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The Superior Serratus Anterior: An Obscure Cause of Persistent Shoulder and Upper Thoracic Pain

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Letter to the Editor

There has been a lot of publicity about the numerous concussions that have occurred within the sport of football (and perhaps soccer and ice hockey).

I have had the opportunity to evaluate and treat an NFL quarterback who had sustained several concussions. On evaluation the player had craniosacral dysfunction which responded well to cranial manipulation. He continued his career without further concussion episodes.

This outcome, I believe, is significant because it demonstrates the effectiveness of cranial treatment.

When a traumatic force has the right velocity and direction, enough to cause a concussion, it leaves a person with bony and membranous craniosacral dysfunction. The craniosacral dysfunction remains until mobilized by a competent cranial clinician.

If the craniosacral dysfunction is not diagnosed and treated, I believe the person is much more susceptible to future concussions, even at a lower velocity.

Undiagnosed craniosacral dysfunction set the person up for future problems such as dementia.

Regards,

Dick MacDonald, DO

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The mission of the American Academy of Osteopathy® is to teach, advocate and research the science, art and philosphy of osteopathic medicine, emphasizing the integration of osteopathic principles, practices and manipulative treatment in patient care.

In this issue:

Editorial

Regular Features

Original Contributions

Contributors

A. L. Lepin, *D. E. Mokhov*, and *S. V. Novoseltsev*, from the Saint Petersburg State University Institute of Osteopathy have contributed an interesting article, *Osteopathic Diagnosis and Treatment of Dorsalgia Caused by Disturbance of Proprioception in the Cervical Spine*. In the study the authors show the relationship between postural disorders which disturb proprioception in the cervical spine resulting in dorsalgia and low back pain. They show how the use of OMT can result in measurable improvements in this condition.

Luc Peeters, DO-MROB, BSc Ost Med, has written the article *Median Arcuate Ligament Syndrome – Literature Study and Osteopathic Considerations*. Median Arcuate Ligament Syndrome (MALS) is also known as coeliac trunk compression syndrome or Dunbar syndrome. Occasionally it is referred to as abdominal angina. The author shows how symptoms of this condition may be due to somatic dysfunction, and if so, OMT can help the patient avoid more invasive forms of treatment.

Matthew Kozminski, DO, CPT, MC, Field Surgeon, 4th Battalion, 9th Infantry Regiment (Operation Iraqi Freedom) has contributed *Principles of Osteopathy in the Battlefield*, which we present as a special communication. In this article the author discusses the issue of teaching osteopathic manipulative techniques to military combat medics.

Regina K. Fleming, OMS IV and *Karen T. Snider,* DO present *Low Back Pain in Rowers*. The authors point out the higher incidence of low back pain in rowers as compared to other atheletes, and present an interesting case study demonstrating the use of OMT in the treatment of this problem.

Regular Features

"Dig On"

Daniel J. Kary, DO, FAAO and *Michael M. Dominello* OMS IV, present The Superior Serratus Anterior: an obscure cause of persistent shoulder and upper thoracic pain. This article describes the evaluation and treatment of somatic dysfunction involving the superior portion of serratus anterior. The authors discuss how dysfunction associated with this muscle typically presents as vague, poorly localized, shoulder, upper thoracic and lateral upper arm pain.

From the Archives

With this issue we present the second of three excerpts from a book by *George M. McCole*, DO, entitled An Analysis of the Osteopathic Lesion. This issue's excerpt is from Chapter XLIX, "Facet Separation (continued)", in which the author continues his discussion of "joint popping" and its role (or non-role) in the alleviation of somatic dysfunction. This section includes comments from well-known osteopathic practitioners of the time who weigh in on the importance of this phenomenon.

Quotes by Andrew Taylor Still . . .

"You find that all men are successes or failures.
Success is the stamp of truth.
I will say all men who fail to place their feet
on the dome of facts do so by not sieving all truth
and throwing the faulty to one side."

Andrew Taylor Stil, MDl

"He who is able to reason
Must see that this great `River Of Life'
Must be tapped
And the withering fields irrigated
At once,
Or the harvest of health
Will be lost forever"

Andrew Taylor Still. MD

View From the Pyramids

Osteopathic Medicine: The Road to the Future Revisited

Raymond J. Hruby

Many of us knew the late great Paul Kimberly, DO, FAAO. He will always be remembered as one of the giants in the osteopathic profession. I had the privilege of knowing Paul as well as the opportunity to work with him as a faculty member in CME courses, and assisting him several times when he taught students at what is now NOVA Southeastern College of Osteopathic Medicine. When Paul talked about the history of osteopathic medicine he used one particular slide in his presentation that somehow burned itself into my brain and has stayed there ever since. This slide showed two parallel tracks, one representing the eastern origins of medicine and one the western origins. Along the way Paul noted certain people or events that, over time, shaped each of these tracks as either osteopathic or allopathic in their orientation. My crude representation of Paul's slide is shown here in Figure 1.

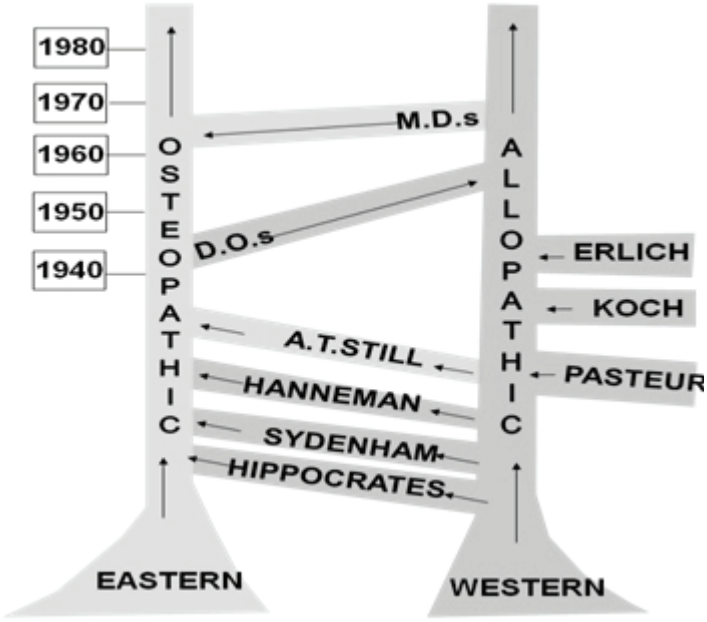

Figure 1. Roots of osteopathic and allopathic medicine.

Paul's idea was that Eastern philosophy gave origin to a more wholistic, patient-centered approach to medicine, while Western influences gave birth to a more reductionistic and disease-oriented approach. In our country these two general influences became osteopathic and allopathic medicine, respectively. Along the way, we saw pioneers like Hippocrates, Sydenham, Hanneman and Still, who moved away from Western influences and adopted the more osteopathic approach. We can also see people like Erlich, Koch, and Pasteur, as a few examples, who made discoveries and inroads that support the allopathic approach to health and disease. Over time, we also see that some DOs seem to move more toward allopathic approaches, while some MDs have adopted the osteopathic approach.

Some years later I was privileged to be chosen to give the Scott Memorial Lecture. (See "Osteopathic Medicine: Shaping the Road to the Future", *The AAO Journal*, Vol. 9, No. 1, Spring 1999). For my presentation I chose to talk about the future of osteopathic medicine as a separate and distinct profession, and I decided to center the presentation around Dr. Kimberly's famous slide. One thing I decided to do was update Paul's slide, since it only showed a time line that reached to about the early 1980s. My updated slide is shown in Figure 2.

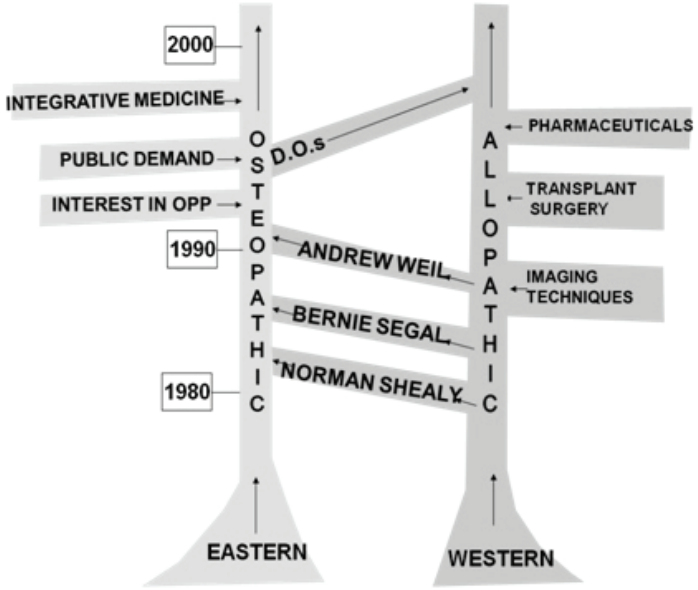

Figure 2. Kimberly slide updated to the year 1999.

In the updated slide, we see more influences that shaped the osteopathic and allopathic roads to the future. For example, physicians like Shealy, Segal, and Weil are allopathic physicians who are well known to the public and who have seemingly embraced more of what we would characterize as the osteopathic than the allopathic philosophy. This has lead to increased public knowledge and demand for physicians who practice from a more patient-centered, wholistic philosophy, like the one we are trained to know as DOs. On the other hand, technology has led to further discoveries and innovations, such as state-of-the-art imaging techniques, transplant surgery, and pharmaceuticals, that support the more allopathic approach to patient care. This

is not to insinuate that a DO would not use these things; but the DO's decision to use them would be based on critical thinking and diagnostic acuity stemming from the principles and tenets of osteopathic medicine rather than any other approach.

Other, non-medical, influences have shaped the two medical roads to the future as well. For example, the increase in the number of osteopathic colleges over the years, the opening of ACGME training programs to DO graduates, and the growth of managed care. Osteopathic medicine has become global, with the establishment of osteopathic training programs in many places outside the United States. We have also seen the demise of osteopathic hospitals over time, from nearly 300 such hospitals in the 1970s to only a very small number now. Most of our osteopathic training hospitals were small to medium sized hospitals, and these hospitals were either closed or merged into larger allopathic systems as managed care grew over the years. Similar sized allopathic hospitals have experienced the same fate.

At this point in my presentation I raised the question: what is the future for osteopathic medicine? If osteopathic and allopathic medicine can be thought of as two parallel and distinctive schools of medicine, on parallel roads to the future, how will these roads look in the years to come? Will the two professions remain separate and distinct? Will they grow closer together, and thus less distinguishable from each other? Will they grow farther apart or even merge altogether? How will my slide look well into the future? Will the two roads still be parallel? Will they be parallel but closer together? Farther apart? Merged together entirely? Will they cross somehow and then continue onward in opposite directions? Figure 3 shows the two parallel roads of osteopathic and allopathic medicine, and perhaps allows one to speculate on what these two paths will look like in the future.

