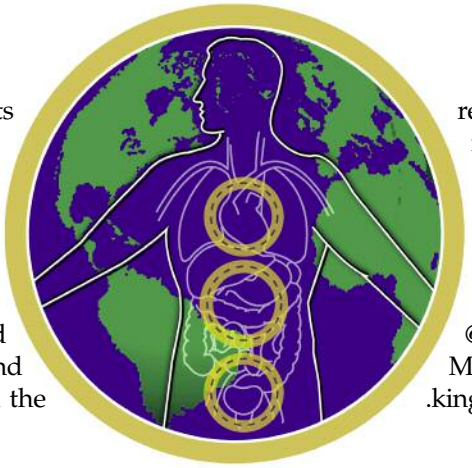
JAOA THE SOMATIC CONNECTION



"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 *JAOA—The Journal of the American Osteopathic Association* 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 (mseffinger@westernu.edu), or Editorial Board Member Hollis H. King, DO, PhD (hollis.king@fammed.wisc.edu).

Self-Treatment of Myofascial Trigger Points Relieves Chronic Pelvic Pain

Anderson R, Wise D, Sawyer T, Nathanson BH. Safety and effectiveness of an internal pelvic myofascial trigger point wand for urologic chronic pelvic pain syndrome. *Clin J Pain.* 2011;27(9):764-768.

Osteopathic physicians have used intrapelvic and intrarectal osteopathic manipulative treatment to relieve pelvic somatic dysfunction for more than a century. Physical therapists have reported using manual therapy such as myofascial release and inhibition of trigger points to treat chronic pain syndromes for at least half of a century; Janet G. Travell, MD, began teaching myofascial trigger point concepts to physical therapists in the 1950s, and osteopathic physicians at the Michigan State University College of Osteopathic Medicine have taught these procedures to physical therapists since the 1970s. Physical therapists have taught successive generations of physical therapists what they learned from these physician pioneers. More recently, physical therapists at Stanford University's urology department have reported success at relieving muscle-derived pelvic pain in patients with chronic pelvic pain by using these manual techniques. However, the large number of patients with chronic pelvic pain, the limited number of physical therapists available to apply the procedures, and the limited financial resources to pay for these manual services led the clinicians to devise a self-treatment protocol for patients. Using a plastic tool with a nitrile rubber tip, shaped like a finger, patients were able to apply sustained pressure to intrapelvic trigger points in the pelvic diaphragm muscles as an adjunct to self-massage, stretching exercises, and prescribed or over-the-counter medications for pain relief.

In the study, researchers assessed the efficacy and safety of this personal tool, called a *wand*, in reducing pelvic muscle tenderness. Patients were eligible for the study if they had chronic pelvic pain refractory to standard medical treatment and if they self-enrolled in a 6-day course on pelvic muscle relaxation and external massage and stretching exercises for the perineal region. Patients were excluded from the study if they had other pelvic pathology that could account for complaints of pain. Patients who were included in the study were educated about the relevant anatomy and were taught how to use the wand. More than 1000 participants were enrolled (n=1157) but only 113 (106 men and 7 women; median [range] age, 41 [32.5-52.5] years) completed the 6-month follow-up. The median number of trigger points palpated in each patient was 6 (range, 4-6.5). One hundred fifty-seven participants completed the 1-month follow-up of wand use; the 44 participants that withdrew before study completion stated various reasons, including preference for using their own finger, lack of pain relief from the tool, or the need to use the wand more than once weekly. Of note, no participants cited an adverse event as a reason for discontinuing use of the wand. Three participants reported self-limited minor bleeding caused by the tool but did not cease using it for that reason.

Participants used the wand at least once per week for 6 months. At 1 and 6 months of use, participants were evaluated for adverse events and assessments of pain sensitivity by intrapelvic physical examination. Almost all of the patients (95.5%) reported that the wand was either very or moderately effective in alleviating pain. No serious adverse events were reported. Baseline median (range) sensitivity to palpation using the 10-point visual analog scale was 7.5 (6-8.5), which decreased significantly at 6 months to 4 (2.5-5.5; $P<.001$). Almost all of the patients (93%) were at least moderately satisfied with using the wand.

