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).

Eye Contact, Appetite, and Vomiting Improved in Children With Autism Spectrum Disorder After Visceral Osteopathic Technique

Bramanti-Castellarin I, Patel VB, Drysdale IP. Repeat-measures longitudinal study evaluating behavioural and gastrointestinal symptoms in children with autism before, during and after visceral osteopathic technique (VOT) [published online January 13, 2016]. *J Bodyw Mov Ther.* doi:10.1016/j.jbmt.2016.01.001.

In a novel research approach, researchers in the United Kingdom assessed the application of visceral osteopathic technique (VOT) to children aged between 3½ and 8 years who had a diagnosis of autism spectrum disorder (ASD) and whose medical records included significant gastrointestinal dysfunction. Forty-nine children met inclusion criteria of ASD and gastrointestinal symptoms, including abdominal distention or pain, constipation, chronic diarrhea, and foul-smelling stools or flatulence. Parental approval was required for participation.

The trial used a single-patient design, and each patient acted as his or her own control using pre- and posttreatment repeated measures. This design is particularly appropriate for the ASD population because separate homogeneous groups of patients with ASD are virtually impossible to assemble as a result of the vast array of ASD presentations.

The modified standardized Autism Research Institute/Secretin Outcomes Survey Form was used to assess social behavior, ritual, and repetitive activities; digestive symptoms; and general symptoms. Parents filled out the forms 4 times during the 6-week control period; 4 times during the 6-week treatment period (weekly treatment sessions); and 1 time during the posttreatment period at week 18. At each treatment session, any changes in health status, changes in the patient's diet or medication, and any infections were assessed to confirm the safety of continuing in the study.

The intervention was administered using standard VOT procedures to the ileocecal valve, mobilization of the duodenum, mobilization of the ligament of Treiz, mobilization of the pancreas, and sigmoid colon technique.

The main effects analysis for ritual and repetitive activities, digestive signs, and general signs were not significant. However, there were significant subscale differences before and after VOT for less vomiting ($P<.001$), improved appetite ($P=.039$), and improved eye contact ($P=.035$).

The authors cite limitations of no randomization and participant self-referral by the parents. The authors also suggest a possible gut-brain axis mechanism of action in which worsening of behavior symptoms may be a result of inflammatory gut reactions mediated by immunologic signals. As a source for such speculation, the authors cited the osteopathic research of Hodge et al.[1,2]

This article demonstrates a possible benefit of osteopathic intervention in this special needs population and thus warrants additional investigation. (doi:10.7556/jaoa.2016.064)

Hollis H. King, DO, PhD
University of California,
San Diego School of Medicine

References

1. Hodge LM, Downey HF. Lymphatic pump treatment enhances the lymphatic and immune systems [review]. *Exp Biol Med (Maywood)*. 2011;236(10):1109-1115. doi:10.1258/ebm.2011.011057.
2. Hodge LM, Bearden MK, Schander A, et al. Lymphatic pump treatment mobilizes leukocytes from the gut associated lymphoid tissue into lymph. *Lymphat Res Biol*. 2010;8(2):103-110. doi:10.1089/lrb.2009.0011.

Postural Balance and Gait Improved With an Osteopathic Intervention in a Special Needs Population

Vismara L, Cimolin V, Galli M, Grugni G, Ancillao A, Capodaglio P. Osteopathic manipulative treatment improves gait pattern and posture in adult patients with Prader-Willi syndrome [published online September 12, 2015]. *Int J Osteopath Med*. 2016;19:35-43. doi:10.1016/j.ijosm.2015.09.001.

Researchers at the Istituto Auxologico Italiano in Piancavallo, Italy, evaluated the effects of a single application of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) on patients with Prader-Willi syndrome (PWS). This condition is a relatively rare genetic disorder affecting a part of chromosome 15. Major clinical features of PWS are short stature, obesity, scoliosis, developmental delay, muscular hypotonia, reduced physical activity, and gait and postural disorders. Study participants were 10 patients with genetically confirmed PWS. Two control groups were used: one of 15 obese individuals and another of 20 normal-weight healthy participants. Obese participants were recruited among other inpatients in rehabilitation, and healthy participants were recruited from the institute staff. Exclusion criteria included history of cardiovascular and neurologic conditions or musculoskeletal complaints, vision loss, vestibular impairments, symptoms related to intracranial hypertension or use of neuro-active drugs, pregnancy, and substance abuse.

