

ABSTRACTS

LBORC-NUFA Poster Abstracts 2024: Clinician & Residents

Every year at the American Academy of Osteopathy Convocation, the Louisa Burns Osteopathic Research Committee (LBORC) and the National Undergraduate Fellows Association (NUFA) together host a research poster presentation session for residents and medical students. The 2024 poster abstracts for the one clinician and all residents are presented here and may have been edited to conform to AMA 11th Edition style guide.

Clinician

ORIGINAL RESEARCH

Christopher M. LaFontano, DO; Teodor Huzij, DO, FACN; Madison Garlock; Miranda Speth; Keana Ko, OMS I; Nicola Crouch; Raechel McDaniel; Matthew McEchron;

Somatic Dysfunction and Behavior Correlates in Medical Students

Introduction: Previous work suggests that Somatic Dysfunction (SD) may be related to sleepiness, depression, and fatigue.^{1,2} Our study builds on this work by determining if the profile and amount of SD is associated with sleep disturbances, fatigue, depression, anxiety, and/or pain.

Methods: 115 medical students at the Rocky Vista University College of Osteopathic Medicine–Colorado campus completed a survey that included the Pittsburgh Sleep Quality Index (PSQI); Depression, Anxiety and Stress Scale-21 (DASS-21); Fatigue Severity Scale (FSS); and Chronic Pain Scale. Following survey completion, SD was quantified by two Osteopathic physicians using a novel scoring technique across the following regions: Cervical, Thoracic, Lumbar, Sacral, Pelvis, Ribs, and Upper and Lower Extremities. SD was assessed by screening areas of greatest restriction (AGR). AGR was scored for each region using a 0 to 3 scale according to how many TART (tissue texture abnormality, asymmetry, restriction of motion, or tenderness) criteria were present. Tenderness was not included in scoring. A score of 0 indicated the absence of TART, and 3 reflected all TART criteria present.

Results: SD summed across all regions correlated with

DASS-21 measures of Stress, Anxiety, Depression, and overall DASS-21 totals. Thoracic and Pelvis SD correlated measures of Anxiety, Depression, and DASS-21 totals. Lumbar SD correlated with Sleep impairment, Stress, Anxiety, and DASS-21 totals. Rib SD correlated with Depression and DASS-21 totals. Interestingly, Fatigue correlated with PSQI scores, DASS-21 scores, and Chronic Pain. Correlations were significant at $p < 0.5$.

Conclusion: SD was associated with a number of behavioral sequelae, most consistently depression, anxiety, and stress on the DASS-21. These correlations occurred most often in the thoracic, lumbar, sacral, and pelvic regions.

References

1. Wiegand S, Bianchi W, Quinn TA, Best M, Fotopoulos T. Osteopathic manipulative treatment for self-reported fatigue, stress, and depression in first-year osteopathic medical students. *J Am Osteopath Assoc.* 2015;115(2):84-93. doi:10.7556/jaoa.2015.019
2. Licciardone JC, Gatchel RJ, Kearns CM, Minotti DE. Depression, somatization, and somatic dysfunction in patients with nonspecific chronic low back pain: results from the OSTEO-PATHIC Trial. *J Am Osteopath Assoc.* 2012;112(12):783-791.

Residents CASE STUDY

Jackilyn Barr, DO, PGY3; Arlene O'Donnell, DO, IBCLC

From finger to breast: OMT helps latch

Introduction/Background: The importance of breastfeeding in infant survival and overall health is well recognized. Breastfeeding and latching difficulty in infants are common complaints in the osteopathic manipulative medicine (OMM) clinic. Problems contributing to these difficulties range from decreased tongue motion due to

tongue tie, uncoordinated tongue motion, torticollis, shallow latch, and more.

Case: A 27-day old female presented to the OMM clinic with mom for latching difficulty and was feeding with finger feeds. She was born full term to a nulliparous mother with gestational diabetes via uncomplicated vaginal delivery. Torticollis, palate sensitivity, and lack of tongue coordination were present. Some somatic dysfunctions identified were palate restriction, occipital condyle compression, sacroiliac joint restriction and left respiratory diaphragm restriction all treated with myofascial release.

