Effective management of spinal pain in 177 patients evaluated for manipulation under anesthesia.
Daniel T. West, DC, Robert S. Mathews, MD, Matthew R. Miller and George M. Kent, MD.

Objective: To demonstrate that manipulation under anesthesia (MUA), a conservative treatment modality, is both safe and efficacious in the treatment of acute and chronic spinal pain disorders in appropriately selected patients. MUA can be safely utilized to treat pain arising from the cranial, cervical, thoracic, and lumbar spine, as well as the sacroiliac and pelvic region.

Setting: An ambulatory surgical center.

Subjects: The treatment group consisted of 177 patients between the ages of 17 and 65. Evaluation followed a treatment algorithm, created by the authors, as a multidisciplinary approach to patient selection, evaluation, treatment and timing of specialized referral, in consideration of previously published algorithms. These patients had failed prior forms of treatment, both conservative and surgical in nature.

Intervention: Patients underwent three sequential manipulations under IV sedation, followed by 4-6 weeks of skilled spinal manipulation and therapeutic modalities.

Outcome Measures: Data regarding change in Visual Analog Scale, range-of-motion, medication needs and return to work status were used to document their progress. All patients had follow-up for 6 months.

Results: On average, VAS ratings improved by 62.2% in those patients with cervical pain problems. On average, VAS ratings improved by 60.1% in those patients with lumbar pain problems. There was a near-complete reversal in patients out of work pre-MUA (68.6%) and those returning to full work at 6 months post-MUA (64.1%). There was a 58.4% reduction in the percentage of patients requiring prescription pain medication from the pre-MUA to 6-months post-MUA period. Additionally, 24.0% of the treatment group required no medication at 6 months post-MUA.
Conclusion: A multidisciplinary approach to evaluation and treatment, including manipulation under anesthesia, offers patient benefits above and beyond those which can be obtained through the individual providers working alone.

Key Indexing Terms: Chiropractic Manipulation; Low Back Pain; Cervical Spine.

Physician-applied contact pressure and table force response during unilateral thoracic manipulation.
Steven J. Kirstukas, PhD and Jerrilyn A. Backman, DC.

Objective: To measure the applied loading to human subjects during the reinforced unilateral thoracic manipulation.

Design: Biomechanical descriptive study.

Setting: The National College of Chiropractic Clinical Biomechanical Laboratory in Lombard, Illinois.

Subjects: Seven males aged 24 to 47 with no positive responses regarding muscle relaxants or thoracic spinal fractures, surgeries, or pain.

Main Outcome Measures: We measured the contact pressure distribution at the physician-subject contact region and extracted three biomechanical parameters. From the measured time-dependent support force magnitudes, we extracted five additional biomechanical parameters.

Results: In the application of the reinforced unilateral manipulative treatment, the physician establishes contact and applies a near-static preload force of 250 to 350 N. The dynamic portion of the typical thrust is preceded by a 22% decrease in force magnitude, and the peak thrust magnitude is linearly related the preload force magnitude. We estimate that the peak contact pressure beneath the chiropractor’s pisiform can exceed 1000 kPa, with the highest pressures transmitted over areas as small as 3.6 cm², depending on manipulative style.

Conclusions: This work represents the first attempt at (1) performing simultaneous measurements of the physician-applied loading and table force response, and (2) measuring the contact pressure distribution at the physician-patient contact region during chiropractic manipulation. This type of work will lead to a better
understanding of the relationship between the dynamic physician-applied normal forces and the resulting load response at the table, and gives us additional outcome parameters to quantify manipulative technique.

**Key Indexing Terms:** Chiropractic Manipulation; Orthopedic; Spine; Thoracic Vertebrae; Biomechanics; Kinetics.

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**A review of biomechanics of the central nervous system. Part II: Spinal cord strains from postural loads.** Deed E. Harrison, DC, Rene Cailliet, MD, Donald D. Harrison, PhD, DC, Stephan J. Troyanovich, DC and Sanghak O. Harrison, DC.

**Objective:** To review spinal cord strains arising from postural loads.

**Data Collection:** A hand search of available reference texts and a computer search of literature from the indexed medicus sources were collected, with special emphasis placed on spinal cord strains caused by various postural rotations and translations of the skull, thorax and pelvis.

**Results:** All spinal postures will deform the neural elements within the spinal canal. Flexion causes the largest canal length changes and hence largest nervous system deformations. Neural tissue strains depend upon the spinal level, the spinal movement generated, and the sequence of movements when more than one spinal area is moved.

**Conclusions:** Rotations of the global postural components, head, thoracic cage, pelvis and legs, cause stresses and strains in the central nervous system and peripheral nervous system. Translations of the skull, thorax and pelvis as well as combined postural loads, need to be studied for their effects on the spinal canal and neural tissue deformations. Flexion of any part of the spinal column may generate axial tension in the entire cord and nerve roots. Slight extension is the preferred position of the spine as far as reducing the magnitude of mechanical stresses and strains in the CNS is concerned.