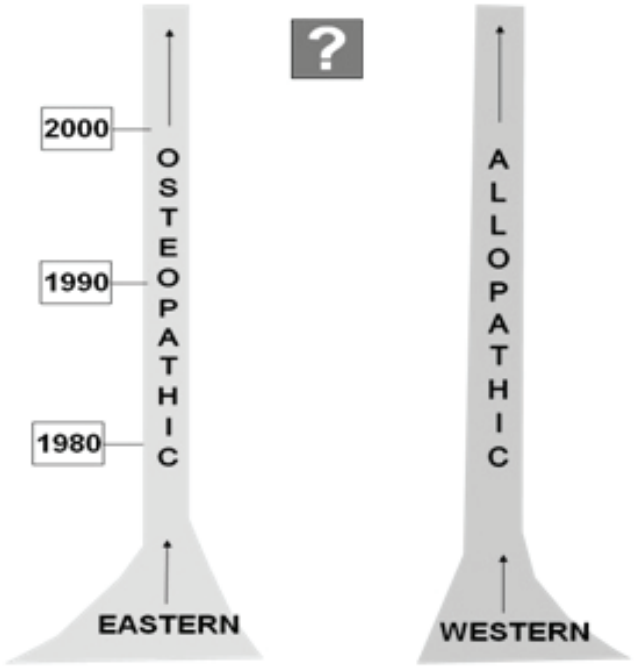

Figure 3. Osteopathic and allopathic roads to the future: what will they look like in the years to come?

I have my own thoughts about these questions, but I will leave them for another time. In the meantime, what do you, the readers, think? Perhaps you'd like to write an article, editorial or a letter to the editor and send it in to *The AAOJ*. We would be most interested in hearing others' take on this issue. Think about it. Let us know.

Raymond J. Hruby, DO, MS, FAAO
Scientific Editor

Evidence Does Not Grow Stale with Age

Murray R. Berkowitz

I had originally intended to devote this issue's editorial to consideration of international, non-physician osteopaths in United States Osteopathic Graduate Medical Education (OGME) programs; however, a number of recent events make the subject of "evidence" a much more timely matter for our consideration and discussion. We all know that there has not been as much evidence-based (osteopathic) medicine to provide the desired support of the hands-on, manual techniques performed by osteopathic physicians when they provide Osteopathic Manipulative Treatment/Osteopathic Manipulative Medicine (OMT/OMM) to their patients. That said, there is also little evidence-based (allopathic) medicine, albeit a greater proportion of evidence exists in that arena.

In his Letter to the Editor "AOA Should Support IOM Report on Resident Work Hours" in the March 2010 issue of the *Journal of the American Osteopathic Association*, one of our military osteopathic physicians (Major Jeremy H. Conklin, DO, MPH, MBA, USAF MC) provided a well-written, well-researched, and well-documented treatise on the issue of limiting residency duty hours and its impacts on patient safety. As we are all keenly aware, the Institute of Medicine (IOM) raised the matters of patient safety and errors in medicine to their current public awareness. Dr. Conklin provided excellent research to support his position – he applied a traditional, osteopathic approach to the prevention of illness and the furtherance of health by advocating a policy that supports the current guidelines of both the AOA and ACGME that limits resident duty hours to 80 hours per week. Again, he fully supported his position with evidence. Also published along with Dr. Conklin's letter was a "response" from the AOA Director of Education and Secretary of the Council on Osteopathic Postdoctoral Training, Diane N. Burkhart, PhD. Dr. Burkhart's statements echoed those of past-President of the AOA Carlo DiMarco, DO, who about a year ago opined that the evidence regarding resident duty hours is "old". Dr. DiMarco also opined that much of the evidence was performed overseas. I could not believe the jingoistic language attributed to our then-President and felt he surely must have been misquoted in the printed version. Given Dr. Burkhart's statements, I now have to wonder about the policy position taken by the AOA as a result of Dr. DiMarco's statements.

If one follows the logic of the position of the AOA with respect to evidence, then the following applies. We must re-accomplish all studies regarding the research and findings of Watson and Crick with respect to the structure of DNA and our understanding of genetics. After all, this research was published in the early 1950s (it is "old") and it was performed overseas. We must also again perform experiments to show that the acceleration of gravity at the earth's surface is 32 feet per second squared ($g=32$ ft/sec^2). Again, this was performed hundreds of years ago and was performed overseas. We must also perform experiments to ensure that the Sun is actually the center of the Solar System. Copernicus' findings were published shortly before his death in 1543AD. Once again, this is "old" and was performed overseas. I can give numerous other examples. The way to argue against evidence is to provide studies and evidence that support the contra-positive position. This means that to refute the current (even "old" and/or overseas) evidence supporting limiting resident duty hours, one must provide studies that provide evidence that increased resident duty hours results in increased resident performance, increased patient (and House officer) safety, and decreased errors. The problem here is that not one such study exists!

There are implications about the notion of "time-stamping" of evidence with an expiration date for both the AOA and the Academy. As we develop questions for NBOME COMLEX and the various specialty board examinations, there are recently implemented policies that the questions and material must be "recent" – typically found in a standard reference published within the past five years. Does this mean that the works of our stalwart osteopathic teachers such as Fryette, Mitchell, Jones, Sutherland, Magoun, etc. have grown "stale" and are without value merely because they were published well over five years ago? Do we need to discard all of these teachings? They're "old". Or, do we merely need to not test these concepts due to their lack of currency? We would do well to remember the lessons of our youth in such subjects as history – "primary sources" (that is, the original works) are valued over the later "secondary" resources. Evidence does not grow stale with age.

Murray R. Berkowitz, DO, MA, MS, MPH, C-NMM/OMM,
CAQ-Occ Med,
Associate Editor

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Dig On:

The Superior Serratus Anterior: An Obscure Cause of Persistent Shoulder and Upper Thoracic Pain

Michael M. Dominello and Daniel J. Kary

This article describes the evaluation and treatment of somatic dysfunction involving the superior portion of serratus anterior. Dysfunction associated with this muscle typically presents as vague, poorly localized, shoulder, upper thoracic and lateral upper arm pain. The vague nature of the symptoms creates a diagnostic dilemma; one must look for serratus involvement to make the diagnosis.

Anatomy review

The serratus anterior arises from extensive anterolateral costal attachments to ribs one through eight, nine, or ten and from fascia covering the intervening intercostals. Though not always illustrated accurately, the serratus anterior has three distinct portions (superior, middle and inferior), three different scapular attachments, and three distinct actions (Figure1). It acts to protract the scapula, and is a prime mover in all pushing and reaching motions of the upper extremity.[1]

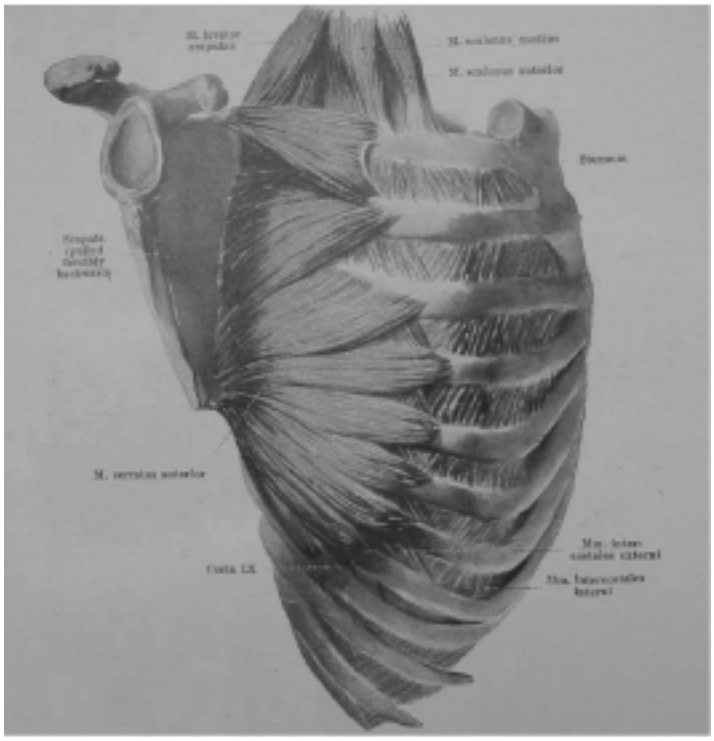

Figure 1. Serratus anterior: viewed from the side and somewhat in front. Clavicle, pectoralis muscles, external abdominal oblique and muscles from anterior and posterior scapular fossae have been removed, and scapula drawn forcibly backward.

From: Spalteholz W. *Hand Atlas of Human Anatomy* p. 283.2

As depicted in figure 1, the superior portion of serratus anterior attaches to ribs one and two and the costal and dorsal surfaces of the superior scapular angle, where its fascia is also contiguous with fascia of the levator scapula.[3] A fibrous arcuate ligament joins its two costal attachments. The superior portion acts to protract the scapula *inferiorly*, rotating the scapular glen caudally when reaching forward and downward.

The middle portion of serratus anterior attaches along the second rib (posterior to the superior portion's attachment), as well as along the third and sometimes fourth ribs. The middle portion attaches broadly along the ventromedial border of scapula. It acts to protract the scapula *anteriorly*, as when reaching the arm forward at shoulder level.

The inferior portion of serratus anterior is comprised of the lowermost four to five digitations, which converge to form a strong attachment to the ventral aspect of the inferior angle of scapula. This portion draws the inferior scapular angle laterally forward to rotate the scapular glen *superiorly,* allowing for completion of arm flexion.[4]

The fascial relationship with levator scapula also warrants consideration. The levator scapula typically attaches inferiorly to superior scapular angle, and superiorly to the transverse processes of C1 to C4. However, attachment variations of levator are common, and include accessory attachments to the temporal mastoid process, occiput, first or second rib, and to scaleni, trapezius and serratus muscles.[5] Fascial relationships such as these, and those of the extensive clavipectoral fascia may provide important diagnostic clues to the otherwise vague symptoms associated with dysfunction involving the superior portion of serratus anterior. Those fascial relationships should be considered during treatment.

History

Common subjective complaints of superior serratus anterior dysfunction include vague and poorly localized upper thoracic, shoulder, and lateral upper arm pain. Some describe discomfort or "a feeling of tightness," deep to the clavicle or scapula. An impulse to shift the shoulder is common and difficulty lifting the arm fully is often reported. Symptom onset may follow overuse or trauma such as overexertion while pushing or reaching below shoulder level, or a fall onto one's hand or elbow. A fall onto an inferiorly reaching arm may cause rapid lengthening of the superior serratus anterior, resulting in abrupt muscle lengthening and subsequent dysfunctional contraction.

Examination

An index of suspicion is necessary to evaluate and treat somatic dysfunction involving the superior portion of serratus anterior. This is typically part of a group dysfunction, involving rib cage, cervicothoracic junction, upper extremity and thorax.