Results: Immediately following treatment, the patient latched onto the breast. Change in breastfeeding position also allowed a deeper latch. One week later, mom reported finger feeds were decreased with increased breastfeeding. OMT was performed, and after another week, mom reported direct breastfeeding. One month later mom reported a growth spurt, and the infant was only finger feeding again. Somatic dysfunctions identified were occipital condyle compression, left palatine and ethmoid restrictions, coronal suture compression, and others. Myofascial release and balanced membranous tension techniques were applied. The infant then latched directly onto the breast.

Discussion: This case supports the use of osteopathic manipulative treatment (OMT) in infants with latching difficulty. After two visits and simple position modifications, she was able to directly breastfeed. While she would not breastfeed after a growth spurt, she latched again after OMT. Having prompt access to a physician skilled in performing OMT can allow for correction of somatic dysfunctions and support the breastfeeding journey.

Elliot Cecil, DO; Dennis Burke, DO

The Role of Osteopathic Structural Findings in Meningitis

Introduction/Background: The inflammation of the meninges in meningitis disrupts the blood-brain barrier, causing significant cerebral edema. Currently, no literature supports the association between tentorium cerebelli (tent) dysfunction and acute meningitis. Identifying this crucial somatic dysfunction could expedite early diagnosis and streamline the work-up process. Moreover, Osteopathic Manipulative Treatment (OMT) directed at the tent could directly influence cranial lymphatic and glymphatic drainage. The tent's close connection to brain glymphatics may improve infection visibility for the immune system, decrease intracranial pressure,

and symptomatically alleviate associated neck pain in patients.

Case: 57-year-old male presented with 2 week history of right-sided throbbing headaches, weakness, weight loss, diarrhea, cough, and fatigue. A delayed spinal tap confirmed a diagnosis of Cryptococcus Meningitis. This patient decompensated despite having received standard of care and daily OMT, including osteopathy in the cranial field and balanced ligamentous tension, until the patient was transitioned to comfort measures.

Results: Daily OMT was provided as a part of the patient's hospitalization with reduction in the patient's somatic dysfunctions and neck pain. There was delay in obtaining the spinal tap due to the pursuit of other work-up, but the clinical finding of tent tension was present and could have served as an early diagnostic clue.

Discussion: This clinical finding seems to be significant in the setting of meningitis. The quality of the tent dysfunction is unique enough due to the acute infectious changes and local congestion of the glymphatics from that of regular membranous strain that a trained osteopath would be able to discern the difference and warrant further work-up. Having had the ability to evaluate the patient prior to the onset of meningitis would have served a useful contrast.

Dakota Dalton, DO, PGY3; Alexis Walker, OMS III; Patrick Vu, OMS III; Christopher Medina, DO

Efficacy of Osteopathic Manipulative Treatment in Post-Stroke Recovery Patients

Introduction: Each year, an estimated 795,000 people report having a stroke making it the 5th leading cause of death and the 10th leading cause of adult disability in the United States. Stroke patients specifically suffer from pain related to positional changes, muscle contractures and somatic dysfunctions. Beneficial stroke rehabilitation begins in the subacute setting, however current literature has primarily addressed the use of OMT for pain and musculoskeletal limitations in patients in a post-acute stroke setting.

Case: We present a 53 y/o Caucasian female who presented to the emergency department with a history of slurred speech and right-sided weakness secondary to a left MCA stroke. A head CTA showed moderate stenosis of the distal M1 segment of the left MCA. The inpatient osteopathic manipulative medicine team was consulted three days following admission, for total body

pain related to positional changes, muscle contractures and chronic rheumatoid arthritis. Following six sessions of OMT, the patient reported improvement of pain in all treated regions as well as increased motor function in her paralyzed side. Over the course of treatment, the patient was lowered in her levels of required assistance with ADLs and ambulation.

Methods: OMT was provided in both the neurological ICU and the inpatient rehab facility for a total of 14 treatments over 36 days. Treatment primarily included indirect techniques directed towards detected somatic dysfunctions as well as surrounding structures contributing to the patient's restrictions bilaterally.

Discussion: The case demonstrates that in conjunction with evidence-based PT/OT, subacute stroke OMT can increase biomechanical functionality as demonstrated by the increased functionality of both the paralyzed extremities and the newly dominant side.

Clayton King, DO, MS, PGY3; Hugh M. Ettlinger, DO, FAAO, FCA

The role of diaphragmatic motion in peritoneal lymphatic absorption examined in case of splenic rupture

Introduction/Background: Diaphragmatic motion is a major driver for the lymphatic system. It affects both the intrathoracic and intraabdominal pressure. Its' pumping motion serves to aid in the reabsorption of fluids in the abdominal cavity. In many traumatic injuries diaphragmatic motion becomes hindered affecting the ability of the diaphragm to pump fluids. Herein we present a case demonstrating the importance of diaphragmatic motion in post-traumatic injury.

