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ISSN 2375-5717 (online)  ISSN 2375-5776 (print)

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Official Publication of the American Academy of Osteopathy®

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Editorial

View From the Pyramids: Color Blindness .............................................. 5
Janice Upton Blumer, DO, FAAO

Clinical Practice

An Osteopathic Perspective to COVID-19: Is There a Missing Link to Treatment? ................................................................. 7
Richard Chmielewski, MS, DO, FACEP(ret.), NMM/OMM

Case Report

Severe Viscerosomatic Neck Pain from Refractory Gastroesophageal Reflux ..................................................... 17
Jarrod Uhbrig, DO and Jean Rettos, DO
An Osteopathic Approach to Post-Partum Low Back Pain:
A Case Report ................................................................................. 23
Thomas R. Mehner, OMS IV, and Drew D. Lewis, DO, FAAO

The Immediate, Intermediate, and Long-Term Effects of Osteopathic Manipulative Treatment on Pulmonary Function in Adults with Asthma ............................................. 29
Kody M. Kasten, OMS IV; Samantha K. Tyler, OMS IV; Anna R. Johnson, OMS IV; Erika R. Kolakowski, OMS IV; Jonathan Pickos, OMS V; Katherine Heineman, DO; and Chunfa Jie, PhD

Regular Features

AAOJ Submission Checklist .......................................................... 4
CME Certification of Home Study ........................................ 15, 21, 28, 36

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<th>Rate</th>
</tr>
</thead>
<tbody>
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Questions? Contact editoraaoj@gmail.com.
I’ve often heard it said that if we are to resolve racial discord in our society, we need to adopt a “color blind” way of interacting with others. While I believe that this might help in the short term, I don’t know if it would work in the long term because it doesn’t get to the heart of the problem. The heart of the problem is that we need to see below the surface. We need to see each individual as a story of their life: their past and history, their entire being. We need to ‘be’ with them, empathize with them, and share in their joys and their sorrows.

Our country is at a crossroads in its history, with a movement brought out of years of social injustices, but now again in the limelight due to the technology of instant media. There have been many of these pivotal moments in the history of our nation where we later recognize them as the points the tides turned. While I am grieved by the social injustices and look forward to a time when all humans can be seen as humans, I know that my every day actions are the messages that speak the loudest.

As osteopathic physicians, we have been given a gift of seeing the story beneath the color of the skin. We use our hands to “see” our patients.

As osteopathic physicians, we have been given a gift of seeing the story beneath the color of the skin. We use our hands to “see” our patients, their history and how they have treated themselves along the way. When you see through touch, exterior appearances do not matter. Every individual is on a level playing field when palpation is your ‘go to’ tool. Not only do your hands not lie, they tell the story of what exactly happened to this individual through the tale of the body. So often a returning patient will come into my office with a new haircut or a different look and I won’t remember previously seeing them until I examine them with my hands. I think as osteopathic physicians, we are better for it. I say this because exterior appearances change, sometimes for the better and sometimes for the worse, but if we trust our hands, they will not lie.

When we choose to see a deeper version of our patient, we are given a gift in that way; the true story unfolds: stories of trauma, emotional abuse, physical difficulties, perhaps multiple surgeries, and stories of true healing. It is through empathetically understanding the stories your patients tell that you begin to understand that we, at our cores, are all the same. We may have a different story or exterior of our ‘house’, but we are living and breathing examples of what it means to be truly human. When you look at other humans in this light, exterior appearances fade away.

It is through the stories that my true understanding of my patients develops. It is through the trust they have in me to treat them gently as they navigate these stories that true healing happens. I am grateful to have had the honor to be trusted by my patients regardless of their exterior appearance, socioeconomic background, or the color of their skin. I truly believe that if everyone used this healing power of touch, we could all be in a better place right now. There is a sweetness about it that cannot be found in any other profession.

As the country is navigating the road to racial harmony, osteopathic physicians continue to do the work of attending to our patients’ stories and bodies one person at a time. Please join me in recognizing the power of touch to unite our society. Our nation is depending on us.

In Gratitude –

Janice Blumer, DO, FAAO
Some of our fellow AAO member physicians are struggling to pay dues this year.

Academy leadership is providing an opportunity for members to donate to help offset the cost of dues for physicians that may be struggling due to the effects of the pandemic.

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An Osteopathic Perspective on COVID-19: Is There a Missing Link to Treatment?

Richard Chmielewski, MS, DO, FACEP(ret.), NMM/OMM

Abstract
As the COVID-19 pandemic progressed across the globe, clinical reports and autopsies on patient deaths proved that the pulmonary complications were the result of an acute respiratory distress syndrome caused by an excessive inflammatory response; a cytokine storm. Through literature research and review it has become apparent to the author that the lymphatic system is a vital, somewhat overlooked, missing link in the treatment of COVID-19 pulmonary infection.

The major challenges the whole world is facing now have been a shortage of supplies such as PPE, or personal protective equipment, and intensive care facilities to treat the overwhelming numbers of COVID-19 cases, in under-developed countries as well as developed countries. Osteopathic manipulative medicine (OMM) and osteopathic manipulative treatment (OMT) have been proven, for over a century, to be very effective in the treatment of pulmonary diseases and previous pandemics. Osteopathic professionals must challenge the present paradigm of modern medicine which, only too often, relies less on the body’s own capacity to regulate itself, to compensate, and to heal, and more on outside intervention such as medications and vaccinations.

Osteopathic physicians are needed to step forward and discuss, explain, teach and train the importance of the lymphatic system as a major component of the circulatory as well as the immune system which plays a vital, pivotal, role in fighting diseases such as the COVID-19 coronavirus. A “viral infection protocol” (VIP), as discussed in this article, needs to be promoted as a mainstream adjunct, along with all of the other modalities of modern medicine, to health professionals and the public, in the event that the health care systems are overwhelmed.

The VIP treatment is easy to train and to certify practitioners, with proven results in other pulmonary infections and epidemics. It may prove invaluable in preventing clinical deterioration of masses of patients, who then would require more expensive, less available, and more dangerous technological interventions.

Introduction
Osteopathic manipulation has historically been central to, and a defining aspect, of the medical practices of DOs since 1892 when Dr. Andrew Taylor Still opened the first school of osteopathy. Surveys in recent years however, have shown that most DOs in the United States do not use osteopathic manipulative treatment (OMT) in their practice at all. The reasons for this are varied. These include the concepts not being reinforced in their residencies, lack of mentorship, and criticism of there not being adequate research or support from evidence-based studies. Moreover, many osteopathic medical students and practitioners assume that OMT is used only for musculoskeletal conditions.

We are in the midst of the COVID-19 pandemic, which is challenging health care systems all over the world. There are over 100 vaccine trials taking place throughout the world right now. Dexamethasone and remdesivir have shown some promise in lowering the morbidity of patients on respirators. Yet so far, 6 months since the World Health Organization designated the rising infections a pandemic, we have no vaccine or medications effectively treating or stopping the spread of the COVID-19 virus.

Treatments against the coronavirus, SARS-CoV-2, which is the
(continued from page 7)

causative agent of the COVID-19 pandemic, might not be enough to reverse these highly pathogenic infections. This opens the possibility to other therapies or modalities which might attack the pandemic infection at different physiological levels.

It has become apparent to this author that any rational medical treatment of COVID-19 infections must address the detrimental changes to the body’s lymphatic circulation and velocity of capillary flow in the pulmonary circulation. Intervening earlier in the infection, the body has a better chance of forestalling a deterioration of the patient’s oxygenation, acid-base balance, and CO2 retention, which in turn leads to a cytokine storm, collapse of the alveoli with accumulation of exudate and fibrin products, coagulopathy, hypoxia, cardiac arrhythmia, and ultimately, death.

Early Reports of a Novel Coronavirus Infection

First reports of a highly contagious virus affecting citizens in Wuhan, China came out in December 2019. By January, the first case in the United States was reported in the state of Washington. On March 11, 2020, the World Health Organization deemed the spread of the virus as a pandemic. The virus was soon dubbed the SARS-CoV-2 virus and the pandemic named the COVID-19 pandemic.

Reports on biopsies and autopsies declared that people were dying from a novel coronavirus. Serendipitously, two patients, initially operated on because of a diagnosis of lung cancer, tested positive for the COVID-19 infection.

There continues to be a paucity of autopsy reports from China and European countries, such as Italy and Spain, which were hit hard by the pandemic. There also were few autopsies in the United States because of the same fear of contagion and possible spread of the COVID-19 virus.

The CT scans of those early Wuhan patients’ lungs showed “ground-glass opacity (GGO)” suggestive of acute respiratory distress syndrome (ARDS). It was felt that these were the first cases to show early imaging and histological changes of COVID-19 infection.

From the report: “Pathologic examinations revealed that apart from the tumors, the lungs of both patients exhibited edema, proteinaceous exudate, focal reactive hyperplasia of pneumocytes with patchy inflammatory cellular infiltration, and multinucleated giant cells.” The lung damage is particularly noticeable and viscous secretions can be found seeping through the air sacs.

ACE 2 Receptors and COVID-19

The COVID-19 virus, SARS-CoV-2, enters the human body through a number of portals involving the upper respiratory tract, including the mouth and nose, and also possibly the eyes. Researchers have found a receptor, the ACE2 receptor, which allows the coronavirus to preferentially attach and eventually stick to cells in the lungs.

Other organ systems, through symptoms, tissue samples and autopsies, have been found to be attacked by the virus. These sites include the eyes, the olfactory system, the heart, and gastrointestinal system. This may explain why some patients exhibit symptoms of conjunctivitis, as well as loss of smell and taste.

ARDS

Clinical reports and subsequent autopsies on patient deaths from the SARS outbreak in 2003 and MERS epidemic of 2015 showed that these coronavirus infections were a result of acute respiratory distress syndrome, or ARDS. A more recent characterization of ARDS, developed by the European Society of Intensive Care Medicine in 2011 in Berlin and now called the “Berlin definition,” includes the following:

ARDS is an acute form of diffuse lung injury occurring in patients with a predisposing risk factor, meeting the following criteria:

1. Onset within 1 week of a known clinical worsening respiratory symptom;
2. presence of bilateral opacities on chest X-ray;
3. diagnosis of respiratory failure;
4. presence of hypoxemia.

Therefore, the autopsy and histology slide reports cited above from Wuhan provided the first clues that those patients died from hypoxia and alveolar collapse, as a result of ARDS.

Inflammation of the Alveoli and the “Cytokine Storm”

The signs and symptoms of acute inflammation overlap in pneumonia and acute respiratory distress syndrome (ARDS). This sometimes makes it difficult, early on, to tell the difference between them.

The epithelium of the upper and lower airways is the first site of defense and contact with inhaled agents. The breach of the body’s natural physical barriers and its defense mechanisms, such as the immune system, leads from a cascade of events to a cytokine storm.

