Dynamic Chiropractic

CHIROPRACTIC (GENERAL)

Research Abstracts From the *Journal of Manipulative and Physiological Therapeutics*

MAY ABSTRACTS VOLUME 33, ISSUE 4

The *JMPT* is the premiere scientific journal of the chiropractic profession, dedicated to the advancement of chiropractic health care. The National University of Health Sciences, owner of the journal, upholds the journal's compliance with the highest publication standards, which expressly support editorial freedom and best publication practices. The *JMPT* is an independent publication that strives to provide the best scientific information that improves health care practice and future research.

Effects of Manipulation on Central Integration of Dual Somatosensory Input After Motor Training

Heidi Haavik Taylor, PhD, BSc(Chiro), Bernadette Murphy, PhD, DC

Objective: This study sought to investigate the influence of spinal dysfunction and spinal manipulation on the response of the central nervous system to a motor training task.

Methods: The dual peripheral nerve stimulation somatosensory evoked potential (SEP) ratio technique was used in 11 subjects before and after a 20-minute typing task and again when the typing task was preceded with cervical spine manipulation. Somatosensory evoked potentials were recorded after median and ulnar nerve stimulation at the wrist (1 millisecond square wave pulse, 2.47 Hz, 1X motor threshold). The SEP ratios were calculated for the N9, N11, N13, P14-18, N20-P25, and P22-N30 peak complexes from SEP amplitudes obtained from simultaneous median and ulnar (MU) stimulation divided by the arithmetic sum of SEPs obtained from individual stimulation of the median (M) and ulnar (U) nerves.

Results: There was a significant increase in the MU/M+U ratio for both cortical (ie, N20-P25 and P22-N30) SEP components after the 20-minute repetitive contraction task. This did not occur when the motor training task was preceded with spinal manipulation. Instead, there was a significant decrease in the MU/M+U ratio for the cortical P22-N30 SEP component. The ratio changes appear to be due to changes in the ability to suppress the dual input, as concurrent changes in the MU amplitudes were observed.

Discussion: This study suggests that cervical spine manipulation not only alters cortical integration of dual somatosensory input, but also alters the way the central nervous system responds to subsequent motor training tasks.

Conclusion: These findings may help to clarify the mechanisms responsible for the effective relief of pain and restoration of functional ability documented after spinal manipulation, and the mechanism involved in the initiation of overuse injuries.

MRI Investigation of the Function of the Deep Cervical Flexors During Craniocervical Flexion

Barbara Cagnie, PT, PhD, Roseline D'Hooge, PT, Eric Achten, MD, PhD, et al.

Objective: Evidence suggests that the deep cervical flexors (DCFs) are important for the control of the cervical spine. The craniocervical flexion (CCF) test is a clinical test developed for patients with neck pain disorders based on the action of the DCFs. Because these muscles are deeply situated, it is difficult to reach the DCFs with surface electromyography. Magnetic resonance imaging (MRI) can be used to measure these muscles in cross-section. The objective of this study was (1) to determine the reliability of MRI for measuring cross-sectional area (CSA) of the longus colli (Lco) and longus capitis (Lca); and (2) to evaluate the changes in CSA during contraction.

Methods: Thirty healthy subjects ages 29 ± 9.3 years were imaged using MRI. The CSA of the Lco and Lca was evaluated at four different levels (C0-C1, C2-C3, C4-C5, and C6-C7) at rest and during CCF.

Results: The intraclass correlation coefficients for the CSA of the Lco and Lca showed good to excellent reliability (0.73-0.92), except at the C4-C5 level. There was a significant increase in CSA of both Lco ($F = 6.79$, $P = .015$) and Lca ($F = 19.20$, $P \leq .001$) due to CCF, and this was at different levels. The highest increases in CSA occurred at the C0-C1 level for the Lca (11.1%) and at the C2-C3 level for the Lco (17.4%).

Conclusions: This study demonstrated that the action of CCF resulted in a contraction of the Lco and Lca at different levels. The results indicate that MRI is a promising technique to evaluate changes in CSA during contraction.

Paraspinal Cutaneous Temperature Modification After Spinal Manipulation at L5

Richard Roy, DC, MSc, Jean Boucher, PhD, Alain Comtois, PhD

Objective: The purpose of this study was to investigate local paraspinal cutaneous temperature (CT) modifications after spinal manipulative therapy at L5.