Case: Our patient is a 56-year-old male with complaint of diffuse abdominal pain. Two days prior he was discharged from the hospital with left rib 9 and 10 fractures, small splenic laceration, and a perihepatic hematoma in stable condition. Imaging of the abdomen showed signs of delayed splenic rupture with hemoperitoneum. Following emergent splenic artery embolization our team was consulted. The patient was treated with OMT throughout admission, utilizing various modalities including balanced ligamentous tension and myofascial release with focus on improving his respiratory-circulatory functioning.

Results: After application of OMT the patient had reduction in the severity of his somatic dysfunction and reduced pain. Reevaluation and continued treatment

throughout hospitalization showed continued improvement in the severity of his somatic dysfunction, including improved diaphragmatic motion.

Discussion: The case presented provides a window for examining the role of diaphragmatic function. Peritoneal fluid is reabsorbed through localized lymph vessels to the lymph nodes in the mesenteric and celiac areas and through specialized lacunae on the undersurface of the diaphragm. By treating this patient's somatic dysfunction, we were able to improve his diaphragmatic motion which aided reabsorption of his hemoperitoneum. Our hope is that future study can be done to further look at the various roles of diaphragmatic motion in post trauma patients.

Deepika Kurup, DO; Hugh Ettlinger, DO, FAAO, FCA

The Role of Osteopathic Manipulative Treatment in a Case of Pediatric Craniosynostosis

Introduction/Background: Head shape abnormalities are common in infants as their cranial sutures are open and mobile, however, 1 in every 2100-2500 infants are born with craniosynostosis, risking impaired brain development due to the premature fusion of the sutures. Early intervention is crucial in infants with craniosynostosis to allow for brain growth and proper development, many requiring multidisciplinary approaches.

Case: This case discusses a 1-year-old male who presented to the Osteopathic Manipulative Treatment (OMT) clinic with a history of left unicoronal craniosynostosis and a recommendation from neurosurgery for surgical intervention of the craniosynostosis prior to 24 months old. The patient was meeting all pediatric milestones, however, facial asymmetry including R frontal bossing, L orbit compression, and L temporal flattening, was noted along with the patient's mother reporting that he would often hit the right side of his head. Patient was treated for the next year with OMT, including Osteopathic Cranial Manipulative Medicine and Balanced Ligamentous Tension.

Results: Patient continues to meet developmental milestones, with improving facial asymmetry, and within three months of OMT, decreased hitting of the right side of his head with his hand.

Discussion: This 1 year old male with left unicoronal craniosynostosis had improvement in overall head shape, facial asymmetry, and changes in behavior within the year of treatment with OMT. While this case study

focuses on one patient, these results demonstrate how OMT can have a role in the treatment of craniosynostosis in patients where non-surgical treatments are preferred. Though there has been limited research into the use of OMT in patients with craniosynostosis, there is potential for further research of OMT as a nonsurgical approach to craniosynostosis or alongside surgical treatment for craniosynostosis.

Michelle Mather, DO, PGY2; Max Schaefer, DO

More Than a Pain in the Butt: Response to OMT as a diagnostic aid to identify arterial gluteal claudication

Introduction/Background: Gluteal claudication can be a diagnostic challenge as it can present with a normal Ankle-Brachial Index (ABI) and lack of ischemic leg symptoms. It is often misdiagnosed as a musculoskeletal injury. This case is important as it highlights osteopathic manipulative treatment (OMT) as part of the diagnostic process for this often-difficult diagnosis.

Case: 58-year-old male with past medical history of coronary artery disease, hypertension, hyperlipidemia, and tobacco dependence presented with progressively worsening axial low-back and left buttock pain. Osteopathic assessment identified axial low back pain (LBP), left piriformis syndrome, and lower cross syndrome with significant lumbar, sacral, pelvic, and lower extremity somatic dysfunctions. Contributing lifestyle factors identified regular wallet placement in his back left pocket, sedentary desk job, lack of stretching or exercise, and tobacco use. Initial response to OMT, lifestyle changes, and exercise prescription was significant. His LBP resolved and overall mobility improved. However, he continued to have exertional left gluteal pain in the absence of somatic dysfunction or discomfort at rest. Re-review with radiology of 2018 CT abdomen/pelvis identified internal iliac calcification. Follow-up CT angiography confirmed severe stenosis of left internal iliac artery. In coordination with the vascular team this patient continued lifestyle modifications, exercise prescription, and OMT resulting in progressively improved exercise tolerance and decreased tobacco use.