Researchers concluded that their multimodal protocol using an internal pelvic therapeutic wand seems to be a safe, viable treatment option in select chronic pelvic pain patients with muscle-derived pain and intrapelvic

trigger points. This study had numerous limitations, including no placebo or control group, no monitoring or restriction of medication use, no disclosure of the use of complementary therapies, no comparison of manual therapy techniques applied by a physical therapist vs those applied by an osteopathic physician, and no cost analysis. In addition, it was unclear how long participants had experienced chronic pelvic pain and whether participants had previous surgical procedures, underlying pathology that may have been treated with medications, comorbidities, psychiatric problems, or personality (ie, fear avoidance) issues that could have factored into the perception of pain. There was also no accounting for the patients who dropped out of the study because of ineffective relief from the wand. Therefore, further studies are warranted to better understand the utility of this tool in clinical practice. —M.A.S., K.M.,* and D.J.Z.*

*Kate McCaffrey, DO, and David Joyce Zuniga, OMS III, are guest authors from the Western University of Health Sciences College of Osteopathic Medicine of the Pacific-Northwest in Lebanon, Oregon.

Empirical Measurement of the Effects of Myofascial Release in Cervical and Lumbar Regions

Tozzi P, Bongiorno D, Vitturini C. Fascial release effects on patients with nonspecific cervical or lumbar pain. *J Bodyw Mov Ther.* 2011;15:405-416.

In the world of manual medicine, the topic of fascia, including its anatomy, biomechanics, and treatment, seems to be growing by leaps and bounds; in the past 5 years, there have been 3 International Fascia Research Congresses, the successes of which have led to the formation of the Fascia Research Society. However, fascia has been a topic of concern in osteopathic medicine since the very formation of the profession. In *Philosophy and Mechanical Principles of Osteopathy*, Andrew Taylor Still, MD, DO, wrote, "I write at length of the universality of the fascia to impress the reader with the idea that this connecting substance must be free at all parts to receive and discharge all fluids, and eject all impurities. … A knowledge of the universal extent of the fascia is imperative, and is one of the greatest aids to the person who seeks the causes of disease."[1]

Research by Standley and colleagues[2,3] has shown potentially beneficial effects on human bibroblast cells from use of manual fascial techniques. In addition, a summary of osteopathic manipulative treatment approaches to fascia was published recently.[4] With this recent focus on fascia, osteopathic medical researchers and clinicians may be interested in the comprehensive review and focused research project on manual fascial techniques carried out by Italian researchers Tozzi and colleagues. Two of the researchers were Italian allopathic physicians who became osteopaths through additional education and practice similar to that delivered in US osteopathic medical training. An osteopath performed all assessments in the study.

The research project took place at the Centro di Ricerche Olistiche per la Medicina Osteopatica e Naturale in Rome, Italy. During a 1-year period, 356 patients who presented to the clinic with nonspecific neck pain (NP) and nonspecific low back pain (LBP) were screened. Inclusion criteria were age 18 to 60 years; complaint of nonspecific pain in the cervical or lumbar region, with or without associated neurologic symptoms, lasting at least 3 weeks and not more than 6 months; and magnetic resonance imaging or ultrasonography findings indicative of absence of inherited or acquired pathologies of the neck, spine, kidneys, or bladder. Exclusion criteria were pregnancy, use of physical or manual therapy, or use of analgesic or anti-inflammatory medication in the previous 72 hours. One hundred twenty patients were selected for the study and were randomly assigned to the following groups: 30, NP experimental; 30, LBP experimental; 30, NP sham-control; and 30, LBP sham-control.

A real-time ultrasonography video recording technology known as Dynamic Ultrasound Topographic Anatomy Evaluation (D.US.T.A.-E) was performed on each participant in the NP experimental and sham-control groups. Each participant lay in the supine position with his or her head in mild extension and right side-bending rotation. The participant's head rested on a comfortable table before and after the manual fascial techniques or sham treatments had been applied.