**Key Indexing Terms:** Posture; Spinal Cord; Biomechanics; Central Nervous System.

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**Chiropractic management of a patient with myasthenia gravis and vertebral subluxations.** Joel
Objective: The chiropractic management of a patient with myasthenia gravis and vertebral subluxation is described. We discuss the pathophysiology, clinical features and treatment of patients with these diseases.

Clinical Features: The 63-yr-old male patient suffered from complaints associated with the disease myasthenia gravis along with signs of vertebral subluxation. The patient had an initial complaint of dysphagia. In addition, the patient experienced swelling of the tongue, nausea, digestive problems, weakness in the eye muscles, difficulty breathing, myopia, diplopia and headaches. Balance and coordination problems resulted in walking difficulties.

Intervention and Outcome: Contact specific, high-velocity, low-amplitude adjustments were applied to sites of patient subluxations. Myasthenia gravis is no longer debilitating to the patient; he is medication free and has assumed a "normal life."

Conclusion: The chiropractic management of a patient with myasthenia gravis is discussed. The clinical aspects of the disease, including the possible role of chiropractic intervention in the treatment of patients suffering from myasthenia gravis, are also discussed. This case study encourages further investigation into the holistic approach to patient management by chiropractors vis-a-vis specific adjustments of vertebral subluxations.

Key Indexing Terms: Myasthenia Gravis; Chiropractic; Dysphagia.

Posterior tibial stress fracture: A report of three cases. Gabrielle M. van der Velde,DC and William S. Hsu,DC.

Objective: To discuss the specific clinical and radiographic features of posterior tibial stress fracture and appropriate clinical management, including imaging and treatment, in the presence of suspected or confirmed tibial stress fracture.

Clinical features: Three patients suffered exercise-related lower leg pain, clinical features and risk factors specific for this posterior tibial stress fracture. Diagnosis was confirmed for all three individuals by radiographic imaging.
**Intervention and outcome:** Treatment included rest and modified activity, followed by a graded return to activity commensurate with bony healing. This approach was successful for two of the individuals diagnosed with posterior tibial stress fracture. In the third individual treatment recommendations were not adhered to, resulting in three separate stress fractures of the posterior tibia over 27 months.

**Conclusion:** Stress fractures may go undiagnosed for a long period of time; therefore, a high index of suspicion, along with knowledge of its clinical and predisposing factors, is necessary for recognition. Inappropriate management of individuals with tibial stress fracture may result in recurrence or frank fracture. Chiropractors have a role in the prevention of stress fractures by identifying and educating patients at risk for this condition.

**Key Indexing Terms:** Fracture; Tibia; Chiropractic.

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**Comparison of work and time estimates by chiropractic physicians with those of medical and osteopathic providers.** Jennifer A. Hess,DC,MPH and Robert D. Mootz,DC.

**Background:** Resource-based relative value scales (RBRVS) have become a standard method for identifying costs and determining reimbursement for physician services. Development of RBRVS systems and methodology are reviewed and the RBRVS concept of physician ‘work’ is defined.

**Objective:** Results of work and time inputs from chiropractic physicians are compared to those reported by osteopathic and medical specialties. Lastly, implications for reimbursement of chiropractic fee services are discussed.

**Methods:** Total work, intraservice work and time inputs for clinical vignettes reported by chiropractic, osteopathic and medical physicians are compared. Data for chiropractic work and time reports were drawn from a national random sample of chiropractors conducted as part of a 1997 workers’ compensation chiropractic fee schedule development project. Medical and osteopathic inputs were drawn from RBRVS research conducted at Harvard University under a federal contract reported in 1990. Both data sets used the same or similar clinical vignettes and similar methodologies. Comparisons of work and time inputs are made for clinical vignettes to assess whether work reported by chiropractors is of similar magnitude and variability as work reported by other specialties.
**Results:** Chiropractic inputs for vignettes related to evaluation and management services are similar to those reported by medical specialists and osteopathic physicians. The range of variation between chiropractic work input and other specialties is of similar magnitude to that within other specialties. Chiropractors report greater work input for radiological interpretation and lower work input for manipulation services.

**Conclusions:** Chiropractors appear to perform similar total "work" for evaluation and management services as other specialties. No basis exists for excluding chiropractors from using E/M codes for reimbursement purposes on grounds of dissimilar physician time or work estimates. Greater work input by chiropractors in radiology interpretation may be related to a greater importance placed on findings in care planning. Consistently higher reports for osteopathic work input on manipulation are likely attributable to differences in reference vignettes used in the respective populations. Research using a common reference vignette for manipulation providers is recommended, as is development of a single generic approach to coding for manipulation services.

**Key Indexing Terms:** Chiropractic; Resource-Based Relative Value Scales; Health Policy; Reimbursement Mechanism.

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**A feasibility study of chiropractic spinal manipulation versus sham spinal manipulation for chronic otitis media with effusion in children.** Charles E. Sawyer,DC, Roni L. Evans,DC, Patrick D. Boline,DC, Richard Branson,DC and Anne Spicer,DC.