(continued on page 9)
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The Cytokine Storm

The first reference to the term cytokine storm in the published medical literature appears to be by Ferrara et al.21 in 1993 in a discussion of graft vs. host disease: a condition in which the role of excessive and self-perpetuating cytokine release had already been under discussion for many years.22 It is believed that cytokine storms were responsible for the disproportionate number of healthy young adult deaths during the 1918 influenza pandemic. In the 2019 coronavirus pandemic, a number of deaths due to COVID-19 are now being attributed to cytokine release storms.23

A recent article in The Wall Street Journal discussed that “an immune system gone haywire may be doing more damage than the coronavirus itself in patients with the severest forms of COVID-19.”24 The theory behind this “cytokine storm” is that pathogens somehow trigger an overreactive immune response, leading to the release of cytokines.

Cytokines are small proteins involved in cell signaling and are central to our immune responses.25,26 They are produced by a variety of immune cells, including macrophages, B lymphocytes, T lymphocytes and mast cells, as well as endothelial cells, fibroblasts, and various stromal cells.27,28 The prevailing “cytokine storm” theory is that an inflammatory response is initiated by an infection of the COVID-19 virus as it attaches to ACE2 membrane receptors and infects lung cells.29,30,31,32

Slowing of the Velocity of Blood through the Capillaries

Blood return through capillary venules and into the veins is not simply the direct result of a pressure wave generated by ventricular contraction down through the circulatory system. Instead, venous return depends on skeletal muscle action, respiratory movements, and constriction of smooth muscle in venous walls.33

Approximately 24 liters of fluid per day flow through and are filtered by capillaries in the average human body. About 21 liters return to the venous end of the capillaries, as described by the principles of Starling’s Law. The remaining 3 liters of fluid, bathing cells in the vicinity of the capillaries, is picked up by minute vessels of the lymphatic system with their one-way valves. These valves assure that there is a unidirectional flow of lymphatic fluid back into the veins and the right side of the heart. A major function of the lymphatic system, therefore, is to return the fluid (lymph) to the blood. It is the body’s own “sewer system,” making sure that fluid that had filtered out of the capillaries is eventually returned, making it a closed system. Lymph may therefore be thought of as recycled blood plasma.34

Historically, interstitial edema is thought to be largely the result from an increased leakage of fluid and proteins from the capillaries and venules into the interstitium, or extracellular space. However, in inflammatory situations such as with viral or bacterial infections, mediators of inflammation, released in the vicinity of lymphatic vessels, have been shown to directly affect the lymphatic smooth muscle and alter lymphatic pumping.35

Those lymphatic smooth muscle cells are pivotal to the role lymphatic vessels play in achieving tissue fluid homeostasis.36 It is apparent from both experimental and clinical studies spanning several decades that inflammation has been shown to be a critical component in the pathophysiology of interstitial as well as gross lymphedema.37

The Lymphatic System: The Missing Link to Our Present Perspective on Treatment of COVID-19?

The capillaries leak proteins, especially albumin, between contiguous endothelial cells on a regular basis. The resulting colloidal osmotic pressure from these leaked proteins draws fluid into the interstitium and thus, into the alveoli.

A cascade of events is triggered by a COVID-19 infection, resulting in a slowing of the flow of blood through the capillaries, leading to further leakage of protein and fluid, furthering of the “cytokine storm,” and deposition of fibrin and other proteins into the alveoli. Finally, the lymphatic channels are prevented from drawing the interstitial fluid away from the alveoli and back into the venous system.

This finely tuned lymphatic drainage system, or “sewer system,” now no longer functions normally. The destruction of this previously closed system now results in the pulmonary manifestations of COVID-19 infection, the resultant “cytokine storm,” deposition of fibrin products into the alveoli, hypoxia and CO2 retention, and the ultimate development of ARDS and death.

Challenges to Treatment of COVID-19 Infection

The public is clamoring for treatments now to fight the infections and complications of the COVID-19 pandemic. Doctors in China, Europe and the United States are trying all sorts of drugs and treatment protocols to try and save people from needing those ventilator supports, and from dying. Some of these are novel interventions, have not been tried before, are remedies that have not yet passed clinical trials nor met FDA approval.38
Medications like hydroxychloroquine (an anti-malarial agent also used to treat lupus and rheumatoid arthritis), remdesivir (an antiviral drug), lopinavir and ritonavir (both anti-HIV drugs), and dexamethasone have been or continue to be evaluated in research trials. Convalescent plasma from patients who have recovered from the COVID-19 infection is also being researched as an additional alternative treatment. Some of these approaches, such as dexamethasone and remdesivir, have shown encouraging, statistically significant outcomes. They need to be tested in larger, randomized, double blinded clinical trials in order to scientifically assess their effectiveness, and in what level of exposure or stage of infection.

Preparing for the Next Pandemic
Globally, there is an extremely limited supply of medication, disinfectants, personal protective equipment, monitors, and machines with which to handle the thousands, and millions of potential cases that may develop ARDS from the COVID-19 infection. This will become dramatically more apparent if there is a second global “surge” of cases, especially in the fall of 2020. It will be glaringly apparent in poorer countries with less access to technical medical supplies, poorly funded healthcare, or too few medical professionals to provide for their people.

Is there anything we can do to avoid this course? The answer is a qualified “yes,” depending on how everyone, from world leaders to local elected officials, decides to respond. We need bold and timely leadership at the highest levels of government in the developed world; these governments must recognize the economic, security, and health threats posed by future pandemics and invest accordingly. The resources needed must be considered in light of the inevitable costs of failing to invest in such an effort.

Osteopathic Manipulative Medicine: Can We Rise to the Challenge?
The COVID-19 pandemic is a challenge to the basic foundation and philosophy of the osteopathic medical profession. The tenets of osteopathic medicine, as approved and adopted by the American Osteopathic Association, state that:

1. The body is a unit; the person is a unit of body, mind, and spirit.
2. The body is capable of self-regulation, self-healing, and health maintenance.
3. Structure and function are reciprocally interrelated.

4. Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the inter-relationship of structure and function.

It is believed that the osteopathic concept, originally developed by Dr. Andrew Taylor Still and refined as the four tenets of osteopathic philosophy, possesses key elements of the effective treatment of serious viral respiratory diseases, including the present COVID-19 pandemic. Quoting Dr. Still, “I have successfully treated many cases of pneumonia, both lobar and pleurotic, by convecting the ribs at their spinal articulations….I carefully adjust misplaced ribs….The osteopathic prognosis for speedy relief of influenza is good when the osteopath has been called to the case within reasonable time.”

An Overview of Osteopathic Techniques Used During the 1918 Influenza Pandemic
The osteopathic medical literature during and after the 1918 influenza pandemic documented techniques which evolved into what, today, can be called a “viral influenza protocol” (or VIP treatment), a series of manual techniques for viral upper and lower respiratory infections.

The central components, with variations, include:

1. Rib Raising
2. The Thoracic Pump
3. The Liver Pump
4. The Spleen Pump
5. The Pedal Pump (Dalrymple Treatment)

Rib Raising
Rib raising is an osteopathic manipulative treatment technique used to address restricted excursion of the rib cage and to modulate sympathetic nervous system (SNS) activity. According to one description with the patient supine, the operator standing at the patient’s head, raises the ribs by grasping the muscle folds of the pectoralis major and the serratus anterior muscles, gently leans back, thereby elevating the rib cage, enhancing the action of his or her fingers.

The most impressive historical example of the successful application of rib raising—as well as of the thoracic lymphatic pump—occurred during the 1918 influenza epidemic. According to statistics in Georgia W. Walter’s The First School of Osteopathic Medicine: A Chronicle, the estimated nationwide mortality rate for
patients who received conventional medical care during this epidemic was 30% to 40%. By contrast, for the 110,120 patients who received such osteopathic care during that epidemic, the mortality rate from influenza was 0.25%.\textsuperscript{49}

**The Thoracic Pump**

The Swedish anatomist Olof Rudbeck in the 1650s stated that lymphatic circulation is an integrated system that is separate from blood circulation.\textsuperscript{31} Over the ensuing centuries protocols of movement and massage which indirectly addressed concepts of circulation and lymphatic drainage were developed.\textsuperscript{52,53,54}

Dr. Still developed a medical system designed to facilitate natural healing processes by finding and correcting anatomical deviations that interfere with the free flow of blood and lymph and with the so-called “nerve force” in the body. He created an approach to manual medicine, in which for the first time, the lymphatic system held an important place—though for him the lymphatics were still a “mystery to solve.”\textsuperscript{55} Dr. Still admitted, “Possibly less is known of the lymphatics than any other division of the life-sustaining machinery of man.”\textsuperscript{56}

In 1920, Dr. C. Earl Miller popularized a “thoracic pump” technique to treat many types of infections including pneumonia. He wrote that “too little attention is given to the lymph and its function.” He also agreed that “the normal circulation of body fluids is absolutely essential to normal activities of body function, as well as the health and well-being of the individual.”\textsuperscript{57}

There are many variations of techniques for thoracic pumping depending on circumstances and the comfort of the patient. The principle of thoracic pumping is to rhythmically compress the upper ribs into exhalation or vibrating them while the patient goes through excursions of exhalation to inhalation.

A variation taught to this author involves progressively following the ribs more and more into exhalation (easily up with each inhalation to allow the lungs to fill with air) and when at the point of end exhalation, holding the ribs down as the patient starts to inhale. During inhalation the ribs, which were momentarily held in exhalation, are suddenly released “like popping a cork from a champagne bottle,” and air is allowed to rush into the lungs again.

**Hepatic Pump - Supine position**

There are many variations of the hepatic pump technique, from supine to lying in the left lateral decubitus position. One such variation is:

The physician stands at the right side of the patient, facing slightly caudad, with his or her right hand beneath the lower ribs. The left hand is set atop the anterior lower ribs. Using a gentle, rhythmic motion the anterior ribs are pressed lightly downward and caudad at an angle of about 45 degrees. Reciprocally, the posterior lower ribs, at about the level of the liver are stretched upward and cephalad at an angle of about 45 degrees. The rate of rocking or light compression is about 100-120 times per minute. This pumping action is repeated 50-70 times.

**Splenic Pump - Supine Position**

This technique is identical to the supine liver pump, except that all of the directions are reversed to reflect the fact that the spleen is located on the left side of the body. Some contraindications of the thoracic and splenic pump include osseous fractures, certain stages of carcinoma including metastases, enlarged or tender spleen as with infectious mononucleosis, osteoporosis, skin disorders, such as lacerations and burns, or cellulitis at the point of physician contact with the patient.

**Pedal Lymphatic Pump**

The physician stands at the feet of the supine patient. The physician grasps the feet and introduces a gentle, rhythmic dorsiflexion. The umbilicus is used as a landmark to appreciate a wave of motion transmitted from the feet into the abdomen. This results in a massaging of the intestinal lymphatic vessels as well as the liver, spleen and diaphragm. As the rebound wave returns to the feet, the dorsiflexion is continued, thereby creating an oscillatory pump.\textsuperscript{58} The rate of rocking is about 100-120 times per minute. This pumping action is repeated 50-70 times.