Results: A biopsychosocial osteopathic approach to care helped provide both therapeutic benefit and aided in the difficult diagnosis of arterial gluteal claudication.

Discussion: Treatment of somatic dysfunction due to musculoskeletal compensation led to an underlying diagnosis of gluteal claudication. Overall, this case highlights

the importance of using the biopsychosocial lens when approaching osteopathic care, and to consider alternative diagnoses when patients do not respond as expected to OMT.

Ayat Shah, MD, PGY1; Andrea Johnson, DO, MS

The case for Frequency Specific Microcurrent in combination therapy of an acute forearm injury

Introduction/Background: Frequency Specific Microcurrent (FSM) therapy is a transmission of mild electric currents through a special device for pain relief. It can be found in the use of the PrecisionCare Microcurrent Machine. Best explained in “The Resonance Effect” by Dr. Carolyn McMakin, FSM is proving to be a helpful addition to pain relief regimens.

Case: A 57-year-old male patient was working on his 900-pound motorcycle when it fell on his left forearm. Due to the pain, he received Osteopathic Manipulative Treatment (OMT). Muscle energy was applied to the radial head, and Still technique to the wrist. Findings before treatment were a posterior radial head and carpal bones displaced toward the palm; these resolved thereafter. FSM was used over a 40-day period. The frequency on channel A was 124, representing “torn/broken.” The frequencies of 100, 77, 142 and 157 on channel B represent “ligament,” “connective tissue,” “fascia/muscle sheath” and “cartilage.” The frequencies on channel A were 40 and 284, for “inflammation” and “chronic inflammation.” The frequencies of channel B were the same as the aforementioned. At this same time, the patient began using a splint on his left elbow and wrist for 60 days.

Results: Using the McGill Pain Questionnaire after the interventions of OMT, the patient noted pain being “aching” in the wrist; “hot” and “boring” in the elbow. After wrist and elbow splints, pain was “stabbing.” After FSM, it was “aching” and “hot”/“boring.”

Discussion: Limited literature is published on FSM, and follow-up publications will help add clarity to the frequencies that are most suitable for different pathologies. A limitation of this study was that treatment modalities were used at overlapping times.

Yang Jenny Song, DO, PGY3; Rubaiya Faruque, DO, PGY3; Tricia Hall, DO; Michael Waddington, DO

Keeping the MonSTER Under Control: The Role of Osteopathic Manipulative Therapy (OMT) in Characterization and Management

of Chronic Pain in Multiple Sclerosis

Introduction/Background: Multiple sclerosis (MS) is an autoimmune condition that leads to central nervous system (CNS) inflammation, demyelination, neuronal damage, and gliosis. A multidisciplinary approach to MS management calls for both pharmacological and non-pharmacological approaches. The role of OMT in assisting patients in maximizing functional capacity remains unexplored.

Case: A 37-year-old female presented to the Neuromuscular Specialty Clinic earlier this year upon a recent diagnosis of relapsing-remitting MS by her neurologist. The patient has been experiencing symptoms of right-sided weakness and numbness, fatigue, tinnitus, ataxia secondary to neuropathic pain requiring use of a walker, intermittent central scotoma, diplopia, and migraines for the past 3 years. She also presents with severe vitamin D deficiency and supplementation was started. Diagnosis of MS was established based on the 2017 McDonald criteria. Over 8 months, the patient has been receiving Ocrevus (ocrelizumab) infusions (scheduled bi-yearly, patient received her initial 600 mg dose as 2 separate infusions of 300 mg), weekly physical therapy (PT), and monthly OMT.

Results: A combination of lymphatic techniques, Chapman's release to restore autonomic balance, and correction of structural biomechanics were employed. The patient reported significant improvement in her neuropathic pain (10/10 to 5-6/10) and improved Berg Balance Scale (decreased from 30s to 20s range).