Typical findings include first and second rib elevation (inhalation dysfunction), T2 rotation, and inferior protraction of the involved scapula. The thoracic spine and rib dysfunction is readily found, but may prove refractory to treatment if the superior serratus anterior is involved and is not treated as well. It is important to consider what caused and what might maintain the more obvious rib and thoracic findings. Simply mobilizing what may be secondary dysfunction, without determining the cause, may yield short term and partial easing.

Palpate the upper ribs with the patient seated, supine, and prone. The ipsilateral first and second ribs will typically be elevated and have restricted motion. The serratus muscle attachments to the upper ribs may be palpated via the axilla. Evaluate for tenderness and compare with contralateral side. With unilateral superior serratus anterior dysfunction, rib tenderness is typically limited to the ipsilateral first and second ribs.

Evaluate and compare upper extremity flexion. Flexion of the affected side may be limited. Examine cervical and thoracic regions. T2 is typically rotated. This is due to the action of superior anterior serratus upon the first and second ribs and subsequent leverage upon their vertebral attachments. Reflexes, motor strength, and sensation should also be evaluated.

Treatment

Treatment may be done with the patient supine or seated. Position their ipsilateral arm transversely across the chest and abdomen. Passively protract and rotate the scapula, carrying the superior angle toward its anterior and inferior physiologic limit of motion. Hold scapula in this position of ease for the superior serratus anterior and monitor for restoration of intrinsic motion. *Encourage relaxation*. Respiratory facilitation may also be employed by asking the patient to hold their breath in inhalation. This recruits the scalenes to draw ribs one and two into their position of ease. Reassess initial findings after treatment. The rib and thoracic findings usually resolve after treating the scapula. This suggests their dysfunction is secondary to that of serratus.

Treatment may also be accomplished by balancing the clavipectoral fascia. This requires that one develop a mental picture of the fascial attachments. Greater hand and finger sensitivity and dexterity is also required.

Discussion

When first and second rib dysfunction is accompanied by vague complaints in the upper thorax and shoulder, and deep to clavicle and superior angle of scapula, an evaluation for somatic dysfunction of the superior portion of the serratus anterior is warranted. If the serratus involvement is not recognized, the symptoms may prove refractory to treatment. This leads to increased cost of care and sometimes to prolonged morbidity. Because of its obscure location, diagnosis of this dysfunction requires an index of suspicion and an expanded examination.

Somatic dysfunction involving the superior portion of serratus anterior responds readily to osteopathic manipulative treatment, using an indirect functional method or indirect myofascial release. Significant improvement may occur after a single treatment. Dig on!

References

1. Standring S, ed. *Gray's Anatomy, The Anatomical Basis of Clinical Practice, 39th editio*n, New York, NY. Elsevier Churchill Livingstone, 2005:837-838.
2. Spalteholtz W. *Hand Atlas of Human Anatomy, Fifth edition, Vol. II*. Philadelphia & London: Lippincott, 1910:283.
3. Standring S, ed. *Gray's Anatomy, The Anatomical Basis of Clinical Practice, 40th edition*, New York, NY. Elsevier Churchill Livingstone, 2008:811.
4. Ross L, Lamperti E. *Thieme Atlas of Anatomy: General anatomy and musculoskeletal system*. New York: Stuttgart, 2006:260.
5. Standring, op. cit., p. 810.

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Principles of Osteopathy in the Battlefield

Matthew Kozminski

In regards to combat theater health services support in the US Army, there are currently five levels (I-V) of care where different levels denote differences in capability rather than quality of care.[1] A level I facility is referred to as a battalion aid station (BAS) (Figure 1) and is staffed by a physician, called the battalion (BN) surgeon, regardless of expertise or medical specialty training, who oversees the care of all soldiers with the assistance of other members of the medical treatment team: physician assistant and combat medics. The overall challenge at a BAS is to triage and treat medical complaints without any patient holding capacity as well as being able to recognize when medical evacuation to a higher level of care is warranted.

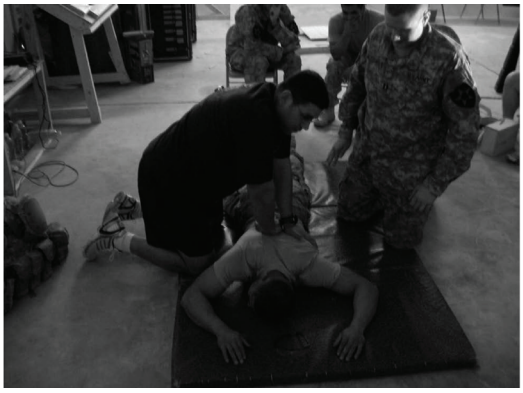
Figure 1. The 4-9 Infantry Battalion Aid Station. Litters set up for trauma and patient examination along with a limited stocked pharmacy.

As of September 2009, I have had the privilege of being deployed to support the mission of Operation Iraq Freedom (OIF) as a battalion surgeon with the 4th Battalion, 9th Infantry Regiment (4-9 Infantry) with the 4th Brigade, 2nd Infantry Division (4/2 Stryker Brigade Combat Team). Musculoskeletal complaints by far have been a leading cause for a soldier to visit the 4-9 BAS during this combat tour. Thus, the utilization of osteopathic principles and techniques can be an invaluable tool for any battalion surgeon.

During my experience as a battalion surgeon so far, I have taken full note that infantry soldiers often enjoy "popping" each other's backs as a therapeutic option for musculoskeletal pain. I have even seen soldiers come to the BAS asking to see a certain combat medic because "he is good at popping backs." Of course, several interventions eventually had to be made on my part. First off, there was one particular day that a soldier came to the BAS stating that he had a soldier "pop" his back and "it did not go right" thus leading to further pain and discomfort. Second, there was another particular occasion where I overheard one combat medic say to another combat medic, "You know what we need? We need a chiropractor to come out here and teach us how to pop backs correctly." Upon hearing this utterance, I did not hesitate to verbally intervene and explain to the combat medics that I was fully capable of teaching them the basic principles of osteopathic manipulation and would offer the chance to allow them to perform such techniques under my supervision and guidance. The combat medics took this statement as a promise and held me to it, thus, the development of a formal curriculum to teach combat medics the basic principles of osteopathic medicine came to fruition. (Figure 2 & 3)

Figure 2. The combat medics receive lecture in the Battalion Aid Station.

Figure 3. SPC Michael Reta is taught the basic crossed-arm technique or "Texas Twist" on a soldier.



It is possible that an osteopathic physician might scoff at the idea of combat medics learning some basic principles of osteopathy; however, I would ask such a physician to consider that A .T. Still himself was an experienced combat veteran during a time when battlefield medicine relied upon purging, bloodletting, and an armamentarium of medicines that could only be characterized as violent.[2] During A.T. Still's tenure as a military surgeon during the Civil War, there were more casualties from sickness than battlefield injuries.[3] It was not until the year 1874 that Still "flung to the breeze the banner of osteopathy;"[4] I can only assume that A.T. Still would have professed his principles of osteopathy to his subordinates while serving as a physician on the battlefield if history were to be recreated and he "flung the breeze" earlier? Is it not the mission of the American Academy of Osteopathy to teach, advocate, and research the science, art, and philosophy of osteopathic medicine?[5]

Medical training for combat medics may be based on the principles for Emergency Medical Technicians (EMT), Basic Life Support (BLS), and Advanced Cardiac Life Support (ACLS);[6] however, given the circumstances of combat, these individuals require a different skill set from a basic EMT. In other words, combat medics are not just simply an EMT, these trained soldiers often are required to perform medical care above and beyond what is required of an EMT in the civilian sector. This unique set of skills has caused the combat medic to become eager to learn any skill or medical knowledge which may lead to enhanced care for soldiers on the battlefield.

Overall, the combat medics within the 4-9 Infantry have vocalized that they feel the usage of osteopathic manipulation as nothing but beneficial toward the overall well being of a soldier and to date, have been appreciated of any skills or knowledge of osteopathy that has been imparted onto them. I would ultimately argue that so long as I teach the combat medics principles of osteopathy, soldiers can now "pop" backs correctly and seek proper care. Lastly, I would also argue that many young combat medics do have an interest in pursuing careers as physicians after their military obligations; perhaps my teaching would encourage them to consider an osteopathic pathway?

References

1. Burris DG, FitzHarris JB, Holcomb JB, Hetz SP, et al. *Levels of Medical Care, in Emergency War Surgery, Third United States Revision*. Borden Institute. 2004.
2. Peterson BE, Ward RC. *Major Events in Osteopathic History in Foundations for Osteopathic Medicine, Second Edition*. Lippincott Williams & Wilkins, 2003.
3. Duffy J, Urbana, IL. *Humors to Medical Science; A History of American Medicine, 2nd Edition*. University of Illinois Press; 1993.
4. Still, AT. *Autobiography of Andrew T. Still with a History of the Discovery and Development of the Science of Osteopathy. Rev Ed.* Published by author, Kirksville, MO, 1908.
5. Berkowitz MR, Osteopathic Education and Training-Advocating the Adoption of an External Paradigm for Residency Training in NMM/OMM, 2009 *AAOJ*;19(4):7.
6. Bond C, Hastings PR, Kling J. I*ntroduction to Battlefield Medicine, in 68W Advanced Field Craft Combat Medic Skills*. Jones and Bartlett Publishers. 2010.

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Prolotherapy Weekend

October 7-9, 2010 at UNECOM

Course Outline:

Thursday, Oct 7: This is required for those physicians who have not taken a prior course in prolotherapy. It will include an introduction to prolotherapy, wound healing, degenerative postural cascade, coding and billing.

Friday and Saturday, Oct 8-9: Participants will be divided into two groups, beginners and advanced. These two groups will alternate between lectures and anatomy and injection technique while the other group will be in the anatomy lab performing injections under supervision and reviewing prosections.

Presenting:

Mark S. Cantieri, DO, FAAO, Program Chair
George J. Pasquarello, DO, FAAO

Prerequisites

Functional Anatomy; (1) Level I course or equivalent

CME

The program anticipates being approved for 20 hours of AOA Category 1-A CME credit pending approval by the AOA CCME.

Program Time Table

Thursday, October 7 ..... 5:00 pm - 10:00 pm
Friday, October 8 ..... 8:00 am - 5:30 pm
Saturday, October 9 ..... 8:00 am - 5:30 pm

Thursday includes a 30 minute break; Friday & Saturday include (2) 15 minute breaks and a (1) hour lunch)

Who May Attend Policy

The primary educational objective for AAO is to provide programs aimed to improve understanding of philosophy and diagnostic/manipulative skills for AAO members, DOs who are not AAO members, individuals who are licensed for the unlimited scope and practice of medicine, and for those in programs leading to such license.

Course Location:

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Prolotherapy Weekend, October 7-9, 2010

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□ I require a vegetarian meal

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Median Arcuate Ligament Syndrome – Literature Study and Osteopathic Considerations

Luc Peeters

Introduction

Median Arcuate Ligament Syndrome (MALS) is also known as coeliac trunk compression syndrome or Dunbar syndrome (Dunbar et al., 1965). Occasionally it is referred to as abdominal angina.