The outcome measures were 3-dimensional gait analysis and static posturography. The PWS participants were assessed on admission and 24 hours after OMTh. One-time assessments were made with the control participants.

Participants in the PWS and obese groups received conventional treatment, but the PWS participants additionally received OMTh, which was delivered in a single 45-minute session. This was a pragmatic OMTh session delivered before any other intervention or rehabilitation by a registered osteopath. Somatic dysfunction was assessed, and the major sites addressed by OMTh were the spine, legs, dural system, and thoracic respiratory diaphragm. Procedures used included "thrust," muscle energy, strain-counterstrain, and myofascial release.

Before treatment, the PWS group had a significantly slower walk, shorter stride length, reduced cadence, and reduced postural stability compared with both control groups. After treatment, the PWS participants showed significant improvement in knee and ankle kinematics with greater ground push-off force. Postural stability also improved significantly, with reduced anteroposterior and mediolateral sway. The authors noted the small sample size as a limitation, and

they suggested that if verified by further research, OMTh would show benefit and reduced cost in a comprehensive rehabilitation program.

This study was selected for review as demonstrating a possible benefit of OMTh in patients with a genetic disorder and to highlight the further use of gait analysis and posturography in osteopathic research. (doi:10.7556/jaoa.2016.065)

Hollis H. King, DO, PhD
University of California,
San Diego School of Medicine

Significant Benefit Shown After Lumbar Disk Surgery Rehabilitation by Inclusion of Osteopathic Intervention

Kim BJ, Ahn J, Cho H, Kim D, Kim T, Yoon B. Rehabilitation with osteopathic manipulative treatment after disc surgery: a randomized, controlled pilot study. *Int J Osteopath Med.* 2015;18:181-188. doi:10.1016/j.ijosm.2014.11.003.

The use of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) in postoperative rehabilitation after lumbar microdiskectomy was compared with a standard exercise program in a major metropolitan hospital in Seoul, South Korea. A total of 33 patients aged 25 to 65 years were randomly assigned to the OMTh group (n=16) or exercise group (n=17).

Inclusion criteria were low back pain with referred leg pain caused by imagery-verified herniated intervertebral disk at spinal levels L3-4, L4-5, and L5-S1. Eight patients had more than 1 herniated disk. There were no statistically significant differences between the groups.

Primary outcome measures were the Roland-Morris Disability Questionnaire and visual analog scale (VAS) for pain. Secondary outcome measures were lumbar range of motion, use of medications, and patient satisfaction. Patients received either OMTh or exercise twice a week for 4 weeks, and each session was 30 minutes.

Each OMTh intervention was performed by 2 osteopathy students under the supervision of a qualified osteopath. Techniques were individualized and included soft-tissue and joint mobilization, myofascial release, muscle energy, craniosacral release, and rib raising; no high-velocity, low-amplitude thrust was used. The same exercise protocol was used for all patients in the exercise group and included stretching for low back and abdominal muscles, isometric strengthening for back and hip extensors, and back stability exercises using a Pilates exercise apparatus.

Outcome measures were made at baseline (2-3 weeks after surgery) and after the final rehabilitation session (7-8 weeks after surgery). Results showed that both groups improved on primary outcome measures; however, postsurgical physical disability was more improved in the OMTh group (54% vs 26%, $P<.05$). Although not statistically significant, residual leg pain on VAS was reduced 53% in the OMTh group and 17% in the exercise group, and residual back pain reduced 37% in the OMTh group and 10% in the exercise group. Patients in both groups required less frequent use of medications—reduced 87% in the OMTh group and 73% in the exercise group. Both groups were highly satisfied by their rehabilitation, and there were no adverse events reported for either group.