Discussion: OMT enhances the quality of life in MS patients through better lymphatic drainage slowing disease progression, as well as equilibration of vagal tone, sympathetic trunk tonicity, and craniosacral flow to mitigate sympathetic pain and biomechanical alignment to improve posture and function. Further research should be undertaken to delineate the role of OMT in the control of MS co-morbidities (i.e. transverse myelitis), new MRI lesions, and disability accumulation, so to shed further light on MS management.

Roshny Vijayakar, DO, PGY2; Stephanie Obialo, BS, OMS IV; Katherine Nixon, DO, MS

Seize the Dura: An Osteopathic Approach to Postictal Delirium

Introduction/Background: Delirium is common in patients with underlying conditions—affecting 30% of elderly hospitalized patients—but can affect anyone at any

age. Here we describe a case of severe delirium following a postpartum seizure and how osteopathic manipulation targeting the reciprocal tension membrane (RTM) contributed to its resolution.

Case: A 20yo G1P1001 with mild transaminitis early in pregnancy developed pre-eclampsia with severe features before term vaginal delivery. Despite intravenous magnesium through postpartum day one (PPD1), a seizure occurred and rash developed on PPD2. Intubation resulted due to severe postictal encephalopathy. Within 24 hours, liver enzymes increased significantly, platelets remained stable, but LDH rose and hemoglobin dropped consistent with early HELLP syndrome. CT head showed a prominent, superiorly displaced pituitary; MRI brain was delayed for inability to remain still. The Osteopathic Neuromusculoskeletal Medicine (ONMM) service was consulted on PPD3 to expedite extubation. Exam revealed spheno-basilar synchondrosis compression, bilateral sacral extension/superior shearing, and decreased cranial rhythmic impulse systemwide.

Results: Following initial RTM treatment sacral motion was restored, patient was weaned off sedation and successfully extubated within 18hrs. Her rash faded, liver enzymes halved and trended down for the duration of hospitalization, and MRI showed a non-displaced appropriately enlarged pituitary. Five daily osteopathic treatments addressing diaphragmatic, mediastinal, hepatic, and core link restrictions followed until patient regained baseline mental and physical function.

Discussion: Magnesium was restarted until PPD5 and patient was referred for outpatient follow up on acute fatty liver of pregnancy. A multi-specialty approach including ONMM allowed the patient to continue breastfeeding within 48hrs of postpartum pre-eclamptic seizure, spend minimal time sedated and intubated, avoid extensive endocrine work-up, and discharge home on PPD9. Non-physiologic RTM dysfunctions should be considered in such cases.

Zachary Whitaker, DO, PGY3; Gary Gailius, DO

An Osteopathic Approach to Prolonged Surgical Scar and Epidural Site Pain after Cesarean Section: A Case Study

Introduction/Background: Cesarean section and epidural anesthesia are both common procedures during labor and delivery in the United States. Among the possible complications of these procedures are prolonged surgical scar pain and prolonged pain at or near the epidural

injection site. These can be difficult to treat and there is little in the literature detailing the efficacy of osteopathic manipulative treatment (OMT) or trigger-point injection therapy.

Case: A 28-year-old G3P3 presented for persistent epidural site and surgical scar pain nine weeks after her third low transverse cesarean section (LTCS). Examination revealed significant segmental and myofascial somatic dysfunctions of the lumbar spine and abdomen. Pain to gentle palpation and paresthesia were noted over the LTCS scar. The patient was treated with OMT three times at approximately two-week intervals. The lumbar region was treated at all three visits and included myofascial release, muscle energy, and Still techniques. On the second and third visits, myofascial techniques were directed at the tissues deep to the LTCS scar in conjunction with trigger point injections.

Results: After three treatments, the patient reported greater than 50% reduction in back pain, resolution of surgical scar pain, and greater than 60% reduction in scar paresthesia. She also noted that the pain in her back was no longer constant and that she could now tolerate clothing touching and even compressing the scar.

Discussion: This patient's response to OMT suggests that it is a viable treatment option for improving prolonged post-epidural site pain. It also suggests that OMT combined with trigger point injections is an effective treatment for prolonged surgical scar allodynia. Further research is needed to illustrate the efficacy of these modalities for the indications presented.