The median arcuate ligament can compress the coeliac trunk. This occurs frequently but it is not understood why some cases are symptomatic while some remain asymptomatic.

Various symptoms have been attributed to this syndrome, ranging from abdominal symptoms to musculoskeletal symptoms to psychological symptoms (Carey et al., 1969; Williams et al., 1985).

Classical medicine will often advise operative intervention (the ligament is cut) (Barcourt et al 1988, Ghosn et al., 1982; Mihas et al., 1977) but a clear indication for such surgery is not present. Recently, laparoscopy has been used to relieve the compression (Desmond et Roberts, 2005). The results of these operations are highly variable.

In the osteopathic practice patients with vague abdominal and subdiaphragmatic pain - associated with eating or not - are frequently encountered. The osteopath will often treat the stomach function, the diaphragm and the segments of the upper digestive system. These patients often present with a very rigid and flattened thoracolumbar spine. Decoaptation in this region will often improve the complaint.

Many of these complaints could be associated with median arcuate ligament syndrome. Resultant ischemia of the organs in the upper digestive system and even ischemia of the mesenteric root could also be the part of the problem. As well as the arterial compression an irritation of the coeliac plexus could be contributing to the complaint.

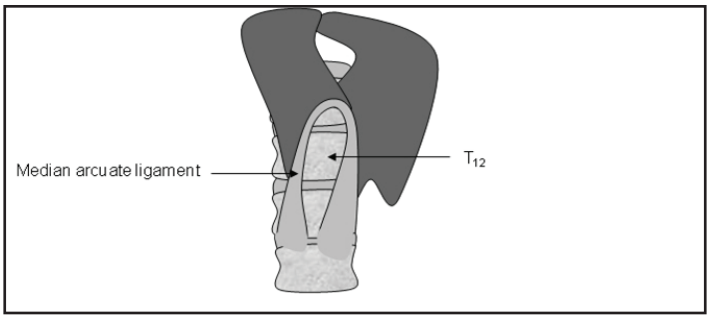
Anatomy

Median arcuate ligament

The median arcuate ligament is the tendinous junction between the right and left crus of the diaphragm (Balaban, 1997; Horton et al., 2005). It is the anterosuperior boundary of the aortic hiatus.

The histology of the ligament demonstrates dense connective tissue infiltrated by fat cells, blood vessels and nerves. Striated muscle fibres are present together with collagen fibres.

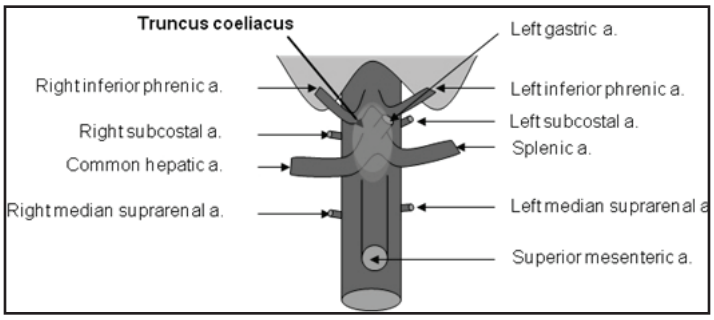
Figure 1 – Median arcuate ligament



The coeliac trunk was found where the median arcuate ligament crosses the midline.

In 12 of 83 cadavers (14.46%) the coeliac trunk was further from the ligament, in 35 cadavers (42.17%) the trunk touched the ligament and in 36 cases (43.37%) the ligament crossed over the trunk. The average distance between both structures was 0.94 cm and when overlapping this distance became 0.42 cm (Dunbar et al .,1965; Petrella et al., 2006). Certain authors suggest that the coeliac trunk is in fact intrathoracic in some cases (Fadhli, 1968; Warter et al., 1970), which leads to a congenital version of the compression syndrome.

Figure 2 – Coeliac trunk



Relative to the spine the coeliac trunk is at the level of T12-L1.

Figure 3 – Topography of the coeliac trunk

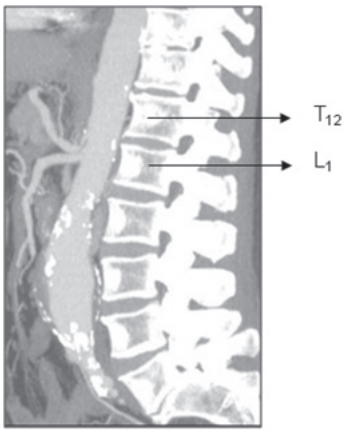
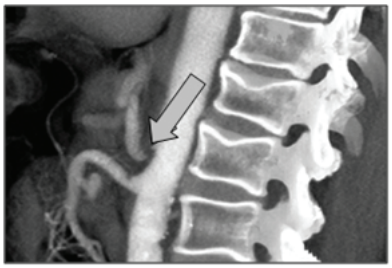


Figure 4 – Compression of the coeliac trunk



The coeliac trunk is also the origin of the suspensory muscle of the duodenum. The suspensory muscle of the duodenum is the bond between duodenum III and IV and the coeliac trunk. This muscle consists of smooth muscle and connective tissue (Saenco et al., 1989).

Coeliac plexus

The majority of the abdominal sympathetic nervous tissue is found anterior and lateral upon the abdominal aorta. The upper part of this abdominal sympathetic tissue is known as the coeliac plexus. The coeliac plexus is found at the level of T12-L1 (Thomson et al., 1977).

Studies of the individual variability of the location of the coeliac plexus show that in 32% of cases the coeliac plexus was an accumulation of numerous smaller ganglia linked by a network of nerve fibres, relatively removed from the blood vessels branching from the aorta. In 38% of case the coeliac plexus was a grouping of medium sized ganglia concentrated around the coeliac trunk, mostly on the left side up to the branching of the superior mesenteric a. and without contact with the median arcuate ligament. In 30% of cases the coeliac plexus was a grouping of 2 to 4 ganglia inserting into the median arcuate ligament and forming a dense ring around the blood vessels (Vlasova, 2000).

The coeliac plexus is highly vascular (Promwikorn et al., 1988). The arterial blood comes from the aorta, inferior phrenic a. and the suprarenal arteries. The venous drainage is via the inferior phrenic v. and the vena cava inferior.

Pathology

Arterial compression

Due to compression of the coeliac trunk the arterial circulation of various digestive organs is also likely to be compromised.

Anatomically, it is most likely that the arterial supply of the stomach, spleen and liver are the most affected.

During exhalation the compression is increased due to the fact that the trunk ascends (Reuter, 1971; Reuter et Bernstein, 1973). This is equally so in case of a diaphragm high position dysfunction – due to fascial retractions in the thorax, congestion of subdiaphragmatic organs or muscular weakness.

Figure 5 – Distribution of the arterial supply to the digestive organs

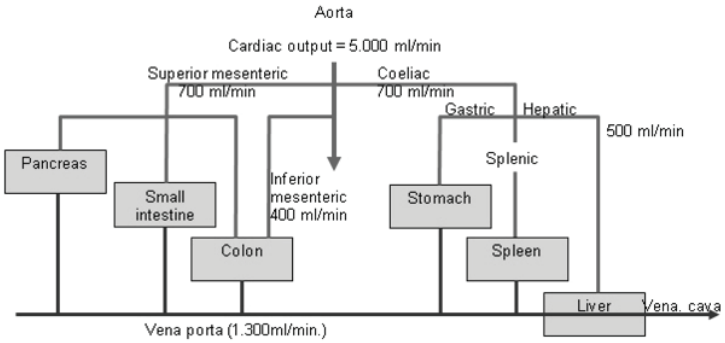
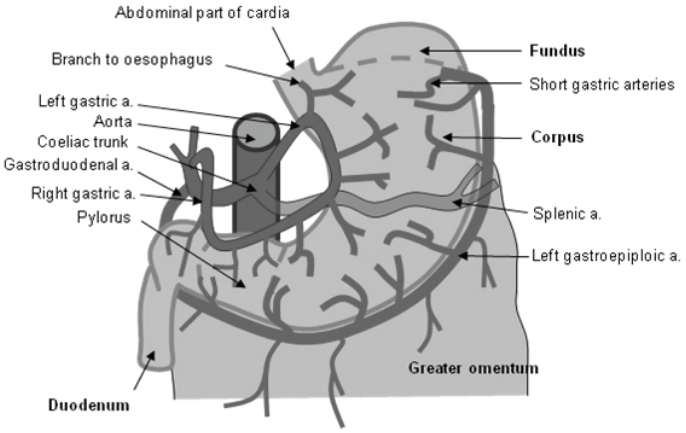


Figure 6 – Arterial supply to the stomach



Via compression from the ligament ischemia can develop in the organs of the digestive system. Such ischemia can be mild but in serious cases can result in necrosis. In serious cases where the symptoms are confirmed with arteriography, urgent surgery is required as this situation can be life threatening, most certainly if combined with arteriosclerosis of the involved vessels (Sulkowski et Wolters, 2000).

In such serious cases the ischemia becomes constant and leads to the symptoms being independent of eating. In more mild cases the ischemic pain will most commonly occur 15 minutes after eating due to the fact that the arterial flow to the stomach cannot increase as required.

Irritation of the coeliac plexus

Balaban et al showed in 1997 that surgical reduction of the pressure upon the coeliac trunk affected the contractile rhythm of the stomach.

Gastroparesis and gastric arrhythmia were diagnosed pre-operatively and were shown to be resolved post-operatively by way of a normal myoelectric activity of the stomach (of 3 cycles per minute). This finding indicates that the symptoms can be of neurogenic origin via irritation of the coeliac plexus.

Trophic changes to the coeliac plexus could be the underlying cause of the coeliac trunk stenosis (Drapanas et Bron, 1966; Harjola, 1963 & 1968; Harjola et Lahtiharju, 1968; Jamieson, 1986; Marable et al., 1966; Of Gossun et al., 1984).

Dysfunction of the duodenojejunal angle

This functional sphincter has no actual sphincter fibres but does suspend from the coeliac trunk and duo III and IV by way of a system consisting of smooth muscle (suspensory muscle of the duodenum), a striated muscle originating from the diaphragm and fibrous tissue. It acts to limit the transit so that the function of the duodenum is better controlled. If the functional sphincter system does not properly function then the evacuation of the duodenum is no longer exponential (first adequate filling must occur before the contents are allowed to advance further). The stomach-duodenal evacuation is interrupted.

When transit is too fast the result is poor digestion.