Methods: Twenty subjects with acute low back symptoms were randomly assigned to either a treatment or a sham group (n = 10 per group). Subjects underwent an eight-minute acclimatizing period. Temperature was measured bilaterally with infrared cameras at the L5 level. In the treatment group, a traditional chiropractic manipulation (lumbar roll technique with a pisiform contact on the ipsilateral mamillary of L5) was delivered, whereas with the sham group, the same technique was used, but no thrust was applied. Cutaneous temperature control measurements were taken two minutes before (t-2) and immediately after the intervention (t0) and at 1, 3, 5, and 10 minutes postintervention (t1, t3, t5 and t10, respectively).

Results: At t0, CT in the treatment group on the treatment side (ipsilateral side) warmed up by 0.2°F, whereas in the sham group, there were no significant temperature modifications on either side. At t3 relative to t0, CT in the treatment group on the treatment side warmed by approximately 0.6°F, whereas the contralateral side (nontreatment side) cooled. In the treatment group, significant differences were noted between sides ($F = 13.36$, $P = .002$, $P = .932$) and sides X times ($F = 2.97$, $P = .016$, $P = .838$).

Conclusion: The effects of a lumbar spine manipulation appear noticeable by changes in paraspinal CT measurements at the level of L5. However, the meaning and mechanisms of CT modifications at L5 are still being investigated.

Effects of HVLA Manipulation on Catalase Activity in Men With Neck Pain

Carolina Kolberg, DC, MS, Andrea Horst, BS, Angela Kolberg, DC, PhD, et al.

Objective: The aim of this study was to identify the influence of high-velocity, low-amplitude (HVLA) manipulation on lipid peroxidation and catalase activity in subjects with neck pain who answered the Neck Disability Index and quadruple visual scale questionnaires.

Methods: Twenty-two men (mean age, 38 years) with neck pain were recruited through radio and newspaper advertisements in the local media. Every patient received six sessions of HVLA manipulation, three times a week for two weeks. Blood samples were drawn from the cubital vein before treatment in the first session and after the third and sixth sessions. The quadruple visual scale was used with the same scheme. The Neck Disability Index questionnaire was applied before the beginning of treatment and after the last session. Catalase activity and lipoperoxidation were measured in erythrocyte samples.

Results: Results showed no change in lipid peroxidation. Nevertheless, the catalase activity was increased by HVLA manipulation. The same treatment reduced pain perception and disability in these subjects.

Conclusion: The present study has shown that catalase activity of the erythrocytes, but not lipoperoxidation, increased after six sessions of HVLA manipulation treatment in men with neck pain. The results support the beneficial role of HVLA in the treatment of patients with neck pain.

Brain Stem Compression and Atlantoaxial Instability Secondary to Chronic Rheumatoid Arthritis

Eve Bonic, DC, Christopher Stockwell, DC, Norman Kettner, DC

Objective: This case study describes a patient with long-standing rheumatoid arthritis of the cervical spine who presented with significant bone destruction, gross joint derangement, and a potentially life-threatening complication, basilar invagination with brain stem compression. The pathophysiology, clinical presentation, imaging, and surgical management are discussed.

Clinical Features: A 67-year-old female presented to a chiropractic clinic with chronic neck pain of 30 years duration complicated by rheumatoid arthritis. Her neck pain had recently exacerbated and was radiating into her trapezius muscle and shoulders. She also reported a recent onset of mild dysphagia. The patient was referred to a neurosurgeon for consultation and management.

Intervention and Outcome: Computed tomography and magnetic resonance imaging of the cervical spine demonstrated significant bone destruction, gross joint derangement, and basilar invagination. There was moderate stenosis of the foramen magnum secondary to basilar invagination with significant brain stem compression. The patient underwent surgical stabilization fusion from the occiput to T2 using a posterior approach. Her pain severity was lessened after surgery, and the

dysphagia had not progressed, suggesting stabilization of brain stem compression.

Conclusion: Patients with long-standing rheumatoid arthritis of the cervical spine often present with chronic neck pain. Cervical spine instability may arise from rheumatoid osteolysis and is also secondary to horizontal or vertical subluxation of the atlantoaxial and occipitoatlantal regions, respectively. High-velocity, low-amplitude manipulation of the upper cervical spine is an absolute contraindication in cases of atlantoaxial instability. A timely diagnosis and favorable surgical outcome provided relief from a potentially life-threatening disorder. This case exemplifies the clinical caution necessary for managing patients with chronic cervical spine pain complicated by rheumatoid arthritis.

JMPT abstracts appear in *DC* with permission from the journal. Due to space restrictions, we cannot always print all abstracts from a given issue. Visit www.journals.elsevierhealth.com/periodicals/ymmt for access to the complete May 2010 issue of *JMPT*.

JULY 2010