ORIGINAL RESEARCH

Elexander Atkinson, DO, PGY3; Sophiah Kawachi, OMS II; Albert Kozar, DO, FAOASM, R-MSK

Effects of Osteopathic Manipulative Treatment (OMT) on the Thoracic Duct via Ultrasound Imaging

Background: Many OMT approaches target the body to create optimal function of the lymphatic system. One of the foundational principles of these treatments is the removal of restriction of the central lymphatic vessels. Hodges et al has shown increased lymphatic flow in animal models using lymphatic techniques; however, there is no human data if OMT changes the structure of lymphatic vessels. Recent studies have shown how to image the thoracic duct (TD) using ultrasound (US) with Hinton et al demonstrating a change in TD diameter with positional changes. These new protocols can allow us to measure the TD before and after OMT.

Objectives: We propose that lymphatic directed OMT causes a significant change in the diameter of the TD as measured by US.

Methods: This pilot study enrolled a convenience study of 7 healthy men and women aged 23-31. TD diameter was measured, using US protocols established in the literature. The Osteopathic assessment and treatment were performed by an ONMM3 resident using a principle-based protocol from the writings and teachings from Gordon Zink, DO. This included targeting the thoracic inlet, abdominal diaphragm, and major transition zones. Paired t-test were utilized to compare pre/post TD measurements.

Results: We saw a 0.18 mm increase in TD diameter (p value 0.045, difference ranged from 0-0.6mm) after OMT.

Discussion: We demonstrated that lymphatic directed OMT can change TD diameter in young healthy individuals. This data suggests that OMT is removing restrictions of terminal lymphatic vessels as part of its mechanism of action. Project limitations include participant number, nonrandomization, healthy subjects, and unblinded. This pilot attempt suggests a feasible measurement method and treatment approach for study expansion.

Amber Brown, DO, MS, PGY3; Eyovel Eyasu, OMS IV; Lauren Hoffmann, OMS IV; Paul Cooke, OMS IV; Devanshi Patel, OMS IV; Megan Schroeder, OMS IV; Steven Wooten, OMS IV; Jennifer Belsky, DO, MS

Osteopathic Manipulative Treatment, a Novel Adjunct in Sickle Cell Disease Care: Interim Safety and Feasibility Analysis

Background: Children and adolescent young adults (CAYAs) with sickle cell disease (SCD) suffer from severe pain, resulting in hospitalization and diminished quality of life. With substantial morbidity conferred by SCD-related pain, improved supportive therapies are needed. Osteopathic manipulative treatment (OMT) is a potentially valuable adjunctive therapy.

Hypothesis: OMT is safe and feasible for hospitalized CAYAs with SCD.

Research Design: Prospective, single institution, observational study evaluating CAYAs with SCD aged 3-26 years hospitalized at Riley Hospital for Children. IRB approval was obtained. Interim analysis included data obtained December 2022-July 2023.

Methods: Patients who reported pain were offered OMT. Verbal informed consent/assent were obtained. OMT was provided by trained osteopathic medical students under the supervision of a board-certified osteopathic physician. Safety was assessed by adverse event grading and pain by validated pain FACES scale. Feasibility endpoints were calculated as the percentage of OMT encounters offered and completed without interruption to inpatient care. Data were summarized using descriptive statistics.

Results: Eight patients received OMT, with 32 separate encounters and 60 unique areas of pain treated. Majority of patients were male (n=5, 62.5%) with median age 17.5 years (range 6.8-23.5 years). All OMT encounters offered were completed without care interruption. No adverse events occurred within 24 hours of OMT. Median FACES scores pre-/post-OMT were 9 and 7.5, respectively. FACES scores post-OMT were decreased (n=22, 68.8%) or unchanged (n=10, 31.3%) in all encounters. 100% of patients surveyed reported interest in OMT for future pain management.

Conclusion: OMT for hospitalized CAYAs with SCD is safe and feasible at interim analysis. The majority of patients had decreased pain following OMT. Findings support continued investigation into the potential efficacy of incorporating OMT into multimodal management of CAYAs with SCD.

Xavier DiSabato, DO, PGY3; Elexander Atkinson, DO, PGY3; Albert J. Kozar, DO, FAOASM, R-MSK; Luke Robinson, DO, DABMA; Edmond Dixon, OMS 1

OMT Improves Diaphragm Range of Motion on Ultrasound Imaging

Background: No research has been published quantifying OMT's effect on diaphragm motion. Improved diaphragmatic function is a frequent OMT goal. In 2023, our group presented a pilot study of healthy patients documenting increased diaphragm motion on ultrasound.