For participants in the LBP experimental group, lumbar D.US.T.A.-E was performed with participants supine. The probe was positioned on the right lateral aspect to assess movement of the superior pole of the kidney and the respective diaphragmatic crura at maximal inspiration and maximal expiration. The researchers aimed to measure the range of the kidney's supero-inferior sliding motion before and after forced respiration. The pelvic probe was positioned above the pubic symphysis to measure the distance between the neck of the bladder and the anterior vesical wall. The Short-Form McGill Pain Questionnaire was used to assess pain.

The NP experimental group received 6 minutes of intervention, including 2 minutes of myofascial release technique that consisted of low load, long duration stretching along the lines of fascial restriction, with one hand of the operator contacting the participant's sternum and the other hand on the participant's forehead for 2 minutes. Then, fascial unwinding was performed for 2 minutes according to the method presented by Robert C. Ward, DO.[5]

The LBP experimental group received 12 minutes of intervention, including 6 minutes of myofascial release and 6 minutes of fascial unwinding. Myofascial release technique was applied in 2 stages, first to stretch and release the

right and then left psoas major and the iliacus muscles and then to release the pelvic floor muscles with a global pelvic anterior/posterior contact. Fascial unwinding was applied to the area psoas muscle, kidney, and lumbar spine.

The sham-control NP and sham-control LBP groups received hand contact by an individual who did not have any knowledge of anatomy or manual therapy whatsoever. In the sham-control NP group, the operator rested his hands on the participant's neck for 3 minutes in each of the hand placements used in the experimental NP group for a total of 6 minutes to match the duration of contact in the experimental NP group. For the sham-control LBP group, the operator rested his hands on the participant's lumbar and lumbopelvic regions for 12 minutes to match the duration of contact used in the experimental LBP group.

All D.US.T.A.-E images were independently evaluated by medical doctors blinded to the groups with which the images corresponded. The evaluators were asked to rate changes in quality and quantity of fascial sliding motions as "none," "discrete," or "radical." The interexaminer reliability showed a highly significant correlation (r=0.915, P<.001). The results showed significantly more mobility changes in neck, kidney, and bladder structures for the experimental group with virtually no changes for the sham-control groups. The Short-Form McGill Pain Questionnaire results showed statistically significant improvement with the experimental groups, while questionnaire results for the control group showed no change.

These findings suggest that ultrasonography is a valid diagnostic tool for osteopathic manipulative treatment research and that myofascial procedures do appear to affect the position of internal organs affected by somatic structures to which they are attached. If the freer motion in the myofascial and visceral structures demonstrated in this study can ever be associated with the function of those structures, then A.T. Still's assertion regarding the freer motion "to receive and discharge all fluids, and eject all impurities"[1] would have empirical validation. —H.H.K.

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OMT and Obesity: A Timely Topic

Vismara L, Cimolin V, Menegoni F, et al. Osteopathic manipulative treatment in obese patients with chronic low back pain: a pilot study. *Man Ther*. 2012;17:451-455.

With frequent references in the popular media to the current epidemic in obesity, it is timely to describe research related to the application of osteopathic manipulative therapy (OMTh) to manage low pack pain in obese patients. Researchers at the Orthopaedic Rehabilitation Unit of the Istituto Auxologico Italiano in Piancavallo, Italy, used spinal angles, a visual analog scale (VAS), the Roland Morris Disability Questionnaire (RMDQ), and the Ostwestry Low Back Disability Questionnaire (OQ) as outcome measures in a pilot study with obese women as participants.

Twenty-one obese women (body mass index >30) were randomly assigned to 2 groups. The first group received ten 45-minute sessions of specific exercises (SE). The second group also received 10 sessions, which consisted of the same 45-minutes of SE plus OMTh (SE+OMTh). The OMTh was "targeted to the patient's clinical picture" and comprised high-velocity, low-amplitude thrust techniques to the thoracic spine, cranial OMTh techniques, and myofascial release techniques. Participants were selected if they complained of chronic low back pain of more than 6 months duration. Exclusion criteria were secondary low back pain, osteoporosis, osteoarthritis, or neurologic conditions that would preclude physical exercise; any cardiovascular conditions diagnosed by means of a treadmill stress test; and any respiratory or psychiatric conditions.