Symptoms

The symptoms indicative of this syndrome are:

- Abdominal pain, not related to eating but due to the ischemia (in 71% of cases).
- Systolic murmur (in 15% of cases).
- Nausea (in 29% of cases).
- Lower thoracic and thoracolumbar pain (in 22% of cases).
- Acidic reflux (in 17% of cases).
- Weight loss (in 15% of cases). The weight loss is due to the lack of normal increase in blood supply 15 min after beginning to eat. The pain is usually associated with eating.
- Vomiting (in 15% of cases).
- Diarrhoea (in 14% of cases). Occurs due to dysfunction of the coeliac plexus as is observed secondary to coeliac plexus block during pain therapy.
- Breathlessness (in 14% of cases).
- Murmur during auscultation due to the post-stenotic turbulence (Edwards et al 1970).

The syndrome occurs most commonly in adults but has been described in children (Dubbins et Scholbach, 2006) most likely due to abnormal congenital anatomy.

Functional osteopathic treatment

The osteopath must be aware of this syndrome. Treatment of the serious, structural cases with associated arteriosclerosis is contraindicated but during the functional stage osteopathic treatment is recommended.

Before osteopathic treatment commences arteriosclerosis must be discounted by appropriate testing.

The osteopathic treatment has the following aims:

- Improving the mobility of the thoracolumbar junction: most important is improvement of the mobility into flexion via a thoracolumbar decoaptation technique.
- The normalisation of the diaphragm function: most important is increasing the inhalation capacity as it is during exhalation (or a dysfunction in high position of the diaphragm) when the coeliac trunk ascends and the chance of compression is most significant.
- The decongestion and stretching of the region ventral to T12-L1: the region of the coeliac plexus is the aim here.

A fat-reducing diet is necessary for obese patients: the median arcuate ligament consists of fat cells and any increase will increase the chance of compression.

Specific techniques

This article is written for professional osteopaths. It is assumed therefore that all the necessary techniques required to achieve the aims above are able to be carried out in safety. However, several specific techniques for this particular complaint are presented below.

Active mobilization of the coeliac trunk

The patient is sitting on their knees and bent forward as far as possible so that the abdomen approaches or even touched the knees. The patient abdominally inhales as deeply as possible and is instructed to hold their breath while actively flexing their thoracolumbar region (kyphosis). In this way the increase in abdominal pressure will flex the thoracolumbar region and the coeliac trunk will descend. The contraction of the diaphragm during the inhalation will place cranial traction upon the median arcuate ligament. At the same time a drainage effect will occur in the abdominal venous system.

This technique is repeated several times.

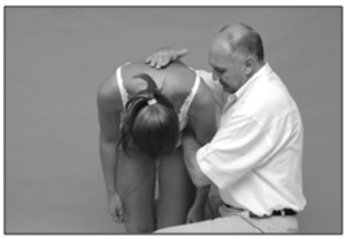
Figure 7 – Active mobilization of the coeliac trunk

Defibrosing of the coeliac plexus (patient standing)

Figure 8 – Defibrosing of the coeliac plexus (patient standing)

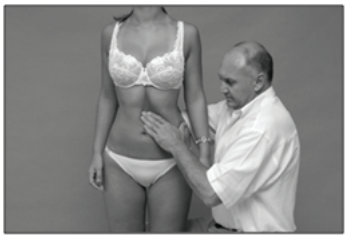
Stretch and mobilization of the region will create a defibrosing action for the coeliac plexus.

Using the palmar side of three fingers, the osteopath contacts the zone of the coeliac plexus.



While exahaling, the patient bends forward and the osteopath strengthens the contact to cranial/posterior/right, in the direction of the vertebral bodies of T12-L1.

The osteopath stretches the region of the coeliac plexus several times to caudal while the patient remains bent forwards (for optimal contact)



The osteopath holds the contact on the coeliac plexus to posterior/caudal while the patient exhales and stands up straight.

The effect of this technique is very strong and must be used with due consideration.

If neurovegetative signs such as sweating occur, the force of the contact should be reduced. It should be clear that this technique is contraindicated in cases of arteriosclerosis.

Problems of the coeliac plexus will often result in local pain with palpation. Avoid this pain during the technique.

During or just after the technique orthostatic hypotension can occur. Inform the patient that this frequently occurring reaction will spontaneously resolve.

Defibrosing of the coeliac plexus (patient supine)

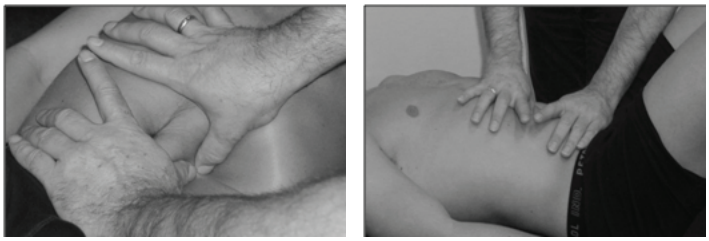
The patient is supine with both legs bent.

The osteopath stands next to the patient and uses both hands to hook lateral/posterior around the small intestine in the direction of the coeliac trunk. This is in the direction of the bodies of spinal levels T12-L1. The osteopath hooks around ventrally to the spine and mobilises towards him/herself. The technique is done during exhalation otherwise the technique cannot be done deeply enough.

The technique is gentle, pain free and done several times on both sides.

It should be clear that this technique is contraindicated in cases of arteriosclerosis.

Figure 9 – Defibrosing of the coeliac plexus (patient supine)



Lift and mobilization of the duodenojejunal angle

The patient is sitting and the osteopath stands behind the patient.

Using the fingers of both hands the osteopath hooks into the abdomen just left of the midline, at the height of the navel, under the duodenojejunal angle. This structure is not palpable as such but the anatomical location is used.

The region is lifted to cranial during an exhalation of the patient and then the region is mobilised to mediolateral.

The technique is repeated several times.

This mobilization will improve the circulatory supply and therefore the trophic condition of the region around the coeliac trunk and plexus. Any adhesions and retractions are also stretched.

Figure 10 – Lift and mobilization of the duodenojejunal angle

References

1. Bacourt F, Goeau-Brissonnière O, Koskas F. Compression associé du tronc coeliaque et the l'artère meséntérique supérieure par le diaphragme. *Chirurgie*. 1988. 114:762-768.
2. Balaban DH, Chen J, Lin Z, Tribble CG, McCallum RW. Median arcuate ligament syndrome: a possible cause of idiopathic gastroparesis. *Am. J. Gastroenterol*. 1997. 92:3:519-523.
3. Carey JP, Stemmer EA, Connolly JE. Median arcuate ligament syndrome. *Arch. Surg*. 1969. 99:441-446.
4. Desmond CP and Roberts SK. Exercise - related abdominal pain as a manifestation of the median arcuate ligament syndrome. *Scand. J. Gastroenterol.* 2004. 39:12:1310 -1313.
5. Drapanas T and Bron KM. Stenosis of the celiac artery. *Ann. Surg*. 1966. 164:1085-1088.
6. Dubbins PA and Scholbach T. Celiac artery compression in children, adolescents, and young adults. *J. Ultrasound Med.* 2006 25:8:1108 - 1109.
7. Dunbar JD, Molnar W, Beman FF, Marable SA. Compression of the celiac trunk and abdominal angina. *Am. J. Roentgenol. Radium. Ther. Nucl. Med.* 1965. 95:731.

8. Edwards AJ, Hamilton JD, Nichol WD, Taylor GW, Dawson AM. Experience with Coeliac Axis Compression Syndrome. *Br. Med. J.* 1970. 1:5692:342–345.

9. Fadhli HA. Congenital diaphragmatic obstrution of the aorta and the celiac artery. *J. Thorac. Cardiovasc. Surg.* 1968. 55:431-433.

10. Ghosn PB, Rabbat AG, Trudel J, D'Amico P, Lecours R, Trudel J. Celiac compression syndrome. *Can. J. Surg*. 1982. 25:4:377-379.

11. Harjola PT. A rare obstruction of the coeliac artery. *Ann. Chir. Gynaecol. Fenn*. 1963. 52:547-570.

12. Harjola PT. Coeliac axis constriction and abdominal angina. *Bull. Soc. Intern. Chir.* 1968. 27:464-467.

13. Harjola PT and Lahtiharju A. Celiac axis syndrome. Abdominal angina caused by external compression of the celiac artery. Am. J. *Surg*. 1968. 115:864-869.

14. Horton KM, Talamini MA, Fishman EK. Median arcuate ligament syndrome: evaluation with CT angiography. *Radiographics*. 2005. 25:1177.

15. Jamieson CW. Coeliac axis compression syndrome. *Br. Med. J.* 1986. 293:159-160.

16. Marable SA, Molnar W, Beman FM. Abdominal pain secondary to celiac axis compression. *Am. J. Surg.* 1966. 111:493-495.

17. Mihas AA, Laws HL, Jander HP. Surgical treatment of the celiac axis compression syndrome. *Am. J. Surg.* 1977. 133:6:688-691.

18. Petrella S, Sousa Rodriguez CF, Sgrott EA, Medeiros Fernandes GJ, Marques SR, Prates JC. Relationship of the Celiac Trunk with Median Arcuate Ligament of the Diaphragm. *Int. J. Morphol*. 2006. 24:2:263-274.

19. Promwikorn W, Thongpila S, Pradidarcheep W, Mingsakul T, Chunhabundit P, Somana R. Angioarchitecture of the coeliac sympathetic ganglion complex in the common tree shrew (Tupaia glis) *J. Anat.* 1998. 193:3:409–416.

20. Reuter SR. Accentuation of celiac compression by the median arcuate ligament of the diaphragm during deep expiration. *Diagn. Radiol.* 1971. 98:561-564.

21. Reuter SR and Bernstein EF. The anatomic basis for respiratory variation in median ligament compression of the celiac artery. *Surgery*. 1973. 73:381-385.

22. Saenko VF, Virchenko SB, Kucherenko TL and Belianskii LS. The role of Treitz' ligament in regulating the evacuation of solid food from the duodenum. *Biull. Eksp. Biol. Med.* 1989. 108(9):263-266.

23. Sulkowski U and Wolters U. Das Syndrom des Median arcuate ligament mit Zweigefäßbeteiligung. Uit the boek Gefässchirurgie (Ausgabe NaN/2000) Springer Verlag. 2000.

24. Thompson GE, Moore DC, Bridenbaugh LD, Artin RY. Abdominal pain and alcohol celiac plexus nerve block. *Anesth. Analg.* 1977. 56:1-5.

25. Of Gossun M, Morobe J, Of Laethem A, Burette A, Somerhausen J, and Schockert J. Syndrome the compression isolée du tronc coeliaque (SCITC). À propos the 8 cas. Acta Chir. Belg. 1984. 84:379-383.

26. Vlasova MI. Individual variability in the structure and topography of the celiac plexus and its clinical significance. Morfologia. 2000. 117:1:16-19.

27. Warter J, Storck D, Kieny R, Tongio J. Sténoses congénitals du tronc coeliaque. *Arch. Fr. Mal. Appar. Dig.* 1970. 59:765-780.

28. Williams S, Gillespie P, Little JM. Celiac axis compression syndrome: factors predicting a favorable outcome. *Surgery.* 1985 98:5:879-887.