**Summary and Perspective**

The COVID-19 pandemic is a colossal challenge to our scientists, our medical providers, our health policy experts, and especially to prevailing paradigms being used in testing or approving treatments against it. The urgency to contain the pandemic can also provide an opportunity to integrate perspectives or protocols of treatment that have been used in the past with various degrees of success.

Researchers and our health professional colleagues don’t hesitate to throw whatever new drug, concoction, blood transfusion, breathing exercise, supplements or diet “against the wall,” during this horrible pandemic, to “see what sticks.” If our worst fears become reality, the COVID-19 pandemic will not be a “war,” rather it will be a “slaughter,” as more people of all ages succumb to a second or third “surge” of new infections or re-infections.
The global economy, while not yet collapsing, has declined precipitously, and may take years to recover. Employment, property values, supply chains in the food and manufacturing industries, have all suffered immeasurably. Inflation, clean water and proper medical care before December 2019, were already at or below the breaking point in many underdeveloped parts of the world and are now worsening.

Ventilators and oxygen, suction equipment and PPE material, and ICUs and intensive care personnel would be in short supply in the event this pandemic stretches out for months or continues to grow. The scales would tip away further if there were a “second surge” of even more COVID-19 cases in the fall of 2020 simultaneously with the seasonal influenza.

The osteopathic manipulative treatment techniques and their therapeutic effects on the lymphatic system have withstood the test of time for more than a century. These OMT techniques are based on sound anatomical and physiological science. They are not some whimsical ideas dreamt up, to be thrown up against some allegorical wall to “see if they stick,” that is, if there is any merit to them.

The osteopathic profession never could, during the 1918 influenza epidemic, nor can it now muster enough physicians to treat most of the patients who have confirmed or suspected cases of COVID-19. Even with a vaccine (which we are told wouldn’t be ready for at least a year or more), or medication (of which we presently have no truly effective choices), it would not provide enough treatment quickly enough for the entire population of the United States, or Europe, let alone countries and continents such as Central and South America, India, China, Russia, or Africa.

I suggest that we, as a profession, collectively promote the osteopathic paradigm of healing to our medical colleagues, and researchers, and legislators. We need to teach, without apology, the importance of the lymphatic system as a central component of the circulatory and immune systems in health and disease. We need to review the various OMM/OMT protocols and rationale for viral illnesses and teach them to all levels of medical providers. We should be ready to train whole cadres of providers for implementation of the simplified VIP treatment. This should include mid-level providers, physical therapists, massage therapists, chiropractors, and possibly even the general public.

The VIP is easy to administer, with minimal training, and is much cheaper than using ventilators, extracorporeal membrane oxygenation (ECMO), and might mitigate the need to use other expensive medicines. Offered early in the course of COVID-19 infection it might lessen the need for ventilators in the first place. With proper training resources, the VIP could be offered across cultures and economic barriers to treatment, offering help and hope in those areas of the world, to those who otherwise may not have vaccine, an effective affordable medication, an ICU team and specialists, or enough PPE materials.

Acknowledgements

Dennis J. Dowling, DO, FAAO
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Family Medicine Department
Nassau University Medical Center,
East Meadow New York

I would like to acknowledge my friend and mentor, Dr. Dowling who, at an AOA convention in Las Vegas in 2009, introduced me to the osteopathic techniques used during the 1918 influenza pandemic. His teaching was seminal in stimulating me to research osteopathic history and research on how they offer an additional approach to treating all sorts viral infections including the 2009 H1N1 influenza pandemic and the present COVID-19 pandemic.

References

(continued from page 12)


(continued from page 13)

The purpose of the continuing medical education quiz is to provide a convenient means of self-assessing your comprehension of the scientific content in the article “An Osteopathic Perspective to COVID-19: Is There a Missing Link to Treatment?,” by Richard Chmielewski, MS, DO, FACEP(ret.), NMM/OMM.

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Name of article: "An Osteopathic Perspective to COVID-19: Is There a Missing Link to Treatment?"

Authors: Richard Chmielewski, MS, DO, FACEP(ret.), NMM/OMM


AOA Category 2-B credit may be granted for this article.

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Complete the quiz to the right by circling the correct answers. Send your completed answer sheet to the American Academy of Osteopathy. The AAO will forward your results to the American Osteopathic Association. You must answer 75% of the quiz questions correctly to receive CME credit.

Below are the answers to The AAO Journal’s June 2020 quiz on the article titled “Hypertension: An Osteopathic Perspective” by Helena Prieto, BA, OMS V; Nicole Pena, DO; Jay H. Shubrook, DO; and Joel Talsma, MS.

1. b. Lateral horn.
3. c. The somatic dysfunctions of that patient on that day.
4. b. Measure BP in at least 1 leg.
New E-Learning CME on OMM Techniques for COVID-19

The AAO has partnered with the American Osteopathic Association to offer an e-learning module to help review applicable OMM techniques for COVID-19 or suspected COVID-19 patients.

OMM Techniques for COVID-19

New CME E-Learning Opportunity

The American Academy of Osteopathy (AAO) has partnered with the American Osteopathic Association (AOA) to offer an online learning activity to help you review applicable OMM techniques for optimizing pulmonary function in COVID-19 or suspected COVID-19 patients.

The e-Learning module, titled, “Osteopathic Manipulative Medicine (OMM) Techniques Addressing Respiratory Symptoms of COVID-19” will provide a refresher in applicable OMM techniques.

Free for all members and non-members, this patient-centered CME will offer 1.0 AOA 1-B credit or 1.0 AMA PRA Category 1 Credits™.

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Severe Viscerosomatic Neck Pain from Refractory Gastroesophageal Reflux

Jarrod Uhrig, DO and Jean Rettos, DO

Abstract
This is a case of a 73-year-old female with achalasia, hiatal hernia, and prior failed laparoscopic Heller myotomy with Dor fundoplication suffering from severe gastroesophageal disease. The patient developed debilitating neck pain associated with her severe gastroesophageal reflux disease (GERD). She underwent a comprehensive musculoskeletal workup that included a cervical computed tomography (CT) scan and magnetic resonance imaging (MRI). The radiologic imaging results proved unremarkable for identifying the cause of her neck pain. Pain management, neurology, and neurosurgery consultations were unable to provide an etiology that explained her symptoms. Searching for methods of treatment to relieve her neck pain, she received osteopathic manipulative treatment (OMT) focused on somatic dysfunction of both the musculoskeletal system and viscera. The results of osteopathic treatment significantly improved her symptoms. Although OMT provided temporary relief of her neck pain, her GERD symptoms persisted and her neck pain gradually returned. Since a comprehensive workup for neck pain revealed no etiology and she had positive responses to OMT, including treatments focused on the viscera, we attributed her neck pain to a viscerosomatic response of gastrointestinal disease. This case report demonstrates the benefit that osteopathic manipulative treatment provides in diagnosis and treatment of uncommon causes of neck pain such as that resulting from viscerosomatic reflexes. Identifying viscerosomatic reflexes can broaden differential diagnoses and lead to better patient care.

Background
One of the tenets of osteopathic medicine is the philosophy that the body is a unit. A second tenet is that structure and function are reciprocally interrelated. The concept of viscerosomatic reflexes, in which inflammation activates afferent neurons that lead to segmentally related tissue texture and motor changes, is well documented. Numerous animal studies in the mid-1900s support the viscerosomatic concept. In these studies researchers placed stress on specific viscera. After the stress was applied, the researchers noted contraction or relaxation of musculature in the axial spine or limbs. A common example of this interrelationship is seen with emotional distress or other psychological influence on irritable bowel syndrome symptoms through vagal regulation. Despite the widespread acceptance of this phenomenon, many physicians still overlook its importance during the workup and treatment of various symptoms. As of 2010, it was estimated that chronic pain affects 100 million Americans and has associated costs in the United States between 560 and 635 billion dollars annually. As health care professionals, a key part in solving these cases is identifying and treating the correct source of pain. By recognizing the precise sources of pain, physicians can provide successful treatments which avoid unnecessary and costly diagnostic and treatment approaches.

This case report describes a woman with persistent neck pain linked to her severe gastroesophageal reflux disease (GERD). The upper gastrointestinal tract has sympathetic innervation from spinal cord levels T5-9. Parasympathetic innervation of the upper gastrointestinal tract is from the vagus nerve (cranial nerve X). The vagus nerve originates at the medulla oblongata and exits at the base of the cranium through the jugular foramen. After exiting, the vagus nerve travels through the cervical and thoracic regions to provide

(continued on page 18)
parasympathetic innervation to much of the viscera. In the thorax and abdomen, the vagus nerve provides innervation to the heart, lungs, stomach and most of the intestines. The vagus nerve is critical to proper function of the stomach. One method of surgically treating severe GERD is cutting the vagus nerve (vagotomy). This procedure has been used as a treatment for refractory peptic ulcer disease, and chronic duodenal ulcers. Vagotomy is effective by decreasing the hyperacidic environment in the stomach by denervating parietal cells.6

Report of Case
This is a 73-year-old female with at least 15-year history of achalasia and hiatal hernia with prior laparoscopic Heller myotomy with Dor fundoplication four years ago for persistent gastroesophageal reflux disease (GERD). About one year after her initial surgery, she began to have regurgitation of food while lying supine. At the same time, she experienced severe musculoskeletal cervical pain. She described a severe aching pain deep at the base of the skull, near C1, more prominent on the right side. She denied any history of similar neck pain or recent trauma to the area. Her neck pain was noted to be worse when she experienced reflux which included burning pain, difficulty swallowing, and regurgitated food. She had intermittent dizziness with her neck pain but did not have any focal weakness, numbness, or visual changes.

She was seen by a gastroenterologist, who performed esophagogastroduodenoscopy (EGD) and BRAVO reflux recording which revealed esophageal ectasia consistent with a slipped fundoplication as well as Los Angeles Grade D reflux esophagitis. Testing for Helicobacter Pylori was negative. She was referred to a tertiary care center for further evaluation. Ultimately, after several further evaluations, she was recommended to have repair of her fundoplication. Due to the extent of disease, surgical intervention was unsuccessful. She continued to experience significant reflux, as well as neck pain, after the repair. She was kept on a combination of proton pump inhibitors (PPI) with H2 blockers along with sucralfate, which improved her symptoms, but did not resolve them.

The patient had extensive workup and consultation for her neck pain, including a CT scan of the cervical spine which showed mild facet arthropathy from C2 through C6 but no other arthritic changes. She had old compression fractures at C7 and T2 which were unchanged from exams prior to her new symptoms. There was no significant central canal stenosis seen on imaging. Follow-up MRI demonstrated consistent findings and also revealed no stenosis of the spinal canal or foramen. During workup, she also had brain MRI which showed no related abnormalities.

