. The authors analyze the therapy of cervico-cephale syndromes in 100 patients treated by manipulation of the cervical spine. The findings of the analysis show that in 75 percent of all cases the headaches were alleviated immediately upon therapy whereas the control examination after 6 months revealed that 40 percent of the patients were almost free of headaches. In chronic headaches the author recommends mobilization and manipulation of the cervical spine taking heed to the following postulates: 1. An EMG diagnosis; 2. Strict consideration of all counter-indications; 3. A comprehensive knowledge of the manipulative technique. The author concludes that manipulation of the cervical spine is a therapeutic method will applicable in the treatment of chronic headaches.

KEY WORDS: Headache, mobilization, manipulation.

Standardized approaches to the evaluation and treatment of industrial low-back pain

Lonstein MB, Weisel SW. *Spine: State of Art Rev* 1987; 2(1): 147-56

Low-back pain is not a new health problem; it afflicted the Egyptians 5,000 years ago, and it was a major concern of Bernadino Ramazzini, the founder of occupational medicine, 300 years ago. Today, low-back pain is a major industrial health problem, being the most common disabling musculoskeletal symptom in the work force of the Western world.

Despite the magnitude of the problem, surprisingly little has been done toward providing an organized approach to the management of low-back pain in industry. Indeed, many physicians in the community, for whatever reasons, are reluctant to treat workers' compensation patients in general and low-back problems in particular. This may result from fear of legal involvement, uncertainty about appropriate diagnostic and therapeutic strategies, or other related factors. This article will briefly outline the epidemiology and impact of industrial low-back pain to establish the setting in which control strategies must function. It will then describe standardized treatment and evaluation strategies which may help to reduce the impact of this ubiquitous problem.

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