**Background:** Pediatric otitis media with effusion is a common and costly condition. Although chiropractors have anecdotally claimed success in treating otitis media, there is little research to support their claims.

**Objective:** A pilot study was undertaken for the purpose of assessing the feasibility of conducting a full-scale randomized clinical trial investigating the efficacy of chiropractic spinal manipulative therapy (SMT) for children with chronic otitis media with effusion.

**Methods:** This study was a prospective, parallel group, observer-blinded, randomized feasibility study. Twenty-two patients, ages 6 months to 6 years, received either active chiropractic spinal manipulative therapy or placebo chiropractic SMT. Otoscopy and tympanometry were used to create a middle-ear status profile, and daily diaries were collected.
**Results:** Five newspaper advertisements over six months generated 105 responses. Twenty patients subsequently qualified and were randomized into the study. Collection of tympanometric and otoscopic data proved to be challenging. Compliance with the treatment and evaluation protocols and daily diaries was excellent. There were no reports of serious side effects as a result of either the active or placebo chiropractic treatments.

**Conclusion:** Recruitment for a randomized controlled trial is feasible and could be enhanced by medical collaboration. Patients and parents are able and willing to participate in a study comparing active SMT and placebo SMT. Parents were extremely compliant with the daily diaries, suggesting that similar quality of life and functional status measures can be successfully used in a larger trial. We found the objective outcomes assessment involving tympanometry and otoscopy extremely challenging and should be performed by experienced examiners in future studies.

**Key Indexing Terms:** Chiropractic; Otitis Media; Pediatrics.

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**Chiropractic biophysics digitized radiographic mensuration analysis of the anteroposterior lumbopelvic view: A reliability study.** Stephan J. Troyanovich,DC, Sanghak O. Harrison,DC, Donald D. Harrison, PhD,DC, Deed E. Harrison,DC, Mark Payne,DC, Tadeusz J. Janik,PhD.

**Objective:** To investigate the reliability of a radiographic measurement procedure that uses a computer and sonic digitizer to determine projected spinal displacements from an ideal normal position.

**Design:** A blind, repeated-measure design was used. Anteroposterior lumbopelvic radiographs were presented to each of three examiners in random order. Each film was digitized and the films were randomized for a second run.

**Setting:** Private, primary-care chiropractic clinic.

**Main Outcome Measures:** The angle of the sacral base in comparison to a true horizontal line (horizontal base angle [HB angle]), lumbodorsal angle (LD angle), lumbosacral angle (LS angle), and the thoracic translational displacement from true vertical (TxT12 ) determined as the perpendicular distance from the center of T12 to a vertical axis line (VAL) drawn from the center of the S1 spinous process cephalad and...
parallel to the lateral edge of the x-ray film.

**Results:** Intraexaminer reliability for (a) HB angle was .72-.94, with confidence intervals included in the range of .52-.97; (b) LD angle was .90-.96, with confidence intervals in the range of .82-.98; (c) LS angle was .84-.96, with confidence intervals in the range of .72-.98; and (d) TxT12 was .95-.97, with confidence intervals included in the range of .91-.99. Interexaminer reliabilities for the three examiners ranged from .71 to .97.

**Conclusions:** Measures similar to those described in this study are commonly used to measure and categorize spinal displacements from true vertical alignment (i.e. scoliosis measurements). Most patient assessment methods used in chiropractic have poor or unknown reliability. The one possible exception to this rule is spinal displacement analysis performed on radiographs. In chiropractic, ICC values greater than .70 are considered accurate enough for use in clinical and research applications. The measures tested here would fit within these guidelines of reliability. Establishing reliability is an important first step in evaluating these measures so that future studies of validity may be undertaken.

**Key Indexing Terms:** Radiography; Chiropractic; Reliability Studies.

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**Introduction of a new physical examination procedure for the differentiation of acromioclavicular joint lesions and subacromial impingement.** Dale J. Buchberger,DC.

**Objective:** To present a new physical examination procedure that may assist in differentiating acromioclavicular joint lesions from subacromial impingement lesions.

**Results:** The acromioclavicular joint differential test is performed by applying downward pressure over the lateral one-third of the clavicle while passively inducing slight adduction, external rotation and forced forward flexion to the humerus while the patient is in the seated position. Although similar mechanisms have been described, the acromioclavicular joint differential test is a new examination procedure previously unreported.

**Conclusion:** This paper describes a new test to differentiate between acromioclavicular joint lesions and subacromial impingement. Based on its mechanism, the acromioclavicular joint differential test may provide
the examiner with an additional tool in the differential diagnosis of acromioclavicular joint lesions and subacromial impingement in the patient presenting with shoulder pain. Although this test has been utilized by the author in a clinical setting, validation data is not yet available.

**Key Indexing Terms:** Shoulder; Acromioclavicular Joint; Examination; Impingement.