She sought consultation with pain management, neurology, and neurosurgery specialists who agreed that there were no local musculoskeletal findings which could explain her symptoms. In looking for alternative treatments, she pursued osteopathic manipulative treatment (OMT) for her symptoms. In evaluation, she had significant dysfunction not only of the upper cervical spine but also of the epigastric abdomen.

She underwent several osteopathic treatment modalities including visceral and myofascial techniques. She responded well to osteopathic treatment focused on her neck with improved mobility and symptomatology. We chose to treat her neck pain primarily with functional positional release (FPR) of the cervical spine since she tolerated indirect treatments well. Gentle muscle energy was used, if needed, to fully release the muscle tension in the upper cervical region.

Interestingly, she had even greater improvement in her neck pain with OMT focused on her abdominal distress. We used indirect myofascial techniques for release of restriction primarily in the epigastric region. To help with resetting aberrant sympathetic responses, we used celiac ganglion and superior mesenteric ganglion release along with FPR of thoracic vertebrae as needed. Parasympathetic tone from the vagus nerve was addressed with suboccipital release and cranial techniques such as CV-4 decompression and vault hold. Improved cranial rhythm was noted after treatments. Lymphatics were addressed with thoracic outlet, abdominal, and pelvic diaphragm releases.

This sequence of treatments did well to lessen her abdominal discomfort, reflux, and neck pain. However, resolution of her pain was temporary. Her neck pain would return after a few days since her reflux did not ever fully resolve due to underlying structural dysfunction from her prior failed surgery and chronic inflammation. On repeat examination, she had recurrent paraspinal hypertonicity in the upper cervical area as well as epigastric fascial restrictions.

She underwent physical therapy and trigger point injections of the upper right cervical spine, both of which improved her neck pain marginally. Muscle relaxers were helpful but not tolerated well due to dizziness. Ibuprofen and acetaminophen both marginally improved her symptoms. Opioids gave her symptomatic improvement but were not tolerated well due to dizziness and near syncopal episodes even at small doses.

Despite progress with manual therapies, the results were short lived. She continued to have significant structural abnormalities of the
The AAO Journal  •  Vol. 30, No. 3  •  September 2020

The combination of OMT techniques was used to treat not only the neck pain, but also the GERD since we believed this to be the underlying cause for her condition. We focused on techniques which would be well tolerated. Other options for the axial spine could have included strain-counterstrain or functional methods since these are both gentle indirect techniques which can be very effective at correcting dysfunction. Aberrancy of the sympathetic and parasympathetic responses was crucial to treating the visceral component of her condition. Since she had a chronic abnormality of her gastric function, these systems were expected to have dysfunction which was found on exam with irregular sympathetic and parasympathetic findings.

Her symptomatology is understandable due to the course of the vagus nerve which travels to the stomach after exiting the cranium through the jugular foramen and through the cervical region. The patient had pain on the right side of her head and neck near the jugular foramen. Visceral dysfunction, such as that from the stomach and esophagus, influences both sympathetic and parasympathetic nervous systems. Visceral input through a viscerosomatic reflex manifests itself as pain in distant parts of the body. Although we could not completely inhibit the viscerosomatic response and restore normal gastric function with OMT, the patient’s pain would temporarily resolve. Because of the chronic disease and prior failed surgery, she had structural disease which was not compatible with allowing the gastritis to fully resolve. Since this was still present, she suffered repeat flares even after treatment. This made complete symptom resolution challenging due to the severe damage to the esophageal and gastric mucosa and we believe this was our greatest barrier to correcting her symptoms.

Another interesting finding in this patient’s case was the sudden worsening of symptoms after the radiofrequency ablation. This relationship is harder to explain but perhaps the ablation process could have led to a separate somatovisceral response, thus leading to decreased gastric motility. Although the ablated nerves do not directly connect to the abdominal viscera, muscles such as the trapezius travel through both the cervical and thoracic regions, influencing sympathetic innervation. The gastric and esophageal sympathetic innervation found in the thoracic region directly influences the upper GI tract leading to a significant change in the ability of the system to optimally function.5

Despite her grim outlook after her hospitalization, she has had slow but remarkable improvement with the help of OMT. We feel the treatments outlined have helped to progressively restore musculoskeletal and visceral motion as well as sympathetic, parasympathetic, and lymphatic function to allow for a remarkable recovery.

(continued on page 20)
Continuing Medical Education Quiz

The purpose of the continuing medical education quiz is to provide a convenient means of self-assessing your comprehension of the scientific content in the article “Severe Viscerosomatic Neck Pain from Refractory Gastroesophageal Reflux,” by Jarrod Uhrig, DO and Jean Rettos, DO.

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Authors: Jarrod Uhrig, DO and Jean Rettos, DO


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Complete the quiz to the right by circling the correct answers. Send your completed answer sheet to the American Academy of Osteopathy. The AAO will forward your results to the American Osteopathic Association. You must answer 75% of the quiz questions correctly to receive CME credit.

1. What is the sympathetic innervation for the stomach?
   a. T1-5
   b. T5-9
   c. T10-11
   d. CN X

2. What is the interrelationship called when dysfunction of a musculoskeletal structure leads to functional changes in a body organ?
   a. Viscerosomatic Reflex
   b. Chapman's Point
   c. Somatovisceral Reflex
   d. Painful Stimulus

3. Where does the vagus nerve (CN X) exit the cranium?
   a. Jugular Foramen
   b. Foramen Magnum
   c. Stylohyoid Foramen
   d. Hypoglossal Canal

4. Which of the following is NOT innervated by the vagus nerve (CN X)?
   a. Heart
   b. Laryngopharynx
   c. Upper gastrointestinal tract
   d. Bladder

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Frontline Perspectives: COVID-19 and OMM

CME E-Learning Opportunity - Treating COVID-19 Patients Using OMM

The American Academy of Osteopathy (AAO) has partnered with the American Osteopathic Association (AOA) to offer a new online learning activity with first-hand accounts from the frontlines.

The e-Learning module, titled, “Frontline Perspectives On Treating COVID-19 Patients Using OMM” features Hugh M. Ettlinger, DO, FAAO, FCA, an OMM residency director at Saint Barnabas Hospital in the Bronx, New York and his colleagues sharing surprising insights from treating COVID-19 patients with OMM.

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After completing this activity, learners will be able to:

- Identify common physical findings being seen in COVID-19 patients undergoing OMM.
- Summarize modifications of OMM techniques appropriate for patients with COVID-19.
- Discuss the physical and emotional burdens on the clinicians treating COVID-19 patients.

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Abstract
Low back pain is a common occurrence in pregnant and non-pregnant patients. Pregnancy causes many anatomic and physiologic changes in the body and invariably leads to altered stresses on the musculoskeletal system. These alterations in the body can persist into the post-partum period as somatic dysfunctions. This case report outlines the importance of an osteopathic approach to address somatic dysfunctions related to low back pain of the pregnant and/or post-partum patient.

A 39-year-old female presented with low back pain that was exacerbated by her pregnancy, which has continued into the post-partum period. She was found to have significant somatic dysfunctions related to her condition. An osteopathic approach was utilized to relieve her low back pain and improve her function with all the duties required to care for a newborn.

Background
Low back pain (LBP) is one of the most common presentations to primary care offices. The prevalence varies, but estimates are between 60-70% of patients will experience LBP during their pregnancy. Pregnant patients with LBP report the pain interferes with their ability to continue working and even activities of daily living. Pregnancy has extensive physiologic effects on the body that involve multiple systems of the body and the musculoskeletal system. In a review on LBP and pelvic girdle pain in pregnancy, Casagrande et al. presented 3 main causes. The first being hormonal changes that lead to increased ligament laxity, especially in the sacroiliac joints and pubic symphysis. The second being an enlarged, gravid uterus which stretches and weakens abdominal musculature, causing strain in lumbar musculature to compensate. Lastly, the pelvis rotates anteriorly due to the enlarging uterus, leading to an anterior shifting of the center of gravity, with a resultant compensatory lumbar spine hyperlordosis and increased load on the lumbar spine musculature.

The pregnancy-induced changes in the musculoskeletal system cause alterations in biomechanics and can lead to muscle imbalances, increased stress on joints, and changes in soft tissue structures, including the fascia. Somatic dysfunctions related to those changes can be corrected with various osteopathic techniques and stretching exercises, thereby providing symptom relief through increased range of motion, tissue texture changes and muscle symmetry. Low back pain during pregnancy has been shown to continue into the post-partum period with about half of women having continued LBP one year after delivery. The continuation of symptoms in the post-partum period support the use of osteopathic manipulative treatment (OMT) to relieve symptoms during pregnancy and after delivery.

To address patients with chronic low back pain, Philip Greenman, DO, FAAO, detailed the “dirty half dozen” in the failed low back syndrome. Six somatic dysfunctions were found to be common causes of continued low back pain and can be addressed with OMT and exercises. The dysfunctions include nonneutral dysfunction of the lumbar spine, dysfunction of the pubic symphysis, backward sacral torsions or an extended sacrum, superior innominate shears, short leg or pelvic tilt syndrome, and muscle imbalance of the trunk and lower extremities. The changes involved with pregnancy will predispose patients to the majority of these 6 dysfunctions.

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Disclosures: none reported.
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Submitted for publication April 8, 2020; final revision received July 21, 2020; manuscript accepted for publication September 9, 2020.

(continued on page 24)
One of the lumbar muscles that could be strained in pregnancy is the quadratus lumborum. This trunk muscle is also included in the dirty half dozen dysfunctions.

Travell and Simons\(^8\) detailed the relationship of superficial quadratus lumborum trigger points (TrPs) and their pain referral patterns into the groin and iliac crest. The ability to recognize these referral patterns can clue clinicians into the potential muscles involved. In addition to OMT for somatic dysfunctions causing or contributing to muscle imbalance of the trunk and lower extremities, manual stretches and home exercise prescription can also be beneficial. The home exercise prescription for the quadratus lumborum involves the patient lying in the lateral recumbent position with the involved side towards the ceiling, with the involved leg is adducted off the side of the table/bed and the patient’s arm on the involved side reaching overhead, the stretch is held for up to 30 seconds. This can also be performed similarly in the standing position.\(^7\)

The purpose of this case report is to provide an osteopathic approach to a patient with low back pain during pregnancy and the post-partum period, with multiple significant somatic dysfunctions, especially in the quadratus lumborum muscle. Optimal management of the patient’s recovery included addressing significant somatic dysfunction and stretching prescription for persistent muscle tightness.

