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 (hollis.king@fammed.wisc.edu).

OMT Relieves Severe Chronic Low Back Pain

Licciardone JC, Kearns CM, Minotti DE. Outcomes of osteopathic manual treatment for chronic low back pain according to baseline pain severity: results from the OSTEOPATHIC Trial [published online December 2013]. *Man Ther.* 2013;18(6):533-540. doi:10.1016/j.math.2013.05.006.

The largest and most rigorous randomized controlled trial on osteopathic manual treatment (more commonly known as osteopathic manipulative treatment [OMT]), the OSTEOPAThic Health outcomes In Chronic low back pain Trial, was published in 2013.[1] It used a randomized, double-blind, sham-controlled, 2 × 2 factorial design to study OMT for patients with chronic low back pain (LBP). *The Journal of the American Osteopathic Association* published 4 subgroup analyses of this historic trial.[2-5] Another subgroup analysis from this trial, recently published in *Manual Therapy*, reported the effectiveness of OMT according to baseline severity of chronic LBP.

A total of 455 participants were divided into 2 categories: those who reported low baseline pain severity (<50 mm on a 100-mm visual analog scale; 269 participants [59%]) and those who reported high baseline pain severity (≥50 mm on a 100-mm visual analog scale; 186 participants [41%]). Six 15-minute OMT sessions were provided every 2 weeks by the same trained osteopathic physician over 8 weeks. Outcomes were assessed at week 12. The provided OMT techniques included high-velocity, low-amplitude; articulatory; soft tissue; myofascial stretching and release; strain-counterstrain; and muscle energy. Sham OMT included active and passive range of motion, light touch, improper patient positioning, purposely misdirected movements, and diminished force.

The study revealed a large effect size for OMT vs sham OMT in providing substantial LBP improvement in patients with high baseline pain severity (response ratio, 2.04; 95% confidence interval, 1.36-3.05; $P<.001$). Clinically important improvement in back-specific functioning was also found in the OMT group compared with that in the sham OMT group (response ratio, 1.80; 95% confidence interval, 1.08-3.01; $P\leq.02$). The findings of this study suggest that OMT would be an excellent adjunct to the care of patients with severe chronic LBP. (doi:10.7556/jaoa.2014.009)

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Abdominal Muscles Are the Front Side of the Low Back

Arab AM, Rasouli O, Amiri M, Tahan N. Reliability of ultrasound measurement of anatomic activity of the abdominal muscle in participants with and without chronic low back pain. *Chiropr Man Therap*. 2013;21:37. doi:10.1186/2045-709X-21-37.

I frequently tell my patients with low back pain—particularly those carrying extra weight in the abdominal area—that the abdominal muscles are the front side of their low back, and that they need to do abdominal strengthening exercises to reduce their low back pain. This perspective is a mainstay of physical therapy; core strengthening exercises have been prescribed for every patient I have referred to a physical therapist for low back pain (I also provide these patients with osteopathic manipulative treatment, of course, as appropriate).

Interestingly, in my 20 years of cumulative experience on the faculty of 3 different osteopathic medical schools, I had never seen this notion presented in osteopathic manipulative medicine curriculum. Recently, however, I attended an osteopathic conference where Frank H. Willard, PhD, presented his work on the anatomy related to this concept.[1,2] I selected this article by Arab et al because it relates to the practical application of Dr Willard's work and may further the process of "thinking osteopathically" in regard to low back pain.

Researchers in Iran used ultrasonography to measure abdominal wall thickness with participants in 4 positions: (1) lying supine, (2) sitting on a chair, (3) sitting on a gym ball with both feet on the ground, and (4) sitting on a gym ball with both feet on ground and then lifting 1 foot off the floor. The study included 10 healthy participants and 10 participants with low back pain of more than 6 weeks duration. Ultrasonography of the abdomen was performed with participants in each of the 4 positions. Each image was frozen at the end of expiration.

The reliability of ultrasonography as a measure of absolute abdominal muscle thickness was found to be very high. Intraclass correlation coefficients ranged from 0.88 to 0.95 for within-days comparisons and from 0.85 to 0.94 for between-days comparisons. A clinically useful finding was that the minimal detectable change measure showed a much thicker abdominal muscle wall in low back pain participants compared with that of healthy participants when 1 foot was lifted. The authors suggested, and I agree, that such an easily obtained measurement can be used to assess progress in the management of low back pain, as well as for research purposes. (doi:10.7556/jaoa.2014.012)

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Systematic Review Paints Incomplete Picture of OMT Research

Orrock PJ, Myers SP. Osteopathic intervention in chronic non-specific low back pain: a systematic review. *BMC Musculoskelet Disord*. 2013;14:129. doi:10.1186/1471-2474-14-129.

