

The Somatic Connection

“The Somatic Connection” highlights and summarizes important contributions to the growing body of literature on the musculoskeletal system’s role in health and disease. This section of *The Journal of the American Osteopathic Association (JAOA)* strives to chronicle the significant increase in published research on manipulative methods and treatments in the United States and the renewed interest in manual medicine internationally, especially in Europe.

To submit scientific reports for possible inclusion in “The Somatic Connection,” readers are encouraged to contact JAOA Associate Editor Michael A. Seffinger, DO (mseffingerdo@osteopathic.org), or JAOA Editorial Advisory Board Member Hollis H. King, DO, PhD (hhking@ucsd.edu).

Myofascial Trigger Point Release Massage Therapy Relieves Tension-Type Headaches

Moraska AF, Stenerson L, Butryn N, Krutsch JP, Schmiege SJ, Mann JD. Myofascial trigger point-focused head and neck massage for recurrent tension-type headache: a randomized, placebo-controlled clinical trial. *Clin J Pain*. 2015;31(2):159-168. doi:10.1097/AJP.0000000000000091.

As a result of the high prevalence of tension-type headache (TTH) and adverse effects from analgesic pharmaceutical treatment, there is interest in non-pharmacologic treatment options. Researchers in the United States have examined one of these options, focusing on the efficacy of using trigger point release (TPR) massage therapy on myofascial trigger points (MTrPs) to decrease headache pain.

This randomized placebo-controlled trial included 56 participants with TTH. Outcomes were measured during the 4 weeks before treatment, 6 weeks of treatment, and 4 weeks after treatment cessation. Participants were divided into a massage (n=17), placebo (n=19), or wait-list (n=20) group. Those in the massage group received a standardized treatment, which included TPRs aimed at the MTrPs in the sternocleidomastoids, suboccipital, and upper trapezius muscles. The massages were administered by massage therapists

who had previous experience in MTrPs identification and had completed training sessions to ensure treatment standardization. Detuned ultrasonography was used in the placebo group. The wait-list group received no treatments but was involved in all outcomes measured. Six participants withdrew from the trial.

Headache diaries, maintained by all participants, showed that compared with baseline, a significant decrease in headache frequency occurred for the massage ($P=.0003$) and placebo ($P=.013$) groups. However, the diaries revealed no significant differences in the groups regarding headache duration, headache intensity, or medication use. Headache Disability Inventory scores showed a significant decrease in the massage group ($P=.0003$). However, both the massage ($P=.0002$) and placebo ($P=.011$) groups showed significant decreases in Headache Impact Test scores. After the treatment portion of the study, 84.7% of the massage, 50% of the placebo, and 0% of the wait-list groups reported improvements ($P<.001$). Pressure-pain thresholds were assessed bilaterally in the muscles massaged and were found to have significant improvements in the massage group ($P<.002$ for all outcomes).

Although the exact cause of TTH is still unknown, this study suggests that MTrPs are a

contributing factor in headache pain and supports the use of TPR massage therapy to treat patients with TTH. (doi:10.7556/jaoa.2016.009)

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Spinal Manipulation Unable to Demonstrate Improved Sensorimotor Function

Goertz CM, Xia T, Long CR, et al. Effects of spinal manipulation on sensorimotor function in low back pain patients—a randomized controlled trial [published online August 8, 2015]. *Manual Ther.* In press. doi:10.1016/j.math.2015.08.001.

Osteopathic manipulative treatment has been shown to improve balance in patients with vertigo.¹ Researchers at the Palmer Institute in Des Moines, Iowa, conducted a randomized clinical trial to assess whether chiropractic spinal manipulation improves balance control as an outcome measure for sensorimotor functioning in patients with low back pain.

Researchers randomly allocated 221 participants between the ages of 21 to 65 years (120 men, 101 women; mean age, 44 years) with low back pain that was either acute (<4 weeks), subacute (4-12 weeks), or chronic (>12 weeks) to 1 (n=73) of 3 groups, which were identified by different spinal manipulation techniques. For 4 visits during a 2-week period, participants received high-velocity, low-amplitude (HVLA) spinal manipulation; low-velocity, variable-amplitude spinal manipulation; or a control protocol involving light effleurage and mechanically-assisted sham therapy. Before and after the first visit and at 2 weeks, 2 sensorimotor function tests were conducted: (1) postural sway

test, which assessed balance control of the participant during his or her natural stance, and (2) sudden load test, which assessed response time of erector spinae musculature to the dropping of a 1.6 kg load that disturbed the participant's balance.

Fit analysis of covariance models demonstrated that there was no difference between HVLA and sham control (hard surface sway: adjusted mean, 0.09; 95% CI, -0.06, 0.23; soft surface sway: adjusted mean, 0.35; 95% CI, -0.03, 0.73). There were no between-group differences on balance control for any of the interventions.