**Report of Case**

**History of Present Illness**

A 39-year-old female presented to the clinic, 10 weeks post-partum, with a chief complaint of 18 months of right low back and hip pain. The pain was less prior to pregnancy and gradually worsened throughout the pregnancy. After the child was born the pain did not improve or worsen. The pain is 5/10 on average, constant and described as aching and tightness in the back with stabbing pain radiating into the right groin (see Figure 1). The symptoms worsen when crossing her legs, standing and walking. Sitting without her legs crossed alleviates the pain. She has difficulty finding a comfortable sleeping position secondary to pain. She notes being cautious with bending forward, due to fear of worsening the pain. She reported using acetaminophen as needed for pain control. She has a history of an acute episode of LBP, 7 years prior to this episode, that was relieved by chiropractic adjustments and pool exercises. She has no imaging for current issues. Her goal is to “be pain free eventually.”

**Medical History and Review of Systems**

Medical history was significant for congenital adrenal hyperplasia managed with prednisone and fludrocortisone. Surgical history of Caesarean section, cholecystectomy and laparoscopic gastric banding. Social and family history was non-contributory.

**Physical and Osteopathic Structural Exam**

The patient’s vitals were stable. The patient was awake, alert and oriented times three in no acute distress. She was well dressed and well nourished. A modified ASIA (American Spinal Cord Injury Association) neurologic exam was performed for the lower half of the body.\(^9\) Sensation was intact to light touch in the bilateral L2-S2 dermatomes. Deep tendon reflexes were 2/4 in the bilateral patella and 2/4 in the bilateral Achilles. A motor exam revealed 5/5 full strength in lower limb muscles assessed, including hip flexors (L2), knee extensors (L3), ankle dorsiflexors (L4), great toe extensors (L5), and dorsiflexors (S1). Plantar reflex responses were downward on the left and equivocal on the right. Clonus at the ankle was not present bilaterally. Cranial nerves were grossly intact.

Abdominal exam revealed normoactive bowel sounds. Abdomen was soft, non-tender, non-distended. No masses were appreciated.

Gait exam revealed normal stride, heel/toe progression without gross asymmetry or deviation.

**Figure 1. Pain diagram on initial visit intake form. Legend: \(\bullet\) = aching; / / / = stabbing; ### = weakness**

(continued on page 25)
Active lumbar (trunk) range of motion (ROM) side bending to the left was reduced with a “pulling sensation” produced on the right side. Oblique rotation to the left produced pain on the right side.

Iliac crest was elevated on the right side with the patient standing.

FABER (Flexion, ABduction, External Rotation) test was positive on the right with sacroiliac joint pain produced.

A focused structural exam was performed at the first visit. The following somatic dysfunction was appreciated: right quadratus lumborum (QL) tender point. No osteopathic treatment occurred at the first visit due to time constraints. The patient was instructed to return in one week for a complete osteopathic structural exam and treatment.

First Treatment
The first osteopathic treatment occurred at the patient’s second visit, 7 days after initial presentation. The patient reported increased pain 2 days prior from increased physical activity at work. She reported being unable to find a position of relief at night. Pain was a 3/10, described as aching and tightness in right lumbar region and right iliac crest.

A broader osteopathic structural examination was performed, which revealed somatic dysfunction of the lower extremity, pelvis, sacrum, lumbar and thoracic spine (see Table 1).

<table>
<thead>
<tr>
<th>Body area</th>
<th>Somatic Dysfunctions</th>
<th>Techniques applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic</td>
<td>Thoracic paraspinal tightness, bilaterally</td>
<td>Soft tissue (ST)</td>
</tr>
<tr>
<td></td>
<td>Thoracolumbar shift right</td>
<td>Muscle energy (ME), Springing Technique</td>
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<tr>
<td>Lumbar</td>
<td>Lumbar paraspinal tightness, bilaterally</td>
<td>ST</td>
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<td></td>
<td>Quadratus lumbarum tenderpoint (tp) right Lumbopelvic roll left, iliac crest high left</td>
<td>Counterstrain (CS) ME, Springing Technique</td>
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<td>Sacrum</td>
<td>Left-on-left forward sacral torsion</td>
<td>ME</td>
</tr>
<tr>
<td>Pelvis</td>
<td>Superior innominate shear, right, resolved into</td>
<td>Still Technique</td>
</tr>
<tr>
<td></td>
<td>Anterior innominate rotation, right</td>
<td>ME</td>
</tr>
<tr>
<td>Lower extremity</td>
<td>Piriformis tight right</td>
<td>ME</td>
</tr>
<tr>
<td></td>
<td>Rectus femoris tight bilaterally</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. First OMT session, given 1 week after initial visit

(continued from page 24)

Treatment Course
At the third visit, 14 days after the initial presentation, the patient reported feeling great. Her gait was improved as she felt looser. She felt better overall the afternoon after the first treatment; however, on post treatment day one, she noted increased soreness in the lumbar region that progressively improved over the week (see Figure 2). She reported feeling “much better” for 4 days, and then pain returned to “somewhat better.” The pain was described as occasional, worse when lying down on her stomach and better when off her feet.

Figure 2. Pain diagram on follow-up after 1 visit for OMT. Legend: ★★★ = aching; // / = stabbing; ### = weakness;
The patient continued to demonstrate a superior innominate shear on the right with residual tender point in the right quadratus lumborum muscle (see Table 2). Iliac crest heights level post treatment.

**Follow-up**
In a follow-up telephone interview, 5 months after her initial presentation, the patient reported a sustained 95% improvement in her right low back and hip pain symptoms. The improvement occurred in the days after the last visit and has been maintained since that time. Occasionally, she notes tightness in the right lumbar region, at the same location if she is on her feet more frequently throughout the day. She rates this pain as a 1/10 tightness. The pain that used to refer into her groin and upper thigh region has resolved completely. Overall her back feels much “looser.”

Functionally, she can now cross her legs without pain and has no difficulty with forward bending. This has allowed her to care for the baby with less pain and discomfort. Sleeping has improved and she is able to find comfortable positions without difficulty. The treatments she thought had the most benefit were the thoracolumbar soft tissue techniques and the quadratus lumborum counterstrain, as she felt that they relaxed her back muscles, as well as the superior innominate shear Still technique.

**Discussion**
This case demonstrates the utility of OMT in a new mother with low back pain. She presented with numerous somatic dysfunctions contributing to her condition that may not have resolved without a thorough osteopathic structural exam. In the present case, the pain diagrams and physical exam findings closely resembled classic pain distribution patterns of the right QL muscle. Important somatic dysfunctions found in this patient were the Quadratus lumborum strain (tender point) and superior innominate shear on the ipsilateral side. Effective treatment of the QL tender point with counterstrain and the superior innominate shear with Still technique, in addition to addressing other key somatic dysfunctions, provided lasting relief from her symptoms. A limitation to this case is that only two osteopathic treatments were performed, which makes it difficult to track the resolution of her key somatic dysfunctions.

Pregnancy is a time when women are more likely to experience painful musculoskeletal conditions, including low back pain, sacroiliac joint pain, symphysis pubis pain, and sciatica. Pregnant women may be particularly susceptible to undertreatment and unnecessary suffering from these painful conditions, secondary to messages that their pains are a normal part of pregnancy that will resolve after delivery. Unfortunately, these conditions often persist throughout pregnancy and into the post-partum period. In fact, one study suggested the risk of sciatica later in life was linked with a higher number of births. Many of these pregnant and post-partum women suffering from musculoskeletal pain are harboring somatic dysfunctions that are causing or contributing to their conditions.

After 3 visits, a woman with 18 months of low back pain (5/10) and decreased lumbar spine range of motion was able to have a significant decrease in her pain and increased ability to care for her baby.

---

**Table 2. Second OMT session, given 2 weeks after initial visit**

<table>
<thead>
<tr>
<th>Body area</th>
<th>Somatic Dysfunctions</th>
<th>Techniques applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic</td>
<td>Thoracic paraspinal tightness, bilaterally</td>
<td>ST</td>
</tr>
<tr>
<td></td>
<td>Thoracolumbar shift right</td>
<td>ME</td>
</tr>
<tr>
<td>Lumbar</td>
<td>Lumbar paraspinal tightness, bilaterally</td>
<td>ST</td>
</tr>
<tr>
<td></td>
<td>Lumbopelvic roll right, iliac crest high left</td>
<td>ME, Springing Technique</td>
</tr>
<tr>
<td></td>
<td>Quadratus lumborum tp, right</td>
<td>CS</td>
</tr>
<tr>
<td>Sacrum</td>
<td>Left sacral flexion</td>
<td>ME</td>
</tr>
<tr>
<td>Pelvis</td>
<td>Superior innominate shear, right, resolved into</td>
<td>Still Technique</td>
</tr>
<tr>
<td></td>
<td>Anterior innominate rotation, right</td>
<td>ME</td>
</tr>
<tr>
<td>Lower extremity</td>
<td>Piriformis tight right</td>
<td>ME</td>
</tr>
<tr>
<td></td>
<td>Rectus femoris tight bilaterally</td>
<td>ME</td>
</tr>
<tr>
<td></td>
<td>Semimembranous tp, right</td>
<td>CS</td>
</tr>
</tbody>
</table>

(continued on page 27)
Conclusion

Low back pain is a common condition during pregnancy and in the post-partum period, and one that can be ineffectively treated. Management of post-partum low back pain using OMT led to a lasting improvement in pain and improved daily function, including the new mother’s baby care duties.

This case demonstrates the importance of addressing somatic dysfunctions, including muscle imbalance, in post-partum patients with low back pain. It also illustrates how integrating physical exam findings with a knowledge of common myofascial pain patterns can allow a physician to provide significant symptom relief and avoid further diagnostic work-up or treatment expenses.

References


The purpose of the continuing medical education quiz is to provide a convenient means of self-assessing your comprehension of the scientific content in the article “An Osteopathic Approach to Post-Partum Low Back Pain: A Case Report,” by Thomas R. Mehner, OMS IV, and Drew D. Lewis, DO, FAAO.

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Authors: Thomas R. Mehner, OMS IV, and Drew D. Lewis, DO, FAAO


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---

1. Which of the following is not a main cause of LBP during pregnancy?
   a. Hormonal changes that lead to increased ligament laxity
   b. Enlarged gravid uterus which stretches and weakens abdominal musculature, causing strain in lumbar musculature to compensate
   c. Pelvis rotating anteriorly, the lumbar spine compensating with hyperlordosis and increased load on the lumbar spine musculature
   d. Increased fluid retention

2. Which ligaments are especially prone to develop ligamentous laxity due to hormonal changes in pregnancy?
   a. Iliofemoral
   b. Sacroiliac joint
   c. Iliolumbar
   d. Supraspinous

3. Which of the following somatic dysfunctions is included in Dr. Greenman’s “Dirty Half Dozen”?
   a. Superior innominate shear, right
   b. Anterior innominate rotation, right
   c. Left on left forward sacral torsion
   d. T6-10 neutral, side-bent right, rotated left

4. Which muscle’s myofascial trigger point pain referral pattern is in the groin, iliac crest and lateral hip?
   a. Gluteus minimus
   b. Psoas major
   c. Quadratus lumborum
   d. Rectus femoris
The Immediate, Intermediate, and Long-Term Effects of Osteopathic Manipulative Treatment on Pulmonary Function in Adults with Asthma

Kody M. Kasten, OMS IV; Samantha K. Tyler, OMS IV; Anna R. Johnson, OMS IV; Erika R. Kolakowski, OMS IV; Jonathan Pickos, OMS V; Katherine Heineman, DO; and Chunfa Jie, PhD

Abstract

Context
Asthma is a common chronic obstructive lung disease with increasing prevalence and economic burden. The effect of osteopathic manipulative treatment (OMT) has been studied in patients with several lung diseases, including asthma; however, no clinical trials have studied effects beyond the immediate time period in adults with asthma using spirometry.

