

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).

2b or not 2b: The State of the Evidence for Myofascial Release

Ajimsha MS, Al-Mudahka NR, Al-Madzhar JA. Effectiveness of myofascial release: systematic review of randomized controlled trials [published online June 13, 2014]. *J Bodyw Mov Ther*. 2015;19(1):102-112. doi:10.1016/j.jbmt.2014.06.001.

Andrew Taylor Still, MD, DO, first described myofascial release (MFR) in his teachings and writings at the turn of the 19th century. This manual manipulative treatment was further defined and popularized at colleges of osteopathic medicine and in postgraduate courses by Robert C. Ward, DO, and Anthony G. Chila, DO, in the 1970s through the turn of the 21st century. Physical therapists adapted MFR approaches in the 1980s and conducted a series of randomized controlled trials (RCTs) to determine its effectiveness.

The systematic review by Ajimsha and colleagues assessed the quality, results, and limitations of 19 RCTs found in a multidatabase literature search of peer-reviewed articles in the English language. Analysis was completed using the Physiotherapy Evidence Database scale and the Centre for Evidence-Based Medicine’s Levels of Evidence scale to rate the articles. The 19 RCTs assessed a total of 1228 patients, with the sample sizes varying from 10 to 200 with a mean (SD) of 65 (44) patients. Of 19 RCTs, 2 were of moderate methodologic

quality, and 17 were of high methodologic quality. In many of these trials, the MFR treatment was adjunctive to other treatments, and the potential specific MFR effect could not be determined.

In the reviewed study, MFR was demonstrated to be equal to or more effective than sham, conventional, and no treatment for various musculoskeletal and painful conditions. Of 19 studies, 14 were determined to be category 2b evidence (ie, small sample size and no long-term follow-up), with the other 5 as category 1b (ie, none achieved the highest level of 1a).

The authors concluded that “MFR may be useful as either a unique therapy or as an adjunct therapy to other established therapies for a variety of conditions like subacute low back pain, fibromyalgia, lateral epicondylitis, plantar fasciitis, headache, fatigue in breast cancer, pelvic rotation, hamstring tightness, etc.” I have used MFR, along with other osteopathic manipulative treatment, in patient care for the past 30 years to improve blood flow, lymph drainage, respiration, nerve function, efficiency of posture and motion, and relaxation. In my experience, MFR is effective, and more rigorous research and larger RCTs are warranted. (doi:10.7556/jaoa.2015.125)

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Lymphatic Vessels Found in the Brain—Osteopathic Considerations

Aspelund A, Antila S, Proulx ST, et al. A dural lymphatic vascular system that drains brain interstitial fluid and macromolecules [published online June 15, 2015]. *J Exp Med*. 2015;212(7):991-999. doi:10.1084/jem.20142290.

Louveau A, Smirnov I, Keyes TJ, et al. Structural and functional features of central nervous system lymphatic vessels [published online June 1, 2015]. *Nature*. 2015;523(7560):337-341. doi:10.1038/nature14432.

In previous editions of *The Somatic Connection*,^{1,2} we have reviewed basic science research illuminating osteopathic medical practice, particularly brain functions potentially affected by osteopathic manipulative treatment (OMT). In the October 2012 column,¹ research on cerebrospinal fluid (CSF) drainage into the venous drainage system, now popularly termed the *glymphatic system*, was reviewed. The May 2014 column² reviewed research elaborating how glymphatic system activity is enhanced during sleep and facilitates the cleansing of the brain. These reviews suggest the possible application of osteopathic cranial manipulative medicine procedures as possibly having effects on CSF functions.

Researchers at both the University of Virginia in Charleston and the University of Helsinki in Finland independently and concurrently found lymphatic vessels in the brain, which reverses decades-long basic science opinion that the brain was devoid of any lymphatics. These discoveries bring the lymphatic system into the same conversation as CSF with regard to intracranial fluid flow dynamics.