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CME QUIZ

The purpose of the quiz found on page 28 is to provide a convenient means of self-assessment for your reading of the scientific content in "Median Arcuate Ligament Syndrome – Literature Study and Osteopathic Considerations" by Luc Peeters, DO-MROB, BSc.Ost.Med.

Answer each question listed. The correct answers will be published in the September 2010 issue of the *AAOJ*.

To apply for Category 2-B CME credit, transfer your answers to the *AAOJ* CME quiz application form answer sheet on page 28. The AAO will record the fact that you submitted the form for Category 2-B CME credit and will forward your test results to the AOA Division of CME for documentation. You must have a 70% accuracy in order to receive CME credits.

Osteopathic Diagnosis and Treatment of Dorsalgia Caused by Disturbance of Proprioception in the Cervical Spine

A L Lepin, D E Mokhov, and S V Novoseltsev

Low back pain is the pain localized in the loin, sacral bone and sacroiliac region. The pain may irradiate into the buttocks and/or legs on one or both sides.

At present low back pain is widespread and, according to WHO experts, in the well-developed countries it reached the extent of epidemic: two thirds of the population on the globe suffer from pains in the loin (Novoseltsev SV, 2005), what in majority of cases is connected with increasing stress on man (Walsh A, 1992).

The population studies revealed correlation of low back pain with such factors as sex and age, bearing, muscular strength, mobility of the vertebral column (WHO Department of Noncomunicable Disease Management, 1999). The population study of back pain, performed recently in Sweden among people at the age of 35 – 45 years, revealed that pain occurrence was 66.3%, and this index was insignificantly higher in women than that in men. 25% of the respondents had considerable problems with ability to work, degree of the functional status disturbance. Similar results were obtained in other studies (Toroptsova NV, Benevolenskaya LI, et al., 1995); it was shown that maximum morbidity with transient loss of ability to work was observed in men at the age of 34 – 44 years and in women at the age of less than 35 years.

Low back pain is one of the main causes of economical losses in all countries with well-developed industry because of high rate in the people of able-bodied age (Antonov IP, Barabanova EV, 1998; Jenner JR, Barry M, 1995; Faucett J, 1999). Prevalence of low back pain, including in people of young and middle able-bodied age, stipulates great socio-economic significance of this problem. Therefore back pain is also included into the number of priority directions recommended by WHO for detailed study within the limits of "The Bone and Joint Decade 2000–2010" (WHO, 1999).

It is known that in case of dorsalgia with low back pain different biomechanical disorders are observed, which change postural equilibrium of the human body (its position in the space) and have local and generalized nature (Schmidt IR, 1994; Vasilieva LF, 1999; Ivanichev GA, 2000).

According to modern views concerning the development of dorsalgia with low back pain, great significance is attached to postural disorders caused by the pathology of the major joints of the legs, disturbances in the superior regions of the vertebral column, refraction anomalies, oculomotor pathology, vestibular disorders, which trigger a whole cascade of adaptive reactions resulting in myofascial pain dysfunction, neurovascular and neurodystrophic manifestations (Gagey PM, 1988, 1991; Sknortsov DV, 2000; Mokhov DE, 2002; Prikhodko AE, 2007).

At present medical practitioners have insufficient knowledge of posturology and biomechanics of the human body. It seems us sufficiently important to make an attempt to comprehend the possible causes of mobility disorders of the lumbar motor segments in connection with disturbed equilibrium and postural muscular reactions in case of different pathology.

One of the first studies was performed by DE Mokhov (2002), who considered the development of dorsalgia with low back pain (lumbar ischialgia syndrome) as a result of disturbance of feet proprioception caused by changed position and mobility of feet bones. Postural disbalance occurring in the patients with this pathology plays the decisive role in the development of dorsalgia with low back pain (lumbar ischialgia syndrome). The next study was performed by AE Prikhodko (2007), who demonstrated in his work the development of dorsalgia as a consequence of disturbed proprioception of the oculomotor muscles. Postural disbalance, occurring in case of this pathology, results in the development of dorsalgia.

Stabilography is one of the methods for revealing the postural disbalance (Gagey PM, 1988, 1991). Today the best advances in research in the field of posturology are achieved by the members of the French Association of posturologists and Japanese scientists. Physical principles of stabilometry and the requirements for recording equipment are formulated by G Bizzo et al., 1985. The possibilities given by stabilography to physiology, biomechanics and posturology were studied by J Hirasava, 1973; van Parys, 1976; VS Gurfinkel, 1979; K Tokamasu et al., 1984; C Marucchi et al., 1986, 1988; JP Roll, 1995; Ch Njiokikthen et al., 1976; DJ Steward, G Voloyesi, 1978; JL Guillamon et al., 1990; and M. Magnusson et al., 1990, reported on use of stabilography in the clinical diagnosis and treatment. At present more and more home authors publish the works, in which stabilography is used for diagnosis of the postural balance (Skvortsov DV, 2000; Mokhov DE, 2002; Drozdova LN, Afanasieva EV, 2005; Prikhodko AE, 2007; Bugrovetskaya EA, Bugrovetskaya OG, et al., 2008; Ivonina NA, Schmidt IR, 2008).

The center of gravity plane going through the human body divides it into two parts; two thirds of the body are anteriad from it, one third of the body including the vertebral column with the back and loin muscles are behind it. In the norm the human body equilibrium is maintained only by minor monoarticular muscles of the vertebral column. When pulsing coming from any of the postural system sensors is disturbed by some reason and there is a threat of equilibrium disturbance, phasic muscles of the back and loin are involved in the work; they do not sustain long strain. Their overstrain may result in disturbance of equilibrium and be the cause for development of pain syndromes (Caporossi R,

1991). Adaptation changes in the lumbar spine may develop as a result of normal relationships in the superior force triangle.

Many methods for treatment (pharmacotherapy, physiotherapy, manual therapy etc.) of dorsalgia with low back pain are developed but no one gives complete and steady healing. Understanding of their pathophysiology and therapeutic conceptions constantly are subjected to changes and development. Philosophy of holistics (i.e. unity) is one of the conceptual views; according to it, the pain syndrome reflects dysfunction of the whole locomotor system but not only one local structure (Littlejohn JM, 1956; Magoun HJ, 1976; Busquet, 1982; Caporossi R, 1989, 1991).

The effectiveness of the manual techniques in case of back pains is noted by home authors (Samosyuk IZ, Voitanik SA, 1992; Zhulev NM, et al., 1992; Sitel AB, 1993, 2002; Chokashvili VG, 1997; Cherkes-Zade DD, 1998, 2000; Vasilieva LV, 1999, 2000; Chikurov YuV, 2002; Stefanidi AV, 2003 and others), but at present, in connection with appearance of new diagnostic methods, it becomes possible to reveal and influence the true cause of back pain more purposefully.

The object of our study was to determine the significance of disturbed proprioception of the cervical spine in the development of postural disorders with subsequent forming of dorsalgia with low back pain. Realization of the set object required the successive solution of the following tasks:

1. To reveal the rate and significance of postural disorders in the patients suffering from dorsalgia with low back pain.
2. To determine the role of stabilographic investigation for revealing the causes of the postural disbalance in the patients suffering from dorsalgia with low back pain in case of descending type of equilibrium disturbance with the purpose of their subsequent correction.
3. To reveal and analyze changes in skin electrometry – electrospondylography in the patients suffering from dorsalgia with low back pain with postural disorders developed due to disturbed proprioception of the cervical spine.
4. To make more precise the effectiveness of osteopathic treatment of muscles and vertebral joints of the cervical spine in the patients suffering from dorsalgia with low back pain with descending type of equilibrium disturbance and postural disorders.

Materials and methods of the study

Characteristics of the patients

We performed the complex examination of 91 patients at the age of 16 – 35 years, suffering from dorsalgia with low back pain, at the polyclinic of the NA Semashko Railway Clinical hospital at the railway station Lyublino, OAO "RZhD" (Open Joint-stock Company "Russian Railway"), the city of Moscow. The criteria for inclusion of the patients into the test and control groups were:

- men and women;
- age of 15 – 35 years;
- localization of pain syndrome in the low back: in the lumbar or lumbosacral spine;
- disease duration of no more than 5 years;
- harmonious postural syndrome;
- descending type of equilibrium disturbance.

The criteria for exclusion were:

- age of younger that 15 years and older than 35 years;
- localization of pain syndrome in the low back: in the lumbar or lumbosacral spine with irradiation to the lower extremity;
- disease duration of more than 5 years;
- disharmonious postural syndrome;
- ascending type of equilibrium disturbance;
- mixed type of equilibrium disturbance;
- descending type of equilibrium disturbance caused by oculomotor disorders, teeth occlusion;
- signs of disorder in the vestibular system;
- positive fascial test on the neck;
- discal hernia in the lumbar spine;
- developmental anomalies of the vertebral column;
- tumors of the vertebral column;
- inflammatory diseases of the vertebral column.

The patients younger than 15 years and older than 35 years were not included into the study. All patients of both sexes had pain syndrome localized in the lumbar or lumbosacral spine. Disease duration was from one week to four years.

As a result of performed examination, a group of the patients was excluded from the total number of the patients by these criteria. Out of them:

- disharmonious postural syndrome was revealed in two patients,
- ascending type of equilibrium disturbance was revealed in 31 patients;
- mixed type of equilibrium disturbance was revealed in seven patients.

The following investigations were performed in the patients with descending type of equilibrium disturbance, which was confirmed in the vertical projection in frontal plane, by flexion test, index finger test and external rotator test.

The effect of oculomotor activity on the equilibrium system was studied with the help of cover-test. Positive test was revealed in eight patients.

The influence of teeth occlusion on the equilibrium system was investigated with the help of stabilometry. We excluded from the examination those patients, in whom clenching the teeth resulted in displacement of the center of gravity during repeated recording as compared to initial recording in the upright position with open eyes, closed mouth but not clenched teeth. These changes were revealed in five patients.

Positive test on the cervical fascias was revealed in four patients, strains into the skull cavity, thoracic or abdominal cavity were observed.

The study did not include the patients with verified discal hernias (two subjects) and one patient with neurological symptoms of disturbance in the vestibular system; this pathology was revealed in the patients at the selection stage.

Basing on the obtained data, three groups were distinguished from the total number of the examined patients.

There was a group of 60 patients suffering from dorsalgia with low back pain, who were excluded from further examination and received pharmacotherapy and physiotherapeutic treatment under the neurologist's control.

The remaining patients were divided into two groups by random sampling method. The test group was formed by 17 subjects, and the control group included 14 subjects. The patients of these groups were subjected to further deepened examination. The maximum portion in both groups was formed by the patients at the age of 26 – 35 years (67.7%); dorsalgia with pain syndromes of different localization begins to manifest clinically just in this age period. The distribution of the patients by age is practically identical and equivalent in the examined groups.