A recent systematic review by Orrock and Myers of randomized clinical trials investigating "osteopathic intervention" (ie, osteopathic manual therapy or osteopathic manipulative treatment [OMT]) for patients with chronic low back pain took an interesting approach that differed from previous systematic reviews. Osteopathic intervention for this study was defined as "manual intervention and lifestyle advice applied by an osteopath which would be considered by the osteopathic community to be consistent with osteopathic practice." The authors considered "authentic" osteopathic intervention to be that using a multitechnique approach—similar to the approach used by osteopaths in Australia and the United Kingdom. Only 2 trials met the researchers' inclusion criteria. According to Orrock and Myers, neither trial indicated that osteopathic intervention was superior to sham therapy, physiotherapy, or exercises, and because the studies included in the review had small sample sizes, definitive statements about whether osteopathic intervention is effective for this patient population could not be made.

The last systematic review[1] on this topic, published in 2005, revealed that OMT was more efficacious than sham, placebo, or exercise in reducing pain in patients with acute, subacute, or chronic low back pain. That review was used as a basis for the American Osteopathic Association's national guidelines for use of OMT in patients with low back pain.[2] However, Orrock and Myers did not include the clinical trials reviewed in the 2005 systematic review because those trials either did not treat only chronic low back pain patients, did not treat only nonspecific low back pain patients, or did not specify the type of back pain. In their conclusion, they request that future studies use a pragmatic approach that reflects actual practice, enrolls a large sample size, maintains participant compliance with the protocols, blinds the participants to group allocation, and includes appropriate sham and control groups.

In addition, because Orrock and Myers included trials only published before 2011, they did not include the OSTEOPATHIC Trial that was published earlier this year,[3] the results of which were summarized in the July 2013 installment of "The Somatic Connection."[4] The OSTEOPATHIC Trial addressed many of the requests made by Orrock and Myers in their conclusion, including a larger sample size (455 participants), high patient adherence to protocols, blinding of participants, and use of sham and control groups. It is likely that another systematic review that includes the results of the OSTEOPATHIC Trial will conclude that OMT is indeed an effective treatment for this patient population. (doi:10.7556/jaoa.2014.011)

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Manual Therapy or Exercise Effective for Hip or Knee Osteoarthritis

Abbott JH, Robertson MC, Chapple C, et al. Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial—1: clinical effectiveness. *Osteoarthritis Cartilage*. 2013;21(10):525-534. doi:10.1016/j.joca.2012.12.014.

Researchers in New Zealand carried out a rigorous randomized controlled trial that evaluated the effectiveness of manual therapy and exercise in addition to usual care in alleviating symptoms and improving function in patients with hip or knee osteoarthritis (OA).

The researchers randomly allocated 206 adults (92 men, 114 women; mean [range] age, 66 [37-92] years) with diagnosed OA of the hip or knee into 1 of 4 groups: manual therapy plus usual care (n=54), multimodal exercise therapy plus usual care (n=51), manual therapy and exercise therapy plus usual care (n=50), or usual care only (n=51). Western Ontario and McMaster osteoarthritis index scores were obtained at baseline and after 1 year. In addition, pain levels, global assessment, and physical function were measured. Six trained physiotherapists performed the manual therapy and exercise therapy interventions, which were provided 7 times during the first 9 weeks and twice during week 16. Protocols allowed for individualization of the interventions on the basis of physical examination findings. Manual therapy included thrust and nonthrust joint mobilization, soft tissue manipulation, and stretching of the hip, knee, ankle, lumbar, and pelvic regions. The manual therapy protocol did not include aerobic, strengthening, or neuromuscular control exercises.

Using intention-to-treat analysis, the authors found that participants in the manual therapy group had significant ($P<.03$) and clinically important sustained improvements in symptoms at 1 year. Those in the exercise therapy group also had sustained benefit with respect to physical performance tests. No added benefit was found in the group who underwent both therapies.

To my knowledge, no randomized controlled trials have assessed the effectiveness of osteopathic manipulative treatment (OMT) for this cohort. However, because the techniques used in this study were similar to OMT techniques, it is likely that OMT effectiveness would be similar to the manual therapy effectiveness demonstrated in this study. Studies assessing the effectiveness of OMT for patients with hip or knee OA are warranted. (doi:10.7556/jaoa.2014.010)

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Review of Severe Adverse Events From Spinal Manipulative Therapy of the Lumbopelvic Area

Hebert JJ, Stomski NJ, French SD, Rubinstein SM. Serious adverse events and spinal manipulative therapy of the low back region: a systematic review of cases [published online June 20, 2013]. *J Manipulative Physiol Ther*. 2013. doi:10.1016/j.jmpt.2013.05.009.

In a recent systematic review, Australian researchers searched the literature for case reports that described severe adverse events of the lumbopelvic area that occurred after spinal manipulative therapy (SMT). The authors reviewed only case reports to gather and describe case details and make recommendations for future case reporting.