The kinematic data were obtained by a 6-camera optoelectronic motion analysis system, which had been used in previous studies[1,2] by these same researchers. Markers were placed on each participant to measure in the sagittal plane forward bending motion from S1 to T1, anterior pelvic tilt from the posterior superior iliac spine to the anterior superior iliac spine, lumbar movement from S1 to L1, and thoracic movement from L1 to T1. The kinematic, VAS, RMDQ, and OQ measures were taken at the beginning of the study and after the final SE and SE+OMTh sessions.

There were no differences between the SE and SE+OMTh groups for age and body mass index. Two participants did not complete all the sessions, resulting in 8 in the SE+OMTh group and 11 in the SE group for final analysis. The only statistically significant improvement for the kinematic analysis was seen in the SE+OMTh group for the thoracic range of motion from L1 to T1. Both groups showed statistically significant improvement in self-reported pain (VAS), functional ability (RMDQ), and reduced disability (OQ). However, the SE+OMTh group had substantially greater improvement in VAS, RMDQ, and OQ scores than the SE group.

The authors made comments that are typical for a pilot study; they stated that no generalizations could be made for

clinical practice and that larger clinical trials are needed. An interesting observation was made about the possible "placebo effect" of the SE+OMTh group caused by the increased time the patients had in contact with the OMTh intervention provider. In the authors' opinion, such an effect might have influenced the VAS, RMDQ, and OQ data, but it was unlikely to have affected the spinal mobility as assessed with the kinematic measures.

This study was selected for review because of the timely topic—obesity—and because of the technology used in the kinematic outcome measures, which may be of interest to other osteopathic researchers. The article's introduction provides a good discussion on the relationship between obesity and chronic low back pain, which may provide impetus for further research on this topic. Of note, the OMTh protocol was individualized according to each participant's apparent somatic dysfunction. This procedure raises a perennial question for manual therapy research: how is the protocol defined? I support a protocol like the one used by Vismara and colleagues. However, one must recognize that this type of protocol leaves such a study open to critical questions including "What did you actually do?" and "Can the study be replicated accurately?" At this point in the development of manual therapy research, it is better to proceed with a generally defined protocol that is provided by an experienced osteopathic physician or an osteopath, which was the case in this study. It is also worthy to note that cranial OMTh techniques were used along with the high-velocity, low-amplitude thrust and myofascial release techniques. This inclusion is suggestive of the efficacy of a broad-based manual therapy protocol and reminiscent of the protocol used in the study published in *JAOA—The Journal of the American Osteopathic Association* in 2011 that showed improvement in balance in healthy elderly patients who received osteopathic manipulative treatment.[1] —H.H.K.

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Myofascial Release Combined With Physical Therapy Improves Venous Blood Flow

Ramos-González E, Moreno-Lorenzo C, Matarán-Peñarrocha GA, Guisado-Barrilao R, Aguilar-Ferrándiz ME, Castro-Sánchez AM. Comparative study on the effectiveness of myofascial release manual therapy and physical therapy for venous insufficiency in postmenopausal women [published online ahead of print May 3, 2012]. *Complement Ther Med.* 2012;20(5):291-298.

Manual therapies, such as massage and pedal lymphatic pump, as well as passive motion machines and compressive stockings are used as standard therapies to reduce swelling in the lower extremities for patients with venous insufficiency. It is not known, however, what the effectiveness of combination therapies is for this condition. Researchers in Spain assessed the comparative effectiveness of myofascial release (MFR) therapy and physical therapy on venous insufficiency, pain, and quality of life in postmenopausal patients. Inclusion criteria were age 40 to 75 years and the presence of stage I or II venous insufficiency according to the clinical, etiological, anatomical, and physiopathological, or CEAP, scale. Exclusion criteria were venous insufficiency more advanced than stage II, no evidence of a venous cause, uncompensated cardiorespiratory insufficiency, and recent venous thrombosis.