Both studies used lymphatic endothelial cell markers to identify lymphatic vessels in the dural membranes in and around the brain. Previous research found that CSF drained into the venous circulation through arachnoid granulations,^{3,4} and another study⁵ found that CSF is also drained into extracranial lymphatic and lymph nodes. However, the mechanism of how CSF entered the extracranial lymphatic vessel and nodes was unclear. The reviewed studies offer a clear expla-

nation as to how CSF enters the lymphatic system and how cerebral interstitial fluid is cleared of waste products. Experts previously thought that the blood-brain barrier would limit clearance macromolecules such as amyloid β and other waste products of cellular metabolism. Both studies suggest that the adjacent dural lymphatic network may be the mechanism for clearance of these larger molecules, some of which have been associated with Alzheimer disease.

Although there is still a need to demonstrate the impact of OMT on intracranial fluid dynamics, the scientific basis for the impact of OMT, including osteopathic cranial manipulative medicine, has now been laid out. Such OMT procedures as anterior cervical lymphatic drainage facilitation could affect intracranial fluid dynamics based on these new data. If we add in the immune system impact via the cranial lymphatic flow, brain-immune system interaction should also be examined. (doi:10.7556/jaoa.2015.126)

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Osteopathic Manipulative Therapy Efficacious for Patients With Chronic Migraines

Cerritelli F, Ginevri L, Messi G, et al. Clinical effectiveness of osteopathic treatment in chronic migraine: 3-armed randomized controlled trial [published online January 21, 2015]. *Complement Ther Med*. 2015;23(2):149-156. doi:10.1016/j.ctim.2015.01.011.

In 2011, The Somatic Connection reported on a German clinical trial using osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) for patients with migraines.¹ At the time the study was published, researchers recommended several possible next steps, including adding a sham intervention group and increasing the cohort size. This year, foreign-trained osteopaths who graduated from the Accademia Italiana Osteopatia Tradizionale in Pescara, Italy, in collaboration with local hospitals in Italy, reported on the largest randomized controlled trial of OMTh or sham therapy to treat patients with chronic migraines.

In the reviewed study, 105 participants who had never undergone OMTh (36 men, 69 women, aged 18 to 60 years) were blindly sorted into 3 groups: (1) OMTh group: OMTh and medication (mean [SD] age; 36.9 [9.3] years); (2) sham group: sham therapy and medication (40.7 [8.7] years); and (3) control group: medication alone (38.4 [9.9] years). During a 6-month period, participants received either 8 OMTh or sham therapy sessions, depending on their group. The OMTh group received myofascial release, balanced ligamentous tension or balanced membranous tension, and craniaosacral therapy based on findings from osteopathic assessments. Sham therapy consisted of osteopathic examination and light manual contact. The primary outcome was measured by the Headache Impact Test, which is used to rate the impact of headaches on a participant's daytime activities, taken at baseline and at 24 weeks.

Results showed a statistically significant reduction in Headache Impact Test scores between the OMTh group compared with both the control (−8.40, −11.94, −4.86; $P < .001$) and sham therapy (−4.83, −8.36, −1.29; $P < .001$) groups. The sham

therapy group did not demonstrate a statistically significant difference vs control. In addition, OMTh was effective compared with the sham therapy and control groups using several secondary outcome measures. No adverse effects were reported. The researchers provided both the OMTh and sham therapy interventions; however, participants who received the sham therapy were blinded to group allocation.

Osteopathic manipulative therapy is effective at reducing symptoms and recurrence of migraines, in addition to reducing the amount of medication needed for patients to control symptoms. The researchers concluded that adjunct OMTh notably improved the quality of life of patients with migraines. This is the largest, most rigorous study completed to our knowledge and is important because the authors were able to replicate results of past studies. This study not only provides evidence on its own, but it also lends further credibility to the earlier work. (doi:10.7556/jaoa.2015.127)

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Ultrasound Measurement of Vertebral Artery Blood Flow Before and After High-Velocity, Low-Amplitude Thrust Therapy

Erhardt JW, Windsor BA, Kerry R, et al. The immediate effect of atlanto-axial high velocity thrust techniques on blood flow in the vertebral artery: a randomized controlled trial [published online March 2, 2015]. *Manual Ther*. 2015;20(4):614-622. doi:10.1016/j.math.2015.02.008.