This study is the first to my knowledge that assessed the use of osteopathic manipulation after lumbar surgical care. I believe postsurgical use of osteopathic manipulative treatment would be beneficial for patients, and I hope this study is replicated in the United States soon. (doi:10.7556/jaoa.2016.066)

Hollis H. King, DO, PhD
University of California,
San Diego School of Medicine

Spinal Mobilization Has Peripheral Vasodilation Effects

Zegarra-Parodi R, Pazdernik V, Roustit M, Park PY, Degenhardt BF. Effects of pressure applied during standardized spinal mobilizations on peripheral skin blood flow: a randomized cross-over study. *Man Ther.* 2016;220-226. doi:10.1016/j.math.2015.08.008.

Osteopathic physicians who use spinal manipulation claim that it can improve skin blood flow (SBF), but there are few randomized, sham-controlled, cross-over research studies that have evaluated this claim. Researchers at A.T. Still University in Kirksville, Missouri, and at the Grenoble University in France investigated this claim using laser Doppler flowmetry and the inspiratory gap (IG) test to evaluate SBF during and after application of spinal mobilization (SM) and the Novel Pliance-X system pressure monitor to evaluate the influence of pressure on SBF.

Thirty-two participants (mean [SD] age, 25 [5.4] years) were randomly assigned to 1 of 4 sequences of interventions. Before each session, the participant's pain pressure threshold (PPT) was determined. The researchers used varied pressures of spinal SM—control (no touch) and SM applied at 5% of PPT (sham), 40% of PPT (low-pressure), or 80% of PPT (high-pressure)—and compared the effects of each intervention on the participant's SBF. Using a pressure sensor on the thumb, the investigator used the thumb to rhythmically push on the T1 vertebra, over the lamina on the side of the participant's dominant arm, using a graded translatory pressure toward the base of the participant's opposite axilla. Measurements were taken at baseline at the end of a 20-minute acclimatization period, during the IG test, 5 minutes after the IG test, during the SM phase (or no manual contact for the control intervention), and 5 minutes after the SM. Thus, 4 interventions were applied on 4 different days, and each 40-minute session comprised 5 phases.

There were equal and significant bilateral vasodilation measurements during application of unilateral sham SM, low-pressure SM, and high-pressure SM. A significant difference in mean SBF was seen across the second half of each low-pressure SM application and control (P=.007). A significant difference in mean SBF was seen between high-pressure SM and control (P=.008) and between sham SM and control (P=.02). Significant vasodilation persisted only after high-pressure SM (P=.02).

This study is the first well-controlled investigation to describe bilateral peripheral SBF changes occurring during and 5 minutes after application of standardized SM. The persistence of post-SM vasodilation after only high-pressure SM suggests possible pressure-dependent mechanisms. However, further research is warranted to clarify these findings. Spinal mobilization should also be compared with other manual procedures to determine if this finding is specific to this particular technique. (doi:10.7556/jaoa.2016.067)

Frances Nanadiego, BA
Michael Seffinger, DO
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific,
Pomona, California

Multidisciplinary Biopsychosocial Rehabilitation Improves Outcomes for Patients With Chronic Low Back Pain

Kamper SJ, Apeldoorn AT, Chiarotto A, et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. *BMJ.* 2015;350:h444. doi:10.1136/bmj.h444.

This systematic review and meta-analysis of randomized controlled trials (RCTs) investigated the outcomes of multidisciplinary biopsychosocial rehabilitation for chronic low back pain compared with those of usual care, physical treatment, sur-

gery, and a waitlist. A total of 41 studies were included, in which more than 75% of the participants had low back pain and the diagnosis of disk degeneration or bulging disks, facet joint dysfunction, or sacroiliac joint pain. The sample sizes ranged from 20 to 542 people, with a combined total of 6858 participants. The average age of the participants was between 40 and 45 years. Articles were excluded if the chronic low back pain resulted from any form of inflammatory articular disease.

Multidisciplinary rehabilitation (MR) intervention involved a physical component alongside a psychological or social- or work-targeted component. Usual care varied according to physician. Physical treatments included electrotherapeutic modalities; aerobic, stretching, and strengthening exercises; and manual therapies, but not osteopathic manipulation. The primary measured outcomes were pain, disability, and work absenteeism.

Sixteen RCTs measured the effects of MR vs usual care. Moderate-quality evidence showed that MR was more effective than usual care for long-term pain (7 trials, n=821) and disability (6 trials, n=722) but that MR had no effect above that of usual care in regard to work absenteeism (7 trials, n=1360).