Sixty-five postmenopausal women who met the study criteria were randomly assigned to a control group (n=32) or experimental group (n=33). Patients in both groups underwent physical venous return therapy (ie, kinesiotherapy) for a 10-week period, but the experimental group patients also received 20 sessions of MFR therapy. The MFR therapeutic protocol was administered by a physiotherapist expert in MFR therapy who applied it in several places: longitudinal sliding in a cephalad direction in all compartments of the thigh; hands crossed on external lateral and anterior compartment of the thigh; and MFR of the triceps fascia. Three MFRs were performed in each maneuver lasting 50 minutes for each session. Patients underwent a total of 20 sessions (2 sessions per week) during the same 10-week kinesiotherapy period.

After 10 weeks, blood pressure, cell mass, intracellular water, basal metabolism, venous velocity, skin temperature, pain, and quality of life all showed improvement. Basal metabolism ($P<.047$), intracellular water ($P<.041$), diastolic blood pressure ($P<.046$), venous blood flow velocity ($P<.048$), pain ($P<.039$), and emotional role ($P<.047$) were significantly higher in the experimental group than in the control group after the 10-week treatment program.

The limitations of the study were its length (a relatively short period), its population of only women, and its lack of blinding (the practitioners knew their patients). Furthermore, the MFR therapy performed in this study was not labeled direct or indirect. —M.A.S., K.M.,* and D.J.Z.*

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(continued)

New Technology Sheds Light on CSF Flow Through the Brain

Iliff JJ, Wang M, Liao Y, et al. A paravascular pathway facilitates CSF flow through the brain parenchyma and the clearance of interstitial solutes, including amyloid β. *Sci Transl Med*. 2012;4(147):147ra111.

How does the human brain clear waste products without a lymphatic system? Researchers who investigated this issue at the Center for Translational Neuromedicine at the University of Rochester Medical Center in New York have identified paravascular channels along which cerebrospinal fluid (CSF) flows, clearing the brain of the waste products of cellular metabolism. These channels were observed in 4 mice with brains that contained water channel aquaporin-4 (AQP4) in their astrocytes. Three mice with brains that lacked AQP4 had much slower CSF flow and solute clearance.

The researchers used an advanced technology called in vivo 2-photon imaging, which used laser scanning microscopy to visualize radiolabeled substances in real time. Small fluorescent tracer molecules injected into the cerebral ventricles of the mice showed very little perfusion beyond the injection site. When the tracer was injected into the subarachnoid space, paravascular CSF flow quickly spread throughout the brain. An ex vivo approach was used to map paravascular CSF flow; the tracer exited the brain, primarily along the medial internal cerebral veins or the lateral-ventral caudal rhinal veins. These findings confirm the results of recent studies[1-3] that described CSF flow as something other than the classic secretion by the choroid plexus and resorption by the arachnoid villi.

The great detail of the methods used in this study are too numerous and complex to describe in the present review, but the highlights of the results for the researchers were (1) that it is now possible to describe how brain parenchyma clears waste products without lymphatics and (2) that this clearing of waste occurs via the flow of CSF in the extracellular space. Also, mice brains that did not have these paravascular channels because they did not carry the AQP4 gene cleared amyloid-β at approximately a 70% reduced rate. The authors report the relationship between Alzheimer disease and amyloid-β and suggest that this pathway may remove amyloid-β from the central nervous system, thus providing guidance in the continued attempts to combat Alzheimer disease.

This article was selected for review because of its relevance for neuroscience in general and for osteopathic concepts in particular. The finding that CSF flows in cerebral extracellular paravascular space is an advancement in the understanding of CSF flow dynamics and, while not mentioned in the article, may be useful in the understanding and treatment of hydrocephalus or other intracranial pathologies such as subdural hematoma resolution.

The osteopathic medical profession includes the practice of cranial osteopathic manipulative treatment. In my opinion, science has only begun to penetrate the surface and function of the brain and its fluid dynamics with this study and others reviewed in these pages.[4-7] Osteopathic physicians who use cranial osteopathic manipulative treatment have long thought that the application of manually guided forces on cranial structures enhances the flow of CSF.