Relevant to concerns about the safety of cervical spine manipulation, physical therapy researchers conducted a single-blind randomized controlled trial

on 23 healthy participants aged 27 to 69 years. In this study, 14 women and 9 men were randomly assigned to an intervention group (n=11) or a control group (n=12). Exclusion criteria were a history of known vertebral artery anomalies; hypoplasia or previous injury; undiagnosed dizziness; hypertension ($\geq 140/90$ mm Hg); head or neck trauma within the past 6 weeks; known upper or midcervical instability; recent cervical spine high-velocity, low-amplitude therapy; previous cervical spine surgery or cerebrovascular events of any kind; pregnancy; use of systemic steroids or anticoagulants; cancer; Down syndrome; Klippel-Feil syndrome; Erlos-Danlos syndrome; or if the atlantoaxial section of the vertebral artery could not be visualized on ultrasound.

The outcome measures were assessed with color flow Doppler ultrasound. The measures were hemodynamic markers of peak systolic velocity and end diastolic velocity (EDV). Secondary measures were mean velocity and a resistance index. The ultrasound transducer was held in place over the C1-C2 area throughout the procedure on all participants at 60° or less to ensure accurate measures.

The manipulation for the intervention group was to the atlantoaxial joint. The operator placed a finger over the posterior-superior aspect of the transverse process of C1 and thrust in an anterior-inferior-medial direction to the left and then returned the head to neutral. In the control group, the same setup was followed except that no thrust was applied and with the starting position held momentarily and then the head was repositioned to neutral. This description of the intervention is similar to high-velocity, low-amplitude procedures.

The continuously measured hemodynamic markers showed no statistical difference within or between the intervention and control groups on all the measures (ie, peak systolic velocity, EDV, mean velocity, and resistance index) ($P < .01$). Two markers, EDV and resistance index, at the prethrust point were statistically significant ($P < .05$). However, this finding was not hemodynamically notable

because the change was less than 25%, the cutoff for clinical relevancy.

The authors conclude that this finding adds to the building evidence for the safety of cervical spine manipulation with regard to vertebral artery derangement. As a contributor in the past decade to the American Osteopathic Association's efforts to evaluate the safety and efficacy of cervical manipulation, I believe the safety issue is well established. (doi:10.7556/jaoa.2015.128)

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Osteopathic Manipulative Therapy Shows Promise for Improving Postdiscectomy Recovery

Kim BJ, Ahn J, Cho H, Kim D, Kim T, Yoon B. Rehabilitation with osteopathic manipulative treatment after lumbar disc surgery: a randomized, controlled pilot study. *Int J Osteopath Med*. In press. doi:10.1016/j.ijosm.2014.11.003.

Lumbar discectomy is a common treatment for patients with low back pain because it can help reduce physical disability and relieve nerve root pain compared with other nonoperative treatments.^{1,2} However, many patients report continued physical disability and low back and leg pain after surgery. An interdisciplinary team of surgeons and a British-trained osteopath in South Korea published a prospective randomized controlled pilot trial to determine the feasibility and potential benefit of using osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) as an integral component of a postdiscectomy rehabilitation program.

Inclusion criteria were patients aged 20 to 65 years who underwent lumbar microdiscectomy to manage low back pain and who experienced leg pain resulting from a herniated disk. The exclusion criteria were revision or combined surgery, pregnancy, metastatic disease, or mental disorder.

Thirty-three participants were randomly allocated to either the OMTh group (n=16) or the exercise program group (n=17). Two to 3 weeks after the patients underwent lumbar microdiscectomy, they returned to the hospital for their first rehabilitation session. Both interventions consisted of eight 30-minute sessions performed twice per week for 4 weeks. All patients were prescribed anti-inflammatory medication, analgesics, and muscle relaxants by the surgeons. The OMTh intervention was performed by 2 foreign-trained osteopathic students supervised by a British-trained osteopath. This group received a standardized OMTh protocol including soft tissue, myofascial release, muscle energy, progressive inhibition of neuromuscular structures, osteopathic cranial manipulative medicine, and rib raising techniques. The exercise group also followed a protocol focused on stretching, strengthening, and Pilates exercises.