Methods of investigation:

1. Questioning, collection of anamnesis;
2. Neurological examination;
3. Postural examination;
4. Osteopathic examination;
5. Roentgenologic investigation;
6. Stabilometry.

Neurological examination

- Character and localization of pain syndrome were determined.
- The condition of muscular tone was assessed, painful zones, areas of induration in the muscles were revealed by palpation.
- Passive mobility in the segments of the vertebral column was checked.
- Tendon reflexes were assessed using standard methods.
- Superficial and deep sensitivity were tested.
- Strain and irritation symptoms were assessed using classic tests of Lasegue, Dejerine and Neri.

Postural examination

- Vertical position of the patient's body in frontal and sagittal planes, relative to Barre vertical was assessed.
- Muscular percussion test (P.-M.Gagey).
- Thumb test (Pedallu) – flexion test
- External hip rotator test (B. Autet).
- Postural eyeball convergence test (P.-M.Gagey)
- Influence of disturbed teeth occlusion on the postural system was determined.
- Index finger test (P. Guillaume)

Osteopathic examination

- Position and dynamic tests for all regions of the vertebral column.
- Testing the joints of the lower extremities.
- Fascial audition.

The peculiarities of clinical manifestations and osteopathic status in the patients with low back pain are presented in Table 1 – 3.

Syndromes	Test group		Control group	
	n	%	n	%
Pain	17	100	14	100
Muscular-tonic	17	100	14	100
Neurodystrophic	3	17.6	3	21.4
Function limitation	13	76.4	10	71.4

Table 1: Clinical manifestations in the patients

Dysfunction type	Test group		Control group	
	n	%	n	%
Group dysfunction (NSR) of vertebrae L1 - L5	9	52.9	8	57.1
Limited mobility of the lumbar vertebrae in flexion (FRS)	11	64.7	9	64.3
Limited mobility of the lumbar vertebrae in extension (ERS)	6	35.3	7	50.0
Left torsion of the sacral bone along oblique axis (to the left/to the left)	2	11.8	2	14.3
Right torsion of the sacral bone along right oblique axis (to the right/to the right)	1	5.9	0	0
Right torsion of the sacral bone along left oblique axis (to the right/to the left)	2	11.8	2	14.3

Table 2: Dysfunction of the lumbar vertebrae and sacral bone

Dysfunction type	Test group		Control group	
	n	%	n	%
Group dysfunction NRS in the cervical spine	13	76.4	10	71.4
Group dysfunction NRS in the superior thoracic spine	9	52.9	6	42.8
Limited mobility of cervical vertebrae in flexion (FRS)	10	58.8	7	57.1
Limited mobility of cervical vertebrae in extension (ERS)	7	41.1	6	42.8
Limited mobility of superior thoracic vertebrae in flexion (FRS)	7	41.1	5	35.7
Limited mobility of superior thoracic vertebrae in extension (ERS)	2	11.7	1	7.1

Table 3: Dysfunction of the cervical and superior thoracic vertebrae

Roentgenologic investigation revealed the following:

- First stage of roentgenological changes was revealed in 21 patients: in patients (64.7%) in the test group and in 10 (72.4%) in the control group;
- Second stage of roentgenologic changes was revealed in 10 patients: in six patients (35.3%) in the test group and in four (28.6%) in the control group.

Electrospondylography

For performing electrospondylography we used automated complex for express-diagnosis of the condition of the organism functional systems Mediscreen™ "Paulina", registration certificate of the Ministry of Public Health of RF No. 29/230512980063-00 of 15.03.2000. Developer and manufacturer: ZAO "NST", the city of Moscow.

Practically all patients in both groups show changes in electric conductivity of the skin, which overstep the limits of the standard physiological range. Only one patient (7.1%) of the control group had all indices within the limits of the standard physiological range.

	Physiological balance	Adaptation compensatory condition	Extension of electric skin conductivity profile, increased electric conductivity of 1-12 zones	Extension of electric skin conductivity profile, increased electric conductivity of 12-24 zones	Narrowing of electric skin conductivity profile, decreased electric conductivity of 1-12 zones	Narrowing of electric skin conductivity profile, decreased electric conductivity of 12-24 zones
Group	n	n	n	n	n	n
Test	0 0%	0 0%	2 11.7%	7 41.3%	5 29.4%	3 17.6%
Control	1 7.1%	0 0%	1 7.1%	9 64.4%	2 14.3%	1 7.1%

Table 4

Therapeutic methods used in the course of investigation

Test group

1. Nonsteroid anti-inflammatory medicines
2. Osteopathic treatment of the cervical spine

Control group

1. Nonsteroid anti-inflammatory medicines
2. Massage of the lumbosacral spine.

The repeated complex examination of each patient was performed in one and a half month after starting the therapeutic course.

Results and discussion

Analyzing the dynamics of the functional condition of the cervical and lumbosacral spine as a result of osteopatic treatment has shown the following results:

- the mobility in flexion (FRS), extension (ERS) of the cervical vertebrae was confidently ($p < 0.001$) recovered in all patients of the test group; and in all patients of the control group limitation of mobility remained without changes.
- group dysfunction (NSR) of the cervical vertebrae preserved in 2 of 13 patients of the test group (effectiveness of treatment was 84.6%), and it was unchanged in the patients of the control group; the difference of the data was confident ($p < 0.001$);
- limitation of mobility of the cervicothoracic transition (vertebrae C7-Th1 in rotation) preserved in 5 of 14 patients (effectiveness of treatment was 64.2%), and it remained unchanged in the patients of the control group; the difference of the data was confident ($p < 0.001$);
- group dysfunction (NSR) of the superior thoracic vertebrae preserved in 3 of 9 patients of the test group (effectiveness of treatment was 66.6%). It remained unchanged in the patients of the control group; the difference of the data was confident ($p < 0.005$);
- limitation of mobility of the superior thoracic vertebrae in flexion (FRS) preserved in 4 of 7 patients of the test group (effectiveness of treatment was 57.1%), and it remained unchanged in the patients of the control group; the difference of the data was confident ($p < 0.05$);
- limitation of mobility of the superior thoracic vertebrae in extension (ERS) disappeared in 2 patients of the test group, and it remained unchanged in the patients of the control group; the data were not confident ($p > 0.05$).

Syndromes	Test group		Control group	
	Before Tx n	After Tx n	Before Tx n	After Tx n
Pain syndrome	17 100%	2 11.8%	14 100%	6 32.9%
Muscular-tonic	17 100%	2 11.8%	14 100%	6 32.9%
Neurodystrophic	3 17.6%	0 0%	3 21.4%	1 7.1%
Functional disorders	13 76.4%	0 0%	10 71.4%	6 42.8%

Table 5: Dynamics of neurological indices

Comparison groups	Anterior type n		Posterior type n		Balanced type n	
	Before Tx	After Tx	Before Tx	After Tx	Before Tx	After Tx
Test group	6 35.2%	2 11.7%	7 41.1%	2 41.1%	4 23.4%	13 76.5%
Control group	6 42.8%	6 42.8%	5 35.7%	5 35.7%	3 21.5%	3 21.5%

Table 6: Dynamics of postural clinical examination indices

After administered treatment, the assessment of the patient's body position relative to vertical in two planes showed confident ($p < 0.001$) harmonization of the statico-dynamic stereotype in 13 (76.5%) of the patients in the test group. Four patients showed unchanged (balanced) type of equilibrium disturbance.

In the control group two (14.2%) patients had incomplete harmonization of statico-dynamic stereotype in frontal plane; in all patients disturbance of equilibrium in sagittal plane remained unchanged.

Dynamics of stabilography indices

When analyzing the changes in stabilometric indices in the patients of the test and control groups, we obtained the following results:

- after administered treatment the patients of the test group showed confident ($p<0.05$) changes of stabilometric indices in the tests both with open and closed eyes, what was evidence of the recovery of postural balance;
- after administered treatment the patients of the control group showed not confident ($p>0.05$) changes of stabilometric indices in the tests, what was evidence of preserved postural disturbances.

	Physiological balance	Adaptation-compensatory condition	Extension of electric skin conductivity pro-file, increased electric conductivity of 1-12 zones	Extension of electric skin conductivity pro-file, increased electric conductivity of 12-24 zones	Narrowing of electric skin conductivity pro-file, decreased electric conductivity of 1-12 zones	Narrowing of electric skin conductivity pro-file, decreased electric conductivity of 12-24 zones
	n	n	n	n	n	n
Before Tx	0 0%	0 0%	2 11.7%	7 41.3%	5 29.4%	3 17.6%
After Tx	1 5.8%	9 52.9%	5 29.4%	1 5.8%	1 5.8%	0 0%

Table 7: Dynamics of electrospondylography indices

Statistical analysis for comparison of the treatment effectiveness of the patients in the test and control groups (relief of pain, musculo-tonic, neurodystrophic syndromes) was performed using $\chi 2$ chi-square test with Yates' correction for continuity.

Group	Recovery	Without dynamics	Total
Test	15	2	17
Control	8	6	14
Total	23	8	31
Index chi-square $\chi 2 = 2.423$ obtained in our study.			

Table 8

Significance level "p"	0.1198	0.05	0.025	0.01	0.005
Critical value	2.423	3.842	5.024	6.635	7.880

Table 9

Dysfunction type	Standard error of the first index m_1 Test group	Standard error of the second index m2 Control group	Student's test	Signifi-cance level
Effectiveness of functional disorder recovery	0.87	15.49	2.57	$P < 0.05$

Table 10

Thus, one can state that there are confident differences in effectiveness of functional disorder recovery in the patients of the test group ($p < 0.05$) as compared to the patients of the control group. These findings confirm that osteopathic treatment is directed just to recovery of the human organism tissue mobility.

Conclusion

1. All patients suffering from dorsalgia with low back pain combined with disturbed proprioception of the cervical spine show disorders of the statico-dynamic stereotype.
2. Use of stabilography makes it possible to perform high-quality and quantitative assessment of the influence exerted by disturbed proprioception of the cervical spine on the postural tone and maintaining the equilibrium in this group of the patients. Ellipse area, equilibrium function quality (EFQ), movement direction sharp

change coefficient (MDSCC) are the most preferable stabilographic indices in Romberg test, which characterize confidently the harmonization of statico-dynamic stereotype caused by disturbed proprioception of the cervical spine.

3. Postural disorders caused by disturbed proprioception of the cervical spine have the direct cause-effect relation with formation of dorsalgia with low back pain in this group of the patients.
4. Skin electrometry – electrospondylography makes it possible to reveal pronounced hypersympathicotony, disturbance of sympathetic vegetative segment innervation, to determine the number of changes skin zones, to assess the condition of supersegment vegetative regulation and supersegment vegetative nervous system disintegration syndrome and also to perform the control basing on dynamics of recovery and harmonization of these parameters.
5. Improvement of the postural balance is observed in the patients suffering from dorsalgia with low back pain after recovering the proprioception of the cervical spine, what is confidently confirmed by stabilography findings, confidently results in harmonization of the statico-dynamic stereotype, favors improved biomechanics of the lumbar vertebrae, normalization of skin electrometry indices and confidently leads to recovery of the disturbed functions (limited mobility).