Nineteen RCTs compared the outcomes of MR vs physical treatment. Low-quality evidence demonstrated that MR was more effective than physical treatment for long-term pain and disability (10 trials, n=1169). Moderate-quality evidence demonstrated that MR was more effective than physical treatment for work absenteeism (8 trials, n=1006). Low-quality evidence found that MR was not significantly different from surgical procedures in improving pain, disability, or work absenteeism (2 trials, n=423); however, more adverse events were reported in the surgical studies. Three trials provided low-quality evidence that MR was more effective than control (waitlist) in reducing pain and disability.

This review provides moderate- to low-quality evidence demonstrating that MR is more effective than usual care and physical treatment in patients with chronic low back pain. Although osteopathic manipulation studies were not considered, the results are of interest to osteopathic physicians because of the demonstration of the effectiveness of a biopsychosocial approach, which is a cornerstone of osteopathic care. (doi:10.7556/jaoa.2016.068)

Frances Nanadiego, BA
Michael Seffinger, DO
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific,
Pomona, California

Manual Therapy for Hamstring Hypertonicity Improves Temporomandibular Dysfunction in Athletes

Espejo-Antúnez L, Castro-Valenzuela E, Ribeiro F, Albornoz-Cabello M, Silva A, Rodríguez-Mansilla J. Immediate effects of hamstring stretching alone or combined with ischemic compression of the masseter muscle on hamstrings extensibility, active mouth opening and pain in athletes with temporomandibular dysfunction [published onlineJanuary 7, 2016]. *J Bodyw Mov Ther.* doi:10.1016/j.jbmt.2015.12.012.

Temporomandibular disorder (TMD) affects more than 25% of the population. Because the use of local manual therapy in the management of TMD may have limitations when patients are in acute pain, there is increasing interest in myofascial release and trigger point therapy. Physiotherapists in Spain evaluated the immediate effects of the hold-relax proprioceptive neuromuscular facilitation (HR-PNF) stretching technique applied to a distant site—the hamstring muscle—with and without ischemic compression of masseter muscle trigger points on "hamstring extensibility, maximal amplitude of vertical mouth opening, pressure pain thresholds, and pain intensity in athletes diagnosed with TMD and hamstring shortening."

Forty-two amateur athletes aged 18 years or older (mean [SD] age, 21.2 [1.6] years) with regular sports practice, no previous hamstring injuries, a right-straight leg raise test outcome of less than 80°, a clinical diagnosis of TMD, and myofascial pain in the temporomandibular joint were randomly allocated to 1 of 2 groups (n=21 in each). Both groups received a bilateral HR-PNF hamstring stretching technique from a physiotherapist, and group 2 additionally received ischemic compression of masseter muscle trigger points.

For the HR-PNF treatment session, a physiotherapist stretched the participants' hamstrings to the maximum level of pain tolerated, followed by the participants engaging in a series of isometric contractions and relaxations of their hamstring muscles, ending with further passive stretching performed by the physiotherapist. After the stretching technique, the ischemic compression technique was applied to the participants in group 2. The physiotherapist located a central trigger point of the masseter muscle and gradually applied pressure until the participant experienced a sensation of both pressure and pain. This pressure was maintained for 90 seconds.

Active knee extension, vertical mouth opening, pressure pain thresholds, and pain intensity measurements were taken before and after each intervention. After the stretching techniques, both groups had significantly improved hamstring extensibility, active mouth opening, and pressure pain thresholds, as well as decreased pain ($P<.01$). Masseter ischemic compression in group 2 offered no statistically significant difference in outcomes from group 1.

Although there was no control group, this randomized clinical trial found that a single HR-PNF session helped manage the symptoms of TMD, lending support to the osteopathic tenets of body unity and structure-function interrelationships. Adding a nonintervention control group, a sham manual therapy control group, or an osteopathic manipulation group would be an interesting follow-up study, which could help elucidate the role of osteopathic manipulative medicine in the treatment of athletes with TMD. (doi:10.7556/jaoa.2016.069)

Ashley Garispe, OMS IV
Michael A. Seffinger, DO
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific,
Pomona, California