Objective/Hypothesis: This follow-up, prospective, pilot-study compared how OMT may affect diaphragm motion measured by ultrasound in a group of unhealthy participants versus healthy. We hypothesized OMT would have a greater effect in increasing diaphragm motion in unhealthy participants.

Methods: A convenience sample of 9 healthy and 8 unhealthy volunteers ages >18 were recruited. Unhealthy participants included subjects with a history of

chronic pain or systemic disease. Ultrasound assessment was completed by a trained ONMM3 resident including measurements of the bilateral zone of apposition (ZOA) and right diaphragm dome. Subjects underwent a principle-based osteopathic approach, by a second ONMM3 resident, using area of greatest restriction screening and a modified MOPSE protocol. Repeated measures ANOVA was used to evaluate differences between group means, pre-treatment and post-treatment means, and interaction effect between treatment and group.

Results: Post-OMT measurements demonstrated a statistically significant increase in left-sided ZOA excursion on maximum inhalation in the unhealthy group (1.249 cm) compared to healthy group (-0.687 cm) yielding a p-value=0.0384.

Discussion/Conclusion: Our results suggest a principle-based OMT sequence can increase diaphragm motion more in unhealthy subjects than in healthy. Project limitations include size, nonrandomization, non-homologous unhealthy group, and unblinded. A larger follow-up study including a more homologous unhealthy group may resolve a sampling error which may have led to the discordant decrease in left ZOA excursion in the healthy group and allow for finding right-sided statistically significant effects as right hemidiaphragm motion is smaller than left.

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OMT in Headache Management: Systematic Review and Meta-Analysis Protocol

Introduction: Previous systematic reviews exploring the effectiveness of OMT in treating headaches did not perform a pooled meta-analysis to investigate the effectiveness of various outcomes.

Objectives: This systematic review aims to provide pooled meta-analyses on the effectiveness of OMT in managing headaches due to musculoskeletal dysfunction and the associated harm outcomes. We hypothesize that OMT will be beneficial in improving headache symptoms that contribute to disability.

Methods and Results: Prospero registration: CRD42023449356. We will search multiple databases, including OstMed and PubMed, for randomized controlled trials (RCTs) investigating OMT for

musculoskeletal headaches in adults from the inception to September 2023. The eligible trials compare OMT techniques to another form of treatment. Outcomes of interest are headache frequency and severity, quality of life, disability due to headaches, and return to work; harm outcomes are dropouts due to ineffectiveness, adverse effects, and all-cause dropout rates. We will pool separately for individual outcomes according to OMT type and comparators. We will report effect estimates with weighted mean differences for continuous outcomes and odds ratios with 95% confidence intervals for binary outcomes. We will assess the risk of bias (ROB) using the modified Cochrane ROB for RCTs. We will determine heterogeneity in the pooled analysis based on the visual inspection of the forest plot and I² and where required we will explore the heterogeneity with the prespecified apriori. The Grading of Recommendations Assessment, Development and Evaluation assessment tool will be used for data synthesis and to assess evidence quality.

Conclusions: Our findings will be of importance to patients and osteopathic practitioners and will identify areas for future research on the inclusion of OMT in the management of musculoskeletal headaches.

Cristian Politi Gonzalez, DO, PGY3; Jonathan Torres, DO, MPA, FACOFP, FAAO

Evaluating the effects of Osteopathic Manipulative Treatments in Pregnancy Comparing the difference between outpatient versus inpatient treatments on incidence rates of C sections

Introduction: Osteopathic Manipulative Treatment (OMT), has a long history in pregnancy care. Historical literature 1900s supported the use of OMT during pregnancy for management of pain and other labor complications. Little research, however has examined its effects on the incidence of C-sections, especially when OMT is used in different medical settings.

Hypothesis: We hypothesized that there would be a lower C-section rate on patients who received longitudinal treatments compared with those receiving a one-time inpatient treatment during labor.

Methods and Results: This IRB-exempt retrospective cohort study of patients that were admitted to Morristown Medical Center (MMC) for labor management over 6 years. We included patients that either received OMT inpatient at MMC or in the outpatient clinic at the Morristown Family Medicine practice (MMCFM). We collected demographics and labor outcomes data.

We excluded patients with pre-eclampsia with severe features, Eclampsia, Placenta previa, placenta accreta, increta, percreta, and Uterine rupture. For our control, we compared a cohort of women with managed labors over this time period who never received OMT.