Objective
To examine the immediate, intermediate, and long-term effects of OMT on objective pulmonary function and subjective quality of life in asthmatic adults.

Methods
Twenty-five adults with asthma were recruited from the Des Moines University community. Standardized Asthma Quality of Life Questionnaire (AQLQ(S)) surveys and spirometry measures including forced expiratory volume in one second (FEV1), forced vital capacity (FVC), the FEV1/FVC ratio, and peak expiratory flow (PEF) were collected at baseline. Spirometry testing was performed immediately after and 3 days after each of 3 weekly standardized OMT sessions. Spirometry and AQLQ(S) surveys were collected again 4 weeks after the final OMT session. Spirometry results were analyzed using a repeated measure, linear mixed-effect model, and survey results were analyzed using paired t-tests.

Results
The study demonstrated statistically significant changes to the spirometry results, including the PEF and FEV1/FVC ratio. The PEF measurements increased 3 days after the first treatment and remained elevated through the completion of the study. The FEV1/FVC ratio decreased by 0.01 at 4 weeks post-OMT compared to baseline. There were no significant differences observed in the immediate, intermediate or long-term FEV1 and FVC measurements post-OMT. However, there was a significant increase in the overall score and all 4 domains of the AQLQ(S), including Symptoms, Activity Limitations, Emotional Function, and Environmental Stimuli.

Conclusion
The results of this pilot study suggest that OMT may improve the quality of life in adults with asthma. Spirometry testing revealed a significant change in some measures of pulmonary function and participants reported an improvement in asthma-specific quality of life. The authors suggest that, in combination with preventive measures and pharmacologic therapy, OMT may offer additional benefit in the treatment of adults with asthma. The results also suggest a need for further study of the effects of OMT on respiratory function in asthmatic adults.

(continued on page 30)
Introduction

Asthma is a common chronic obstructive lung disease with an increasing prevalence and economic burden on society. In 2017, the prevalence of asthma in adults in the United States population was 8.3%, increased from 7.6% in 2015 and 7.4% in 2014. Asthma is primarily a clinical diagnosis supported by spirometry results including forced expiratory volume in one second (FEV1), forced vital capacity (FVC), and the FEV1/FVC ratio. Asthma is further defined by reversible bronchoconstriction, described as an increase in FEV1 of 200 mL and 12% or greater as compared to baseline after short-acting β2-agonist inhalation. Asthma is categorized based on patients’ frequency and severity of symptoms. Patients with intermittent and mild persistent asthma usually have normal spirometry results outside of an asthma exacerbation. Symptom triggers include environmental exposures, emotional extremes, respiratory infections, and exercise. Treatment aims to decrease the severity and frequency of symptoms. Standard treatment currently includes multiple classes of medications, the combination of which depends on the level of severity. These pharmacologic approaches have proven to be effective at decreasing asthma symptoms by dilating patients’ airways and decreasing pulmonary inflammation, but they do not address the musculoskeletal aspect of respiration, a crucial component of respiratory function.

Osteopathic manipulative treatment (OMT) is a cost-effective, noninvasive treatment utilized to remove allostatic load and reestablish a more natural homeostatic condition. OMT can be used to maximize the biomechanics of respiration by improving the compliance of the thoracic cage. The pathophysiology of asthma includes an autonomic nervous system (ANS) imbalance characterized by elevated parasympathetic cholinergic tone causing bronchoconstriction and airway hyperresponsiveness causing further reduction of airway caliber following stimuli. These features of asthma are partially addressed with pharmacologic management. OMT may further normalize the ANS’s influence by targeting the vagus nerve and the first 6 thoracic spinal cord levels, which respectively contribute parasympathetic and sympathetic innervation to the lungs. Somatic dysfunctions at the occipitoatlantal (OA) joint are addressed to influence the vagus nerve, and the first 6 vertebrae of the thoracic spine with associated ribs are addressed to influence viscerosomatic facilitation. Inhibitory or stimulatory techniques such as rib raising can also be utilized to balance the ANS by affecting the sympathetic chain ganglia along the vertebral column. Doing so can help interrupt the cycle of viscerosomatic and somatovisceral reflexes that contribute to the development of somatic dysfunction and further augment symptoms of asthma. Finally, OMT may be useful in restoring optimal circulatory and lymphatic flow to and from the lungs by removing fascial restrictions. By improving the biomechanical, autonomic, and circulatory mechanisms involved in the disease process, OMT can help maximize respiratory function and should therefore be considered as an additional treatment modality for patients with asthma.

Some studies in the literature have examined the immediate effects of OMT on pulmonary function in patients with asthma, but to the authors’ knowledge, there have been no studies on the intermediate and long-term effects using spirometry. In 2002, Bockenhauer et al aimed to quantify the immediate effects of a single OMT session on chronic asthma. The study found statistically significant improvements in thoracic wall motion measured by respiratory excursion and in subjectively reported ease of breathing and a non-statistically significant decrease in peak expiratory flow rate (PEF). More recently, Guiney et al performed a randomized controlled trial (RCT) utilizing OMT on pediatric patients with asthma. The OMT group showed a statistically significant improvement in PEF of 13 L/min when compared to a control group that received sham treatments. The authors of both studies suggested the use of spirometry in further investigations to determine the impact of OMT on pulmonary function.

Some studies have observed the effects of OMT on pulmonary function tests in patients with other lung diseases. Noll et al utilized spirometry on patients with chronic obstructive pulmonary disease (COPD) to quantify the immediate effects of OMT with a double-blind RCT utilizing 7 OMT techniques as compared to sham treatments. The OMT group showed a statistically significant decrease in the forced expiratory flow (FEF) in the 30 minutes immediately following treatment. Noll and colleagues suggested there may be other mechanisms affecting pulmonary function testing immediately after OMT.

Allen and Pence observed improvement of FVC after using a thoracic pump technique in hospitalized patients with various lower respiratory diseases, including asthma. Swender et al used spirometry in a single-blind RCT to evaluate pulmonary function in patients with cystic fibrosis following daily OMT versus sham treatments. They observed improvements in spirometry measures in both groups, with no statistical significance between the two.

Henderson et al demonstrated a decrease in salivary α-amylase, a biomarker for activation of the sympathetic nervous system (SNS), following a rib raising technique when compared to a sham treatment. However, they showed no statistically significant differences in cortisol level or salivary flow rate, the latter of which is used to measure parasympathetic activity. They concluded that SNS...
activity may decrease immediately after five minutes of rib raising. Therefore, one potential explanation for the decreased FEF in COPD patients immediately after OMT in the study by Noll et al is decreased SNS activity, leading to uninhibited parasympathetic effects, including bronchoconstriction.  

Most recently, Lorenzo et al compared the effects of OMT to standard pulmonary rehabilitation (SPR) in a healthy population of medical students using spirometry and a survey to quantify objective and subjective change, respectively. They failed to demonstrate an objective change in FEV1, FVC, or the FEV1/FVC ratio with OMT as compared to SPR; however, they demonstrated a statistically significant subjective improvement in breathing ability in the OMT group.

The objective of the current study was to quantify the immediate, intermediate, and long-term effects of OMT on adult patients with a history of asthma. The quantitative effects that were measured include the FEV1, the FVC, the FEV1/FVC ratio, and the PEF. The long-term, subjective effects were measured via the Asthma Quality of Life Questionnaire with Standardised Activities (AQLQ(S)). It was hypothesized that OMT would improve pulmonary function, both objectively and subjectively. We predicted a significant increase in the mean FEV1/FVC ratio and PEF 3 days after each OMT session and a significant increase 4 weeks after the final OMT session, but no increase in the mean FEV1/FVC ratio or PEF immediately after OMT. The authors also predicted an increased overall mean AQLQ(S) score as well as an increased mean score within each domain, including Symptoms, Activity Limitations, Emotional Function, and Environmental Stimuli.

**Methods**

**Design**

This single arm clinical trial (registered at clinicaltrials.gov, identifier: NCT03864354) was approved by the Institutional Review Board at Des Moines University (DMU) in Des Moines, IA. Written informed consent was obtained from all participants.

Participants were recruited by email, class announcements, and word of mouth targeting DMU students and faculty. Inclusion criteria for participation in the study included age over 18 years and a diagnosis of asthma, regardless of whether spirometry was used in the diagnosis. Subjects were excluded if they were a current smoker, diagnosed with any other respiratory disease apart from asthma, or had received manual treatment 30 days prior to or during the study including OMT from a licensed physician, chiropractic treatment, or massage therapy.

The study was conducted over a period of 8 weeks. At week 0, participants completed the initial AQLQ(S) and performed baseline spirometry testing. During weeks 1, 2, and 3 of the study, a standard OMT protocol was performed followed by spirometry testing. Spirometry was performed again 3 days after each session to measure the intermediate effect of OMT. At week 7, participants completed the post-OMT spirometry testing and AQLQ(S) to measure the objective and subjective long-term effects.

**Pulmonary Function Measurements**

Pulmonary function testing was performed using a portable spirometer (McKesson LUMEON, Andover, MA, USA). Testing was conducted by one member of the research team (K.K.) throughout the entire study, after training with a licensed pulmonologist. Subjects were required to perform spirometry until three trials deemed acceptable by the spirometry software (Easy on-PC), based upon guidelines from the American Thoracic Society, were obtained. The trial with the best overall effort was used for analysis. The spirometry measures used to assess participants’ pulmonary function included FEV1, FVC, the FEV1/FVC ratio, and PEF.

**Asthma Quality of Life Questionnaire**

Participants completed an Asthma Quality of Life Questionnaire with Standardised Activities (AQLQ(S)) to subjectively measure asthma severity. The AQLQ(S) is a 32-item survey which asks participants to recall their experiences during the previous 2 weeks as related to 4 domains: Symptoms, Activity Limitations, Emotional Function, and Environmental Stimuli. Each item is rated on a 7-point Likert scale, with 1 being severely impaired and 7 being not impaired at all. The survey was completed in week 0 to establish a subjective baseline value of asthma severity as perceived by the participant and again in week 7 to compare their perceived asthma severity after receiving OMT.