The authors conclude that there were no significant changes in sensorimotor functions after chiropractic spinal manipulation in patients with mild to moderate LBP. However, because it had been previously noted that postural sway may not be affected after short-term treatment,² the authors concluded that a longer treatment period is necessary. Additionally, further research regarding the efficacy of osteopathic manipulative treatment in managing sensorimotor dysfunctions in patients with somatic dysfunction and low back pain should be conducted. (doi:10.7556/jaoa.2016.010)

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Using Osteopathic Manipulative Therapy to Influence Autonomic Nervous System Activity

Ruffini N, D'Alessandro G, Mariani N, Pollastrelli A, Cardinali L, Cerritelli F. Variations of high frequency parameter of heart rate variability following osteopathic manipulative treatment in healthy subjects compared to control group and sham therapy: randomized control trial. *Front Neurosci.* 2015;9:272. doi:10.3389/fnins.2015.00272.

The relationship between manipulative techniques and heart rate variability (HRV) as a measure of autonomic nervous system balance has been reported in the literature.¹⁻⁴ Researchers in Italy conducted a pragmatic, randomized, single-blinded, placebo-controlled crossover study to further examine the effects of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) on HRV.

Sixty-six participants (mean [SD] age, 26.7 [8.4] years; mean [SD] body mass index, 18.5 [4.8]) were randomly allocated to 1 of 3 groups. Groups A and B received both OMTh and sham therapy at different times. Group C was the control group, with no therapy administered. Exclusion criteria included pregnancy, menopause, menstruation during the session, chronic pain, pathologic condition, alcohol use in the past 48 hours, medication or drug use in the past 72 hours, use of orthotics within the past 3 months, surgical interventions, and OMTh in the past 3 months.

Each group was subjected to two 25-minute sessions. Four osteopaths, who were blinded to the study design and outcome data, administered OMTh. Therapy was based on patient evaluation and was limited to balanced ligamentous tension, balanced membranous tension, and craniosacral techniques. Heart rate variability was measured using electrocardiography before, during, and after treatment. Primary outcome measures included HRV as high frequency (HF) expressed in normalized units ($_{nu}$ HF), an indirect measurement of the parasympathetic activity. Secondary outcome measures included low frequency (LF) in absolute units ($_{au}$ LF), LF/HF ratio, detrended fluctuation scaling exponent (DFA α 1), and

$_{au}$ HF. Detrended fluctuation analysis, a statistical method for nonlinear analysis, is a more sensitive measurement of parasympathetic activity.⁵

The OMTh group had a statistically significant increase in $_{nu}$ HF values compared with the sham group ($P<.01$) and the control group ($P<.001$), whereas sham therapy did not show any significant change in $_{nu}$ HF compared with the control group ($P=.44$). Both $_{au}$ LF and LF/HF ratio were significantly decreased in the OMTh group compared with the sham ($P<.05$ and $P<.001$, respectively) and the control ($P<.001$ for both outcomes) groups; OMTh also showed a reduction of DFA α 1 ($P<.05$).

The findings suggest that OMTh influences the autonomic nervous system by increasing parasympathetic activity and decreasing sympathetic activity. Using a pragmatic protocol improves external validity. However, the mechanisms by which OMTh causes these effects is still unknown. (doi:10.7556/jaoa.2016.011)

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Muscle Energy Technique Improves Chronic Lateral Epicondylitis

Küçükşen S, Yılmaz H, Sallı A, Uğurlu H. Muscle energy technique versus corticosteroid injection for management of chronic lateral epicondylitis: randomized controlled trial with 1-year follow-up. *Arch Phys Med Rehabil*. 2013;94(11):2068-2074.

Lateral epicondylitis (LE) is the most commonly diagnosed elbow condition, affecting an estimated 1% to 3% of the population.¹ Proposed treatments are numerous; however, multiple reviews have revealed insufficient evidence to determine which modalities are most effective.²⁻⁶ Researchers from Turkey investigated the efficacy of muscle energy techniques (MET) compared with corticosteroid injections (CSI) for the management of chronic LE.

Eighty-two participants with chronic LE, as determined by an allopathic physiatrist, were randomly allocated to the MET group (n=41; 23 women; mean [SD] age, 46.17 [7.56] years) or CSI group (n=41; 22 women; mean [SD] age, 43.78 [9.16] years). Inclusion criteria included tenderness over or near the lateral epicondyle, pain elicited with at least 2 of 3 pain provocation tests, unilateral pain lasting more than 3 months, and pain greater than or equal to 50 mm on a 100-mm visual analog scale. Patients were excluded if they were surgically treated for elbow complaints, received physical therapy or CSI in the past 6 months, had bilateral elbow symptoms, or had elbow pain for less than 3 months.