In particular, the compression of the fourth ventricle (CV4) technique is thought, among other effects, to enhance intracranial CSF flow. Assuming that these findings on mouse brains are indeed applicable to human brains, as the authors of this article assert, then the possibility of enhanced CSF flow by application of the CV4 technique may be an important clinical tool with several possible implications. To say that the CV4 technique may be helpful in the prevention of Alzheimer disease by means of the enhanced clearance of amyloid-β is indeed speculative at best, but it is a possibility worthy of future research and discussion. —H.H.K.

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Myofascial Release Relieves Pain and Improves Function in Patients With Fibromyalgia

Castro-Sánchez AM, Matarán-Peñarrocha GA, Arroyo-Morales M, et al. Effects of myofascial release techniques on pain, physical function, and postural stability in patients with fibromyalgia: a randomized controlled trial. *Clin Rehabil*. 2011;25(9):800-813.

Osteopathic physicians caring for patients with fibromyalgia syndrome (FMS) often use osteopathic manipulative medicine in conjunction with pharmaceutical therapy. Osteopathic manipulative treatments, including myofascial release (MFR) techniques, are used in the management of FMS to modify autonomic input, treat somatic dysfunction,

reduce pain, and restore normal motion.[1] Physical therapists also use MFR techniques. Researchers in Spain performed a randomized, placebo-controlled trial to determine the efficacy of MFR techniques as performed by a physical therapist in patients with FMS. This research group previously reported that weekly sessions of MFR therapy improve sleep duration and reduce pain and anxiety in FMS patients.[2] In this study, the researchers investigated whether a more frequent protocol (2 sessions per week) would improve physical function and postural stability in FMS patients.

Of the 94 FMS patients that enrolled in the study, 86 completed it: 45 of 47 in the experimental group and 41 of 47 in the placebo group. All patients were taking at least 1 of the following prescription medications during the study: anxiolytics, antidepressants, anti-inflammatories, corticosteroids, antibiotics, sleep inducers, or muscle relaxants. Patients included in the study were aged 40 to 65 years, agreed to attend evening therapy sessions, and reported pain-related limitation of usual activities in the past 30 days or an average pain level less than or equal to 4 on a 10-point scale. Exclusion criteria were receipt of other nonpharmaceutical therapies; presence of infection, fever, hypotension, or treatment-limiting respiratory disorders; and alterations in cutaneous integrity.

The MFR group received 1-hour sessions consisting of 10 MFR techniques that addressed the following regions: temporal, suboccipital, posterior cervical, pectoral, diaphragm, and lumbosacral. The placebo group received sham (unplugged) short-wave therapy and ultrasonography on cervical, dorsal, and lumbar regions for 10 minutes per region. Both groups received 2 sessions per week for 20 weeks. The outcome variables included the number of tender points, report of pain, posture stability, overall physical functioning, severity of clinical symptoms and signs, and global improvement determined by clinical assessment.

Outcome measures were assessed before and immediately after interventions and at 6 months and 1 year after the last session of intervention. After 20 weeks of MFR therapy, the experimental group showed a significant improvement in painful tender points ($P<.05$), McGill Pain Score ($P<.032$), physical function ($P<.029$), and clinical severity ($P<.039$). Six months after intervention, the experimental group had a significantly lower mean number of painful points ($P<.05$), pain score ($P<.048$), physical function ($P<.049$), and clinical severity ($P<.043$). There were no adverse events reported. The sex of the participants in each group was not reported.

The researchers concluded that MFR therapy can be an adjunct therapy for pain symptoms, physical function, and clinical severity, but this therapy does not improve postural stability in patients with FMS. —M.A.S., K.M.,* and D.J.Z.*

*Kate McCaffrey, DO, and David Joyce Zuniga, OMS III, are guest authors from the Western University of Health Sciences College of Osteopathic Medicine of the Pacific-Northwest in Lebanon, Oregon.

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