**OMT Protocol**

An OMT protocol was derived from a survey of the DMU Osteopathic Manipulative Medicine (OMM) Department faculty as well as current and past DMU Predoctoral OMM Fellows. The survey assessed the approach each participant would use when treating an asthmatic patient with OMT. Based on the survey results, the authors developed the standardized OMT protocol used during each of the three OMT sessions. These sessions lasted 21.3 ± 3.6 minutes. The protocol included the following techniques, performed in the order represented here: supine occipitocervical (OA)
joint balanced ligamentous tension (BLT), supine cervical spine Still technique, supine thoracic inlet myofascial release (MFR), stimulatory supine rib raising soft tissue, supine rib BLT, supine abdominal diaphragm MFR, seated thoracic spine Still technique, and seated posterior rib Still technique.

After the OMM Fellows (A.J., S.T., E.K., A.B.) completed the treatment protocol, participants were screened for somatic dysfunction resolution by a board-certified neuromusculoskeletal medicine/osteopathic manipulative medicine (NMM/OMM) physician (K.H. or J.P.). If inadequate resolution at a specific body region was found, that region was retreated using the same technique included in the protocol. The retreatment lasted 6.3 minutes on average and was performed by the same OMM Fellow. The protocol’s final step involved one minute of stimulatory tapotement, or rhythmic tapping of the tissues, applied to the paraspinal region at the levels of the first 6 thoracic vertebrae. This was included to target the lung viscerosomatic reflex area and potentially temper parasympathetic cholinergic tone to decrease bronchoconstriction.

**Data Analysis**

Changes in FEV1, FVC, the FEV1/FVC ratio, and PEF were determined by calculating the mean for all participants at each time point. The immediate effect of OMT was determined by comparing the measurements taken immediately after each treatment to baseline. The intermediate effect was determined by comparing the measurements 3 days after treatment to baseline. The long-term effect was determined by comparing the measurements 4 weeks after the final OMT treatment to baseline. Each comparison was analyzed using a linear mixed-effect model of repeated measures on random subjects. The Westfall method was used to adjust p-values. Changes in participants’ survey results were determined by calculating the mean for the overall scores and for each of the 4 domains, then comparing the post-OMT values to the pre-OMT values. These values were analyzed using paired t-tests.

Statistical analysis was performed using IBM SPSS® Software and the statistical platform R by Chunfa Jie, PhD of the Des Moines University Research Department.

**Results**

The study enrolled 25 participants, none of whom were lost to follow up. The characteristics of the study subjects are presented in **Table 1**. The mean age of participants was 25.6 ± 2.85 with a range from 22 to 33 years. Participants were primarily female (68% female, 32% male) and Caucasian (88% Caucasian, 8% Asian, 4% Hispanic). Medications were actively used by 64% of patients in the study and 36% either did not take their prescribed medications or had no prescription.

PEF measurements increased significantly from 7.43 L/sec at baseline to 7.87 L/sec three days after the first OMT treatment and remained elevated through the completion of the study (**Table 2, Figure 1D**). A general decrease was observed in the FEV1 as compared to baseline (**Table 2, Figure 1A**), but without statistical significance. Results for the FVC measurements as compared to baseline showed slight variation above and below baseline, but no statistically significant differences (**Table 2, Figure 1B**). Apart from the increased FEV1/FVC ratio immediately following the second OMT session, the FEV1/FVC ratio decreased marginally for each time point, but the only statistically significant change was a decrease in the mean final, long-term measurement from 0.81 at baseline to 0.80 in week 7 (p<0.05) (**Table 2, Figure 1C**). Spirometry results are summarized in **Table 2** and were analyzed utilizing a repeated-measure ANOVA with confidence levels set at 95%.

Differences between pre- and post-OMT AQLQ(S) results were analyzed for the overall scores and for each of the quality of life domains.
domains. Analysis, summarized in Table 3 and Figure 2, showed a statistically significant increase from the baseline results.

Table 3. Effect of OMT on Subjective Pulmonary Function: AQLQ(S) Results Pre- and Post-OMT Sorted by Average Score and Domain

<table>
<thead>
<tr>
<th></th>
<th>Mean Scores (SD)</th>
<th>Pre-OMT</th>
<th>Post-OMT</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>Average</td>
<td>6.02 (0.66)</td>
<td>6.45 (0.46)</td>
<td>0.0000529*</td>
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</tr>
<tr>
<td>Symptoms</td>
<td>5.82 (0.74)</td>
<td>6.38 (0.44)</td>
<td>0.000122*</td>
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<tr>
<td>Activity Limitation</td>
<td>6.33 (0.52)</td>
<td>6.57 (0.47)</td>
<td>0.00353*</td>
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</tr>
<tr>
<td>Emotional Function</td>
<td>5.86 (0.93)</td>
<td>6.38 (0.69)</td>
<td>0.00117*</td>
<td></td>
</tr>
<tr>
<td>Environmental Stimuli</td>
<td>5.95 (0.93)</td>
<td>6.38 (0.55)</td>
<td>0.0169*</td>
<td></td>
</tr>
</tbody>
</table>

* P < 0.05

Abbreviations: OMT, Osteopathic Manipulative Treatment; AQLQ(S), Asthma Quality of Life Questionnaire with Standardized Activities

Discussion

The results of this study demonstrated statistically significant changes in both objective and subjective measurements of pulmonary function in adults with asthma after receiving OMT. Spirometry measurements of FEV1, FVC, and the FEV1/FVC ratio were used to quantify airway obstruction as a result of bronchoconstriction. The OMT protocol was designed in part to influence sympathetic and parasympathetic tone as it pertains to bronchoconstriction in asthma. The FVC increased, whereas the FEV1 decreased from baseline, resulting in the overall decrease in the FEV1/FVC ratio. Although this decrease from 0.81 to 0.80 was statistically significant, it is not clinically significant. Therefore, it is proposed that the current study’s treatment protocol had minimal effects on the bronchoconstriction component of asthma.

The increase in PEF in all but the immediate measurement in week 1 suggests a positive intermediate and long-term effect. While the PEF is indicative of an effect on bronchoconstriction, this value is also dependent on participant respiratory effort. The OMT protocol used in this study specifically addressed somatic dysfunctions that impact the work of breathing. The statistically significant increase in the PEF may therefore be directly related to removing...
restrictions in the musculoskeletal system with OMT, allowing participants to exhale with greater force. These results expand upon previous research that demonstrated a statistically significant increase in PEF immediately after OMT in pediatric asthmatics.\textsuperscript{3}

The use of spirometry is a strength of the current study, as prior studies used peak flow meters to measure the effects of OMT in asthmatics.\textsuperscript{5,9} The study design included a total of 8 spirometry measurements. However, since all spirometry results were compared to baseline, the only true representation of the immediate effect of OMT was the measurement immediately after the first OMT session. Considering the increase in PEF results, the second and third treatments may have served to maintain the changes observed as a result of the first treatment. To evaluate the true immediate effect of multiple OMT treatments, future studies might consider spirometry testing before and after each treatment, as was done by Lorenzo et al.,\textsuperscript{13} to establish a baseline for each treatment.

There were several external factors not controlled for in this study that could have influenced data results. Due to the timing of the study, participants were often exposed to cold temperatures just before receiving OMT and some presented with symptoms of upper respiratory infections, both of which are known to exacerbate asthma symptoms.\textsuperscript{15} In addition, although participants were prohibited from receiving OMT from a licensed physician during the study, many of the subjects were osteopathic medical students who practice OMT skills regularly. The authors attempted to control for this by performing the study when the curricula covered body regions other than those included in the study’s protocol. Participants were not instructed to limit activities that would potentially exacerbate their asthma symptoms and medication use was not monitored.

Implications of the objective findings of the current study require further research. While some of the objective data suggest that pulmonary function in asthmatics did improve with OMT as indicated by the increase in PEF, there was either no statistical difference or a significant decrease in FEV, FEV\textsubscript{1}, and the FEV\textsubscript{1}/FVC ratio. Therefore, future studies with a control group and larger sample size are needed to better define the relationship between OMT and pulmonary function. In addition, a sham treatment group could be used to rule out the placebo effect. Other limitations include not stratifying asthma severity and not randomizing treatment providers.

Diagnosis, severity level, and medical management of asthma are largely determined clinically by the patient’s level of impairment from and frequency of symptoms.\textsuperscript{2} The quality of life domains assessed by the AQLQ(S) used in this study therefore bear important weight clinically, as they have the potential to alter medical management, patients’ ability to function in their desired lifestyle, and overall patient satisfaction. Patients’ attitudes about their treatment have also been shown to positively influence compliance.\textsuperscript{16} The current study found an improvement in participants’ subjective quality of life after OMT, suggesting potential clinical significance of using OMT as an adjunct to treatment for asthmatic patients.

**Conclusion**

The goal of OMT is to address the body’s structure to maximize function and treat medical diagnoses. In the present study, OMT was used to remove restrictions in the respiratory system, maximize efficiency, and decrease the work of breathing in asthmatic adults. This study demonstrated statistically significant changes to the spirometry results including the PEF and FEV\textsubscript{1}/FVC ratio. The PEF measurements increased 3 days after the first treatment and remained elevated through the completion of the study, suggesting positive intermediate and long-term effects of OMT on pulmonary function. Participants’ pulmonary function as measured subjectively by the AQLQ(S) also demonstrated a statistically significant increase. Improvement in a patient’s perception about their condition could lead to improved adherence to therapy and better long-term outcomes. In addition to the current treatment regimen for asthma, including preventive measures and pharmacologic therapy, this study suggests that integrating OMT into the treatment of adult asthmatics may effectively improve patients’ objective and subjective respiratory function by optimizing the body’s structure and function. Future studies using control groups, larger sample sizes, and fewer confounding factors are needed to further identify the effects of OMT on pulmonary function of adult asthmatics.

**Acknowledgements**

We extend our gratitude to: Simon Geletta, PhD for assistance with statistical analysis; Teresa Aoki, MD for spirometry training and interpretation assistance; James Philson, DO for supervising OMT sessions; Amber Brown, OMS V, MS for assisting with OMT sessions; Andrew J Sheehan, OMS V for editing the manuscript. This study was supported by the Des Moines University IOER fund.

**References**


(continued on page 35)
Continuing Medical Education Quiz

The purpose of the continuing medical education quiz is to provide a convenient means of self-assessing your comprehension of the scientific content in the article “The Immediate, Intermediate, and Long-Term Effects of Osteopathic Manipulative Treatment on Pulmonary Function in Adults with Asthma,” by Kody M. Kasten, OMS IV; Samantha K. Tyler, OMS IV; Anna R. Johnson, OMS IV; Erika R. Kolakowski, OMS IV; Jonathan Pickos, OMS V; Katherine Heineman, DO; and Chunfa Jie, PhD.

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Be sure to answer each question in the quiz. You must score a 75% or higher on the quiz to receive CME credit. The correct answers will be published in the next issue of the AAOJ.