Outcome measures were assessed at baseline (2-3 weeks after surgery) and a week after the final rehabilitation session (7-8 weeks after surgery) using the Roland-Morris Disability Questionnaire and a visual analog scale. Postsurgical physical disability improvement was statistically significant in the OMTh rehabilitation group at 54% vs 26% in the exercise group ($P < .05$). Residual leg pain decreased by 53% in the OMTh group and 17% in the exercise group ($P > .05$), and residual low back pain decreased by 37% in the OMTh group and 10% in the exercise group ($P > .05$). In addition, patients required less frequent use of medications in the OMTh group ($P > .05$).

The authors concluded that OMTh as a postsurgical rehabilitation intervention after lumbar microdiscectomy is a feasible and potentially beneficial approach for improving physical function and residual back and leg pain, decreasing the frequent use of medications, and leading to overall patient satisfaction. A larger, randomized controlled trial using sham therapy is warranted. The use of OMTh as a postsurgical rehabilitation inter-

vention after knee and hip arthroplasty has been shown to be a feasible approach for improving postoperative care.^{3,4} This study further supports its utility as an adjunct therapy and a potential standardized protocol for postsurgical rehabilitation. (doi:10.7556/jaoa.2015.129)

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Bodywork Shown to Reduce the Symptoms of Chronic Constipation and Improve Quality of Life

Gürsen C, Kerem Günel M, Kaya S, Kav T, Akbayrak T. Effects of connective tissue manipulation on symptoms and quality of life in patients with chronic constipation: a randomized controlled trial [published online June 20, 2015]. *J Manipulative Physiol Ther*. 2015;38(5):335-343. doi:10.1016/j.jmpt.2015.06.003.

Turkish physical therapy researchers used a bodywork modality called connective tissue manipulation (CTM) in a randomized controlled trial on patients with chronic constipation. Researchers used Rome III criteria for chronic constipation to identify 50 patients and randomly assign them to the intervention group (n=25) or to the control group

(n=25). Patients in the intervention group received CTM and lifestyle advice (eg, increase fiber and water intake, increase exercise, take as necessary laxative and stool softeners), and patients in the control group received lifestyle advice. The Rome III criteria include at least 2 of 6 symptoms, such as having 3 or fewer bowel movements per week, straining during at least 25% of bowel movements, passing lumpy and hard stool in at least 25% of bowel movements, and experiencing incomplete evacuation at least 25% of the time.

Exclusion criteria were comorbid neurologic, anatomic, or metabolic condition; pregnancy; mental problems; history of colostomy surgery; history of gastrointestinal, spinal, or pelvic surgery except cholecystectomy, appendectomy or hysterectomy; history of bowel obstruction, perforation, or bleeding; or intestinal cancer.

The CTM protocol was based on the work of Holey¹ and was applied 5 days per week for 4 weeks by the same physiotherapist. The physiotherapist applied CTM to patients in a sitting position with cross-tissue engagement across prescribed areas of the sacrum, axial skeleton, ribs, and scapulae. To my knowledge, this CTM protocol is similar to deep tissue myofascial release and patissage. According to Holey,¹ this protocol addresses important reflex areas roughly equivalent to somatovisceral interactions as formulated by Korr.² Gürsen and colleagues reported that CTM potentially reduces sympathetic activity and increases parasympathetic activity, which improves circulation, thus “promoting the healing process.”

The primary outcome was measured using the Constipation Severity Instrument, and secondary outcomes were measured using the Patient Assessment of Constipation Quality of Life Questionnaire and Bristol Stool Scale. At baseline, there were essentially no differences between the groups on demographics or outcome measures.

The results revealed statistically significant improvement for the intervention group in overall

Constipation Severity Instrument score ($P<.001$), less colonic inertia ($P=.002$), improved bowel movement frequency ($P=.002$), shorter bowel movement time ($P=.004$), Bristol Stool Scale softer stools ($P=.005$), and improvements in Patient Assessment of Constipation Quality of Life Questionnaire in all dimensions ($P<.001$). Limitations were no blinding and use of 1 physiotherapist.

This article shows the benefit of manual therapy for patients with a systemic disorder and confirms my clinical experience in treating patients with irritable bowel syndrome and constipation, which has also shown benefit for bowel functions. Also, the proposed mechanism of action, based on osteopathic theory, in all likelihood also accounts for the benefit of osteopathic manipulative treatment observed in patients with postoperative ileus.²⁻⁴ (doi:10.7556/jaoa.2015.130)

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