Conclusions: Review of the preliminary data further supports the benefits of OMT on labor outcomes, specifically reducing rates of C-sections. Although not achieving significance, trends show differences between longitudinal outpatient treatments and one-time inpatient treatment ($p=0.32$) and provide a basis for other OMT studies in this population. Further analysis will evaluate for differences in gravida status and number of regions treated.

Anne-Marie Kamp, PGY2; Timm J. Filler

Upon the neuronal supply of the human interosseous membrane of the forearm

Introduction: The interosseous membrane of the forearm (IOM) has been researched especially for its biomechanical function. Recently, mechanoreceptors have been discovered in the IOM, indicating that its sensory role in proprioception has been largely underestimated. The forearm is crucial for everyday tasks, and injury to the forearm can be limiting.

Objectives: This study aims to explore the IOM and its surrounding tissues for mechanoreceptors as well as for sympathetic innervation.

Methods and Results: We excised a cross-sectional piece of the proximal, medial, and distal parts of 14 IOMs of seven donors, three males, and four females. These portions were processed and histologically and partially immunohistologically stained. Then, these sections were scanned and analysed. Mechanoreceptors were classified according to their original descriptions. The Kruskal-Wallis test and the Mann-Whitney-U test were performed.

In 29 out of 42 IOM sections, mechanoreceptors were identified. However, in all sections, mechanoreceptors were identified in the surrounding tissues. In the IOM, Ruffini bodies, muscle spindles, Golgi-Tendon organs, and Vater-Pacini corpuscles were found. In addition, some sympathetic nerves were discovered within the IOM. In the tissues at the border to the IOM and surrounding the IOM Ruffini bodies, muscle spindles, Vater-Pacini corpuscles, and Golgi-Mazzoni corpuscles were discovered. Particularly interesting is the number of Golgi-Mazzoni corpuscles discovered. These are a subvariety of Vater-Pacini corpuscles composed of two or more

axons with corresponding capsules.

Conclusions: These findings prove that the IOM plays an important role in proprioception. Contrary to the current belief of having a solely stabilising function, the central band of the IOM and its surroundings are also richly innervated by mechanoreceptors. Therefore, we recommend considering the IOM and its surroundings as important proprioceptive structures.

Victoria Tschantz, DO; Nicole Fremarek, DO, MBA; Elizabeth Hammond, OMS IV; Shaunak Digambar, OMS II; Emma Vargas, OMS II; David Harden, DO; A. Hope Tobey, DO, FAAP, FACOP; Albert Kozar, DO, FAOASM, R-MSK

“That’s The Way We Have Always Done It”: Resetting the Hips

Introduction: “Resetting the Hips”(RTH) is taught and performed in Osteopathy to align the pelvis prior to diagnosing innominate somatic dysfunction (I-SD). The literature discusses RTH but efficacy has not been reported. Our 2023 ECOP survey confirmed variable COM teaching of active versus passive RTH. Our 2023 pilot study revealed no significant impact of RTH on I-SD diagnosis. This study aimed to further elucidate if RTH impacts I-SD diagnosis utilizing a statistically significant sample size, additional examiner, and stricter methodology. We

hypothesize RTH will not impact I-SD diagnosis.

Methods: We conducted a prospective, randomized control study of 150 OMSs into 3 groups: No RTH, active RTH, and passive RTH. An ONMM3 resident and OMM faculty performed blinded landmark assessments pre/post-RTH, while a second OMM faculty assessed only post-manuever. We utilized a paired design with RMLE-based score test comparison. Inter and intra-evaluator agreement was assessed using 3 methods: paired average proportion, intraclass correlation coefficients (ICC), weighted kappa symmetry.

Results: Following RTH (active & passive), I-SD diagnosis remained unchanged at both locations 78% of time (evaluator 1) and 47% (evaluator 2). Single locations remained unchanged: ASIS position: 87% (evaluator 1); 67% (evaluator 2); MM position: 87% (evaluator 1); 65% (evaluator 2). There was consistently poor agreement between 3 evaluators. For example, post-manuever ASIS diagnosis overall agreement, (43%, ICC 0.27); following RTH, (45%, ICC 0.31).

Discussion/Conclusion:

These findings support our hypothesis that RTH does not impact I-SD diagnosis per evaluator; however, overall interrater reliability was very poor and strict eye dominance did not impact results. Limitations include: recruitment population and interrater reliability. Future studies could evaluate subtle change vs marked landmark change diagnoses and other causes of poor interrater reliability. ■