Participants in the MET group received MET twice per week for 4 consecutive weeks from another physiatrist. Participants in the CSI group were injected with 1 mL of triamcinolone acetone (4 mg/mL) plus 1 mL of 1% lidocaine (10 mg/mL), 1 cm distally from the lateral epicondyle.

Patients were assessed with 3 standard outcome measures at baseline, 6, 26, and 52 weeks. Compared with baseline scores, mean pain-free grip strength scores in the MET group were significantly lower than the CSI group at 6 weeks

($P=.005$) but higher at 52 weeks ($P=.007$). Mean pain scale scores were significantly higher in the MET group than the CSI group at 6 weeks ($P=.004$) but were significantly lower at 26 and 52 weeks ($P=.016$ and $P=.01$, respectively). There were no statistically significant differences between the groups in their Disabilities of the Arm, Shoulder, and Hand (DASH) self-reported questionnaire scores.

Overall, both MET and CSI improved the strength, pain, and functional status of patients with LE. As a short-term therapeutic option, CSI may be used to reduce pain and return strength. However, MET may be a superior modality in the management of chronic LE. (doi:10.7556/jaoa.2016.012)

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Three reviews in this edition of “*The Somatic Connection*” (see items titled “*As the Twig is Bent, so Grows the Tree*”) describe the notable progress in research related to osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) in pediatrics. These studies were highlighted in the First Global Congress on Pediatric Osteopathy in September 2015 in Montreal, Canada. In his presentation at the Congress, Francesco Cerritelli, MsC, DO, announced that because of the recent randomized controlled studies, a systematic review and meta-analysis had been conducted and submitted for publication. According to Cerritelli, the analysis showed benefit of OMTh in the neonatal population.

The studies reviewed herein add to the growing literature on osteopathic manipulative treatment (OMT) and OMTh in neonatal conditions. Lund et al¹ showed OMT benefit in premature infants with nipple feeding dysfunction. Improvement in plagiocephaly has been shown,² as well as in postural asymmetry³ and otitis media.^{4,5} Preceding the Pizzolorusso et al and Cerritelli et al studies reviewed in this edition of “*The Somatic Connection*” were 3 studies⁶⁻⁸ that set the stage for the Cerritelli systematic review.

I am gratified to see the evidence base for pediatric osteopathy come to the fore in such strong fashion, and I am pleased to bring this research to the attention of US-trained osteopathic physicians.

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As the Twig Is Bent, so Grows the Tree—Part 5: In a Single Hospital, OMTh Shortens Length of Stay in the Neonatal Intensive Care Unit

Pizzolorusso G, Cerritelli F, Accorsi A, et al. The effect of optimally timed osteopathic manipulative treatment on length of hospital stay in moderate and late preterm infants: results from a RCT. *Evid Based Complement Alternat Med*. 2014;2014:243539. doi:10.1155/2014/243539.

Italian osteopathic researchers carried out a controlled trial evaluating the effect of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) on premature infants in a neonatal intensive care unit (NICU) in central Italy. One hundred ten infants aged 32 to 37 weeks gestation were randomly assigned to the study or control group. Exclusion criteria included first OMTh applied after 14 days from birth; “genetic/congenital disorders; cardiovascular abnormalities; proven or suspected necrotized enterocolitis with or

without gastrointestinal perforation; proven or suspected abdominal obstruction; pneumoperitoneum;... or drug addicted mother.”

The study group received standard pediatric care plus 2 OMTh sessions per week for the total time in hospital. Each OMTh session was 20 minutes and used indirect myofascial release, balanced ligamentous tension, and balanced membrane tension to normalize dysfunctions of the cranium. The control group received standard pediatric care and 2 osteopathic structural evaluations per week. The evaluation took 10 minutes, then the osteopath stood in front of the incubator or open crib for 10 minutes “to further assist in blinding the ancillary NICU staff.” There were no dropouts during the trial, and no adverse events were recorded.

Both groups were well matched on all neonatal and maternal characteristics. The primary outcome of hospital length of stay (LOS) analyzed by univariate analysis showed mean (SD) LOS as 14.4 (3.6) days for infants in the study group and 17.0 (8.7) for those in the control group ($P<.01$). Also of significance was a linear regression model evaluating the time frame in which OMTh was initiated: 0 to 4 days, 0 to 9 days, or 0 to 14 days. The earlier the OMTh was started, the shorter the LOS ($P<.001$).

Also evaluated were the relative costs of preterm infant care. Although the actual costs between study and control patients were not significant for the patients in this study, ordinary least square regression taking into account all the relevant variables showed that OMTh produced a significant cost saving of €740 per newborn ($P=.01$).