The authors found 41 case studies that described 77 separate cases. They noted that important case details were frequently omitted in the articles, such

as the type of SMT used, the pre-SMT presentation of the patient, and the actual adverse event that occurred.

The most common serious adverse events reported were cauda equina syndrome (38% of cases) and lumbar disk herniation (30%). Other adverse events included fracture (9%), hematoma or hemorrhagic cyst (8%), and other events (eg, neurologic or vascular complications, soft tissue trauma, muscle abscess, disrupted fracture healing, esophageal rupture) (16%). The authors were not able to estimate an occurrence rate from case report findings alone, but they gave the opinion that lumbopelvic SMT was associated with a lower rate of serious adverse events than cervical spine SMT. One of the 77 cases reported a serious adverse event as a result of osteopathic manipulative treatment (OMT), and that case of paraplegia was from 1945.[1] In addition, 1 case reported an adverse event of iliopsoas hematoma with femoral neuropathy after osteopathic manipulative therapy was performed by an osteopath from the United Kingdom.[2]

The authors indicated that in all of the prospective studies they reviewed, few serious adverse events were reported. Of note, the recently published OSTEOPATHIC Trial,[3] which revealed statistically significant benefit of OMT for low back pain, reported adverse events (ie, mild, time-limited complaints) in 27 of 455 participants (6%) and serious adverse events in 9 participants (2%), "none of which was definitely or probably related to a study intervention."

In my opinion, the application OMT in health care has produced exceedingly few serious adverse events, and the American Osteopathic Association is justified in the position that OMT is safe. (doi:10.7556/jaoa.2014.013)

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A Chiropractic Perspective: Spinal Manipulative Therapy Is Not Causally Related to Stroke

Tuchin P. Chiropractic and stroke: association or causation? *Int J Clin Pract.* 2013;67(9):825-833. doi:10.1111/ijcp.12171.

Concern about severe adverse neurovascular events as a result of cervical manipulation has appeared in the scientific literature since the 1960s,[1] with full-blown debate on the issue starting around 2002.[2] In a recent review and commentary, Australian professor Peter Tuchin discussed these concerns about spinal manipulative therapy (SMT) from the chiropractic perspective. Specifically, the author reviewed the evidence on SMT and stroke and evaluated the causal relationship according to specific criteria including strength, plausibility, and other explanations.

First, Tuchin observed that there is not a strong association between SMT and vertebral artery dissection (VAD) and stroke. In many case reports and reviews that describe severe adverse events after SMT, the SMT was provided by either a chiropractor or a general medical practitioner. Tuchin made the argument that the neck pain leading to the chiropractor or general medical practitioner visit was probably caused by a VAD or stroke already in progress. One article[3] reported, "…two of the dissection patients had VAD within seconds of receiving SMT." Tuchin points out, "This would suggest that the VAD must have been present before the SMT, as it seems impossible for a thrombus to instantly form, dislodge, travel to the cerebral cortex to cause a stroke '…within seconds of receiving SMT'."

Second, Tuchin questioned the plausibility of the SMT-VAD association by citing a study[4] that revealed the force exerted on the vertebral artery during SMT was not enough to produce any tearing of the vertebral artery. In the same study, the SMT forces were shown to be less than the forces used during diagnostic and range of motion testing.

Third, Tuchin noted that the critics of SMT have not adequately reported other explanations and risk factors of stroke that could be causes of serious adverse events. For example, morbidities associated with VAD and stroke that have been cited in the literature include hypertension, hyperlipidemia, hyperhomocysteinemia, recent infection, smoking, diabetes mellitus, migraine, atrial fibrillation, obesity, cardiovascular disease, hormone replacement therapy, heavy drinking, illicit drug use, lupus anticoagulant, active malignancy, recent trauma, and genetic factors. Any of these morbidities could cause stroke and precede SMT.

Tuchin concluded that there is a lack of compelling evidence that SMT is causally associated with stroke. Because professional liability carriers often associate osteopathic manipulative treatment with SMT, the American Osteopathic Association has addressed these concerns and determined that osteopathic manipulative treatment of the cervical spine is safe (American Osteopathic Association House of Delegates reaffirmed Resolution H-257 [A/2004—Osteopathic Manipulative Treatment of the Cervical Spine]).[5] (doi:7556/jaoa.2014.014)

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Contribute to the *JAOA*'s "The Somatic Connection"

"The Somatic Connection" appears quarterly in *The Journal of the American Osteopathic Association*. This section highlights important scientific findings on the musculoskeletal system's role in health and disease. If you spot a scientific report that you would like to see reviewed in "The Somatic Connection," contact *JAOA* Associate Editor Michael A. Seffinger, DO (mseffingerdo@osteopathic.org), or *JAOA* Editorial Advisory Board Member Hollis H. King, DO, PhD (hollis.king@fammed.wisc.edu).