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WANTED: OMM/NMM Board Certified Physician to work 40 (+/-) hrs/wk treating patients of all ages in a busy, well established OMT Practice 20 minutes west of downtown Denver, CO.

- Exceptional Biomechanical Skills Required

- Osteopathic Integrative Medicine website: oimcare.com

- Please send CV with letter of interest to: Lori@oimcare.com

(continued from page 34)


CONTINUING MEDICAL EDUCATION

This CME Certification of Home Study is intended to document your review of the CME article in this issue of The AAO Journal under the criteria for AOA Category 2-B continuing medical education credit.

CME Certification of Home Study

This is to certify that I, ____________________________, (type or print name)
read the following article for AOA CME credit.

Name of article: "The Immediate, Intermediate, and Long-Term Effects of Osteopathic Manipulative Treatment on Pulmonary Function in Adults with Asthma"

Authors: Kody M. Kasten, OMS IV; Samantha K. Tyler, OMS IV; Anna R. Johnson, OMS IV; Erika R. Kolakowski, OMS IV; Jonathan Pickos, OMS V; Katherine Heineman, DO; and Chunfa Jie, PhD


AOA Category 2-B credit may be granted for this article.

00____________ (AOA number)

Full name: ____________________________ (type or print name)

Street address: ____________________________

City: ____________________________

State and ZIP code: ____________________________

Signature: ____________________________

Complete the quiz to the right by circling the correct answers. Send your completed answer sheet to the American Academy of Osteopathy. The AAO will forward your results to the American Osteopathic Association. You must answer 75% of the quiz questions correctly to receive CME credit.

1. The point of addressing the occipito-atlantal joint with OMT in the asthmatic patient is to:
   a. Remove restrictions of CSF flow to the thoracic segment of the spinal cord.
   b. Improve mobility of the myofascial elements surrounding the trachea.
   c. Remove restrictions affecting the vagus nerve as it exits the skull to balance parasympathetic tone.
   d. Decrease myofascial "tug" on the spinal cord, normalizing sympathetic input to the lungs.

2. Which of the following is an accurate conclusion made in this clinical pilot study?
   a. The data suggest that using OMT on adult asthmatics has a clear benefit on pulmonary function as measured by FEV1/FVC ratio using spirometry.
   b. The data suggest that using OMT on adult asthmatics may significantly improve a patient's tolerance for activity, reactions to environmental stimuli, symptoms, and emotional function.
   c. The data suggest that using OMT on asthmatics did not have statistically significant changes either objective or subjective measures.
   d. The data suggest that using OMT on asthmatics showed a decrease in pulmonary function as measured by PEF using spirometry.

3. Which of the following regarding the AQLQ(S) is false?
   a. The current study demonstrated a statistically significant long-term improvement in all domains of the AQLQ(S).
   b. The questionnaire was administered twice – once prior to the start of the study and at week 7 to quantify the long-term subjective improvement of quality of life in asthmatics.
   c. The AQLQ(S) is a 32-item survey which asks participants to recall their experiences during the previous two weeks rated on a seven-point Likert scale.
   d. The AQLQ(S) had 3 separate domains including Symptoms, Activity Limitations, and Emotional Function.

4. Which of the following is true regarding participants’ OMT?
   a. The OMT protocol included direct treatments such as High Velocity Low Amplitude (HVLA) thrust to address somatic dysfunction found on screening examination.
   b. Treatments were provided by board-certified OMM/NMM physicians and lasted 21.3 ± 3.6 minutes.
   c. After completion of the treatment protocol, participants were screened for somatic dysfunction resolution by a board-certified OMM/NMM physician and retreatments were provided if inadequate resolution was found.
   d. The final step of the OMT protocol included one minute of stimulatory tapotement applied from T1-T6 to potentially increase parasympathetic tone thereby decreasing bronchoconstriction.
Mask Up with the American Academy of Osteopathy!

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New Horizons in Osteopathic Medicine

AAO at OMED 2020
Oct. 15-18 • Virtual Conference • Victor Nuño, DO, program chair

About the Program
Hosted by the American Osteopathic Association (AOA), OMED is an annual medical conference bringing together thousands of osteopathic physicians, medical students and other health professionals from across the country. This year’s conference will combine the convenience and accessibility of a virtual format with cutting-edge education, thought-provoking discussions and networking opportunities.

Osteopathic medicine is ever-evolving. The AAO’s program will reflect this ever-changing and expanding landscape both of what we can do with our hands and the collaborations we can achieve with our colleagues. All of the material can be immediately relevant to the practicing osteopathic physician. This program will be approachable for all skill levels. It will give perspectives that are unique and make each physician more well-rounded. The AAO is partnering with specialty colleges to provide high quality, evidence-based lectures from clinicians. Joint sessions will be held with the American College of Osteopathic Family Physicians (ACOFP), the American College of Osteopathic Neurologists and Psychiatrists (ACONP), and the American Osteopathic Academy of Sports Medicine (AOASM).

AAO Program Schedule
Program subject to change. All times are Central Time Zone. Contact Gennie Watts for AAO program questions.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday, October 15</td>
<td></td>
<td></td>
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<tr>
<td>9:15-10:45 a.m.</td>
<td>Osteopathic Medicine and the Dental Occlusion</td>
<td>Tasha L. Turzo, DO</td>
</tr>
<tr>
<td>11 a.m.-12:30 p.m.</td>
<td>Tongue Posture, Breathing and the ANS</td>
<td>Michelle Veneziano, DO</td>
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<tr>
<td>1:30-2:30 p.m.</td>
<td>A Discussion on Providing LGBTQIA Sensitive Health Care</td>
<td>Jordan Ann Keys, DO, Jessica Mitter Pardo, M.Sc., OMS IV, and Alok Vaid-Menon</td>
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<tr>
<td>2:45-3:45 p.m.</td>
<td>Insight into the Mechanisms of Action Offered by Osteopathic Lymphatic Pump Techniques</td>
<td>Lisa Hodge, PhD</td>
</tr>
<tr>
<td>4:00-5:00 p.m.</td>
<td>Sex*Gender and Allostatic Load</td>
<td>Robert-Paul Juster, PhD</td>
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<tr>
<td>Friday, October 16</td>
<td></td>
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<tr>
<td>9:15-10:15 a.m.</td>
<td>Osteopathic Intervention for Spiritual Dysphoria and Addictions</td>
<td>Anthony H. Dekker, DO</td>
</tr>
<tr>
<td>10:30-11:30 a.m.</td>
<td><strong>Joint Session with ACONP</strong> Optimizing Physician Mental Health While Providing OMM</td>
<td>Teodor Huzij, DO, FACN</td>
</tr>
<tr>
<td>11:45 a.m.-12:45 p.m.</td>
<td>The Mind, Body and Spirit of Breath</td>
<td>Stacey L. Pierce-Talsma, DO, MS, FNAOME</td>
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<tr>
<td>Time</td>
<td>Title</td>
<td>Presenter(s)</td>
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<tr>
<td>1:30-2:30 p.m.</td>
<td>Update on OMT and Traumatic Brain Injury</td>
<td>Sheldon C. Yao, DO, FAAO and Hallie Zwibel, DO</td>
</tr>
<tr>
<td>2:45-3:45 p.m.</td>
<td>The Piston: Diaphragmatic Theory &amp; Treatment</td>
<td>David M. Kanze, DO, FAAO, C-FP/OMT</td>
</tr>
<tr>
<td>4:00-5:00 p.m.</td>
<td>Differential Diagnosis, Evaluation, and Treatment of Adult Musculoskeletal Low Back Pain</td>
<td>Leslie M. Ching, DO</td>
</tr>
<tr>
<td><strong>Saturday, October 17</strong></td>
<td></td>
<td></td>
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<tr>
<td>9:15-10:15 a.m.</td>
<td>Is the Osteopathic Profession Still Relevant?</td>
<td>Richard G. Schuster, DO</td>
</tr>
<tr>
<td>10:15-11:15 a.m.</td>
<td>An Osteopathic Protocol for the Treatment of Mild Traumatic Brain Injury</td>
<td>Maud H. Nerman, DO</td>
</tr>
<tr>
<td>11:15 a.m.-12:15 p.m.</td>
<td>Research Considerations for OMM in ASD Population</td>
<td>Kimberly J. Wolf, DO</td>
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<tr>
<td><strong>Sunday, October 18</strong></td>
<td></td>
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<tr>
<td>9:15-10:45 a.m.</td>
<td>The Fascial Distortion Model: How FDM Fits in the Toolkit of the Modern Osteopathic Physician</td>
<td>Todd A. Capistrant, DO, MHA</td>
</tr>
<tr>
<td>11 a.m.-12:30 p.m.</td>
<td>Are Your Patients’ Glasses Causing Their Pain?</td>
<td>Joseph Field, DO</td>
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<tr>
<td>1:30-2:30 p.m.</td>
<td>Joint Session with ACOFP and AOASM Sports Performance: Citius, Altius, Fortius</td>
<td>Andrew Martin, DO, FAOASM</td>
</tr>
<tr>
<td>2:45-3:45 p.m.</td>
<td>Joint Session with ACOFP and AOASM Fitness on the Run: Pearls for Being Fit in a 24/7 Lifestyle</td>
<td>Priscilla Tu, DO, FAOASM</td>
</tr>
<tr>
<td>4:00-5:00 p.m.</td>
<td>Joint Session with ACOFP and AOASM Strength Training for You and Your Patients – Make Yourself Stronger Than Your Excuses</td>
<td>Vincent Disabella, DO, FAOASM</td>
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</tbody>
</table>

**AAO at OMED 2020**

**Register to Attend OMED 2020**

Oct. 15-18 • Virtual Conference • academyofosteopathy.org/OMED

**Registration Information**

OMED is an annual education and networking conference for osteopathic physicians, offering the opportunity to earn up to 30 AOA Category 1-A CME credits selected from more than 100 hours of didactic programming focused on clinical practice, advancements in medicine and COVID-19 treatment and care.

When you register for OMED, select the AAO as one of the specialty colleges whose program you will attend to ensure the AAO receives a portion of your registration fee. This profit-sharing allows the AAO to continue providing programming at future OMED conferences. Although you can choose up to four specialty colleges, the fewer you choose, the greater the profit share for each.

**Registration Fees**

The following registration fees are broken down by attendee category:

- AOA Member: $849 * discount available!
- Specialty College (must be AOA member): $849 * discount available!
- AOA Nonmember | Non-DO (ME, PhD, NDO): $1049
- Physicians Assistant (PA): $849
- Intern | Postdoctoral Trainee | Resident: $250
- Student: $100

**Use promo code “ENVISION20” to received $100 off your registration fee.**

Visit academyofosteopathy.org/OMED for the most updated schedule and to register.
We keep SAFETY, QUALITY, and PATIENT COMFORT at the forefront.

Learn more about Gebauer’s Ethyl Chloride at www.Gebauer.com/AAO