The authors noted the limitations, which were that these data are from 1 hospital and thus may have limited generalizability and that the cost estimates are theoretical. However, this was a well-designed study and is a useful contribution to the research literature. (doi:10.7556/jaoa.2016.013)

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As the Twig Is Bent, so Grows the Tree—Part 6: In a Multicenter Study, OMTh Shortens Length of Stay in the Neonatal Intensive Care Unit

Cerritelli F, Pizzolorusso G, Renzetti C, et al.

A multicenter, randomized trial of osteopathic manipulative treatment on preterms. *PLoS ONE*.

2015;10(5):e0127370. doi:10.1371/journal.pone.0127370.

Expanding on previous published studies on the effect of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) on preterm infants in the neonatal intensive care unit (NICU),¹⁻³ Italian researchers replicated these previous studies in a 3-site multicenter study. A total of 695 newborns were randomly assigned to the study group (n=352) or control group (n=343). Inclusion criteria were gestational age between 29 and 37 weeks without congenital complications. Exclusion criteria included lack of parental consent; any genetic disorder; neoplasms; neurologic, cardiovascular, urinary, or hematologic abnormalities; proven or suspected necrotized enterocolitis or abdominal obstruction; birth trauma; operation; pneumoperitoneum; atelectasis; HIV; newborn from an HIV-seropositive or drug-addicted mother; and transfer status to or from another hospital.

The study group received standard pediatric care plus 2 OMTh sessions per week for the total time in the hospital. Each OMTh session was 30 minutes: 10 minutes for evaluation and 20 minutes for treatment. Myofascial release, balanced ligamentous tension, and balanced membrane tension were used. The control group received standard pediatric care and 2 osteopathic structural evaluations per week. The evaluation took 10 minutes, and then the osteopath stood in front of the incubator for 20 minutes with his or her hands near but not touching the infant “to maintain blinding of the NICU personnel.” There were no perinatal deaths in either group, and no adverse events were recorded.

The primary outcome of mean (SD) hospital length of stay (LOS) was 13.8 (8.1) days for the study group and 17.5 (14.5) days for the control group ($P < .001$). Gestational age was associated with LOS ($P < .001$), as was birth weight ($P = .02$). The cost per newborn was €6277.28 for the study group and €7863.29 for the control group, which was a significant difference ($P < .001$).

As a multicenter study, these data are strong and confirm previous findings of the benefit of OMTh in the NICU. This study should be replicated in the United States. (doi:10.7556/jaoa.2016.014)

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As the Twig Is Bent, so Grows the Tree—Part 7: Severe Temporal Bone Restriction in Children Is Risk Factor for Acute Otitis Media

Morin C, Dorion D, Moutquin J, Levasseur M. Suture restriction of the temporal bone as a risk factor for acute otitis media in children: cohort study. *BMC Pediatr*. 2012;12:181. doi:10.1186/1471-2431-12-181.

Canadian osteopathic researchers carried out a prospective cohort study of 64 infants (128 ears) aged 6 to 18 months assessing whether temporal bone suture restriction was a risk factor for the development of acute otitis media (AOM).

The children were recruited from community-based recreational organizations. Inclusion criteria were no previous episodes of AOM and exclusion criteria were congenital anomalies like cleft palate or Down syndrome and any hearing problems.

Temporal bone status was assessed by Canadian osteopaths using visual observation to identify obvious displacement between temporal squamous and petrous parts and suture overlapping and manual examination of each temporal bone. Each temporal bone was assessed for mobility of cranial concept for external and internal rotation, and severe restrictions were noted. Interrater reliability was 0.58 for right and 0.71 for left temporal bones. No osteopathic intervention was applied.

The outcome measure was the diagnosis of AOM by a physician. All children who received an AOM diagnosis received standard care. Documentation of AOM was completed by a research assistant using telephone interviews with parents every 2 months. Physicians, parents, and the research assistant were blinded to temporal bone status.

Severe temporal bone restriction was identified in 23 children (35.9%). Of these 23 children, 14 (43.3%) had at least 1 episode of AOM. Twenty-eight (28.3%) of those without severe temporal bone restriction had an episode of AOM. Higher risk of AOM was associated with restricted temporal sutures ($P < .01$), pacifier use ($P < .01$), and younger age ($P = .001$).

Strengths of this study included the population-based longitudinal prospective design, rigor of the documentation of the health status of the children, and occurrence of only 1 subject dropout. The authors acknowledge that because the families recruited for the study knew the nature of the concern for AOM, parents may have sought AOM consultation, which they may not have otherwise done. (doi:10.7556/jaoa.2016.015)

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