References

1. Антонов И.П., Латышева В.Я. Улащик В.С. Борткевия Л.Г. Некоторые итоги и перспективы изучения остеохондроза позвоночника с неврологическими нарушениями. // Невролог психиатр 1982г. №12 С.8-12.
2. Беленький А.Г. Дорсалгии при дегенеративных заболеваниях позвоночника. 2002г. // Русский медицинский журнал. Т.10, №22, С. 1003-1005.
3. Богачева Л.А. Дорсалгии. Классификация, механизмы патогенеза. 1996г. // Неврологический журнал. №2 С. 2-8.
4. Новосельцев С.В. Введение в остеопатию.Мягкотканные и суставные техники. СПб: «Фолиант», 2005., 240 с.
5. Попелянский А.Я. Вертеброгенные заболевания нервной системы. Йошкар-Ола, 1983г, Т2, 370 с.
6. Привес М.Г., Лысенков Н.К., Бушкович В.И. Анатомия человека // Под редакцией М.Г. Привеса Издание 8 (переработанное), 1974, 670 с.
7. Самосюк И.З., Войтаник С.А., Попова В.Д., Гавата Б.В. Мануальная, гомеопатическая и рефлексотерапия остеохондроза позвоночника. «Здоровье», 1992, 270 с.
8. Шмидт И.Р. Остеохондроз позвоночника. Этиология и профилактика. Новосибирск, «Наука», 1992, 240 с.
9. Gagey P.M., Baron J.B., Ushio N. Activite tonique posturale et activite gestuelle. Le test de la cle. // Agressologie. 1974, V.15., #5 p353-358.
10. Gagey P.M. L'entrie visuelle du systeme postural fin. // Agressologie. 1991, V32, #3, p183-186.

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AAO Calendar of Events

Mark your calendar for these Academy meetings and educational courses

June 2010	June 9: PS&E Committee Meeting at 7:30 pm (EST) via teleconference
July 2010	July 10-11, 2010, Board of Trustees Meeting, in Indianapolis
	July 12-18: AOA Annual Meeting of the Board of Trustees & House of Delegates, Chicago, IL
August 2010	August 6-7: Education Committee meeting, Indianapolis
	August 11: PS&E Committee Meeting at 7:30 pm (EST) via teleconference
October 2010	October 7-9: Prolotherapy Weekend at UNECOM in Biddeford, ME
	October 24: OMT Without an OMT Table in San Francisco, CA
	October 24-28: AOA OMED in San Francisco, CA
December 2010	December 10-12: The Cranial Approach of Beryl Arbuckle, DO at UMDNJSOM in Stratford, NJ

Somatic Dysfunction Following Sigmoid Colon Resection for Diverticulitis: A Case Report

Victoria Ridgeway and Murray R. Berkowitz

Abstract

Somatic dysfunction can be the result of viscerosomatic reflexes. Osteopathic Manipulative Treatment (OMT) can interrupt the cycle caused by excited neurons forming the loop between the diseased viscera and spinal cord segments. A 55-year-old male patient was seen in the clinic with pain in his cervical and thoracic spine, right hip, and lateral regions of his feet bilaterally beginning two months prior following a sigmoid colon resection for diverticulitis. He was treated with OMT to the cranial, costal, thoracic, sacral, and abdominal regions resulting in decreased pain and tenderness and increased range of motion. Developing patterns of somatic dysfunction in this individual, and additional patients, with similar procedures could provide assistance in the treatment of post-operative abdominal patients.

Introduction

Sigmoid colon resection is an invasive procedure that involves trauma to the skin, abdominal musculature, colon, and surrounding tissues. As a surgeon passes into the abdominal cavity, the functioning of the gastrointestinal system may decrease or cease altogether.[1] This can lead to many postoperative complications including altered motility and decreased blood flow[2]. The inflammation caused by surgery leads to pain that is referred in a predictable pattern based on the viscera involved.

Limited information is available on the specific somatic dysfunctions associated with sigmoid colon resection, but similar studies involving patients with other illnesses including cardiovascular disease[3], renal disease[4], coronary artery disease[5], and pulmonary disease[6], in addition to others, have confirmed patterns of somatic dysfunction that correlate with the appropriate viscerosomatic reflex. Developing similar relationships with colon disease can aid in the post-operative treatment of these patients.

History

The patient is a 55-year-old male who presented to the Osteopathic Manipulative Medicine (OMM) Clinic with complaints of pain in the cervical and thoracic spine, right hip, and lateral regions of his feet bilaterally. His pain began two months after a sigmoid colon resection for diverticulitis and an incisional hernia repair. He has no immediate post-operative complications. He described the pain as constant and achy; interfering with his ability to exercise and sleep. He also communicated that he had low back pain with bowel movements and loose stools. He was prescribed Vicodin (Hydrocodone bitartrate) 5/500mg for the first postoperative week, but had not taken any other medications for pain since this point. Nothing alleviated or worsened the pain. The patient's only current medication was Metamucil. His medical history was significant for diverticulitis, a gluten allergy, nephrolithiasis in 2005, weight gain, and a surgical abdominal hernia. In addition to the previously mentioned sigmoid colon resection with incisional hernia repair two months prior, his past surgical history was significant for a laparoscopic cholecystectomy approximately six years prior. His related family history includes a mother with diverticulosis. The patient denied any alcohol or tobacco use and has no know medication allergies.

Physical Exam

On physical exam, his blood pressure was 150/78, pulse was 72 beats/minute, and respirations were 18 per minute. The patient was conscious, alert, and oriented and in no acute distress. Pulmonary exam revealed his lungs clear to auscultation bilaterally with no rales, crackles, or wheezes. Cardiac exam revealed a regular rate and rhythm with an occasional split S2 grade I/VI on every fourth to fifth beat. The patient's abdomen was soft with tenderness to palpation in the left lower quadrant. Surgical incisions were well healed and intact with no signs of infection.

The osteopathic structural examination revealed a cranial rhythmic impulse (CRI) rate of 20/minute. Paraspinal muscles from OA to C5 were contracted and tender bilaterally. In the thoracic region, right-sided musculature from T4-6 was contracted and tender. Thoracic segmental dysfunctions were diagnosed as T5 FR_RS_R, T6 FR_RS_R, T7 NR_RS_L, T10 ER_LS_L, and T11 ER_LS_L. Rib 1 was elevated on the left. Tenderness was found in the costal margin bilaterally and at ribs 6 and 7 on the left. Lumbar segmental dysfunction was identified as L4 FR_LS_L and L5 FR_LS_L. The patient had a positive seated flexion test on the left and an inferior posterior ILA on the right with a deep right sacral sulcus. A right superior pubic shear was also palpated. The patient demonstrated a right anterior piriformis tenderpoint. Also found on examination was a left psoas contracture and decreased range of motion in the hamstrings bilaterally.

Treatment Plan

Our patient had several areas of somatic dysfunction. Our treatment included osteopathic manipulative techniques. The patient was familiar with OMT and asked that we not use high velocity-low amplitude techniques if there was another acceptable alternative. We were able to adhere to his request. The elevated CRI was treated with cranial techniques, and reassessment revealed an increased range of motion and a CRI of 12-14/

minute. Thoracic somatic dysfunction was treated with muscle energy, Still Technique, and articulatory techniques which resulted in increased thoracic movement and decreased pain and tenderness. Articulatory techniques and Still technique were used to treat costal and sacral dysfunctions. The result was increased movement with decreased pain and tenderness in the costal region and normalized sacral motion. The patient's abdominal somatic dysfunctions were treated with Still Technique and muscle energy which resulted in decreased pain and tenderness as well. Overall, the patient reported decreased pain, and we observed that his standing posture had improved from when he entered the clinic.

The patient was counseled to increase his water intake and to treat inflammation and/or any pain secondary to a treatment reaction within the next 24 to 48 hours with Ibuprofen 800mg taken with food three times a day for the next 4 to 5 days. He was also reminded to not perform any physical labor or exercise until instructed to do so by his surgeon. The patient was asked to call in four days to report any progress or problems and a follow up visit would be planned at that time if needed.

The patient reported complete resolution of his presenting problems with no treatment reaction suffered on day 4 post-treatment and no further treatment has been performed. The patient has been instructed to return to the OMM Clinic as needed. While such complete resolution of symptoms following only one treatment session is not the most frequent experience, it is far from uncommon.

Discussion

Viscerosomatic reflexes occur when a visceral disorder or inflammation produces an afferent stimulus to the nociceptor. This impulse then travels to the interneurons of the spinal cord segment associated with the particular viscera. Efferent neurons are involved when the impulse spreads within the spinal cord and the result is somatic dysfunction caused by skeletal muscle contractions, vasomotor changes, and tenderness. This somatic dysfunction then re-excites the viscera by adding another stimulus to the series of neurons. Therefore the neuron activity can be maintained after the original stimulus subsides. [2,7] In our case, the patient had history of diverticulitis and a sigmoid colon resection that could be the initiating event. Trauma to the colon and surrounding viscera during surgery would produce inflammation in those tissues.

Nociceptors from the gastrointestinal tract follow sympathetic neurons to the spinal levels of T5- L2.[2] Preganglionic neurons for the colon and rectum originate at T8-L2.[8] Sympathetic tone is increased by visceral inflammation and nociceptors from a large skin incision. Increased sympathetic tone leads to decreased blood supply and motility. Altered gastrointestinal motility can lead to complications such as post-operative ileus or irritable bowel syndrome.[2] Symptoms of IBS including pain and altered bowel habits were seen in our patient.[9] In addition to the gastrointestinal symptoms associated with increase in sympathetic tone, somatic dysfunction was seen in the areas specifically associated with the GI tract at the levels of T5-7, and T10-11. Contracted cervical paraspinal musculature correlate with the parasympathetic branch of the autonomic nervous system that supplies the GI tract from the esophagus to the right half of the transverse colon[10] and sacral dysfunctions correlate with parasympathetics supplying the remainder of the colon through the rectum originating at S2-4.[8,10]

The goal of osteopathic manipulative treatment to the thoracic and lumbar regions is to decrease the sympathetic outflow and interrupt the feedback cycle.[2] This will consequently lead to increased motility and decreased inflammation.[2] If somatic dysfunction is present in the late post-operative period, whether due to the diseased viscera prior to surgery or the trauma and inflammation caused by the surgery itself, it should be treated[11]. Correction of the somatic dysfunction may require more than one treatment if the dysfunction becomes chronic. Characteristics of this include firm muscles, more restricted joint motion, and atrophic skin over the involved area.[12] The frequency and number of treatments should take into account the patient's tolerance and response.[11]

Pratt-Harrington and Neptune-Ceran found in a preliminary study that post-operative abdominal surgery patients who received OMT had higher incentive spirometry values than those who did not.[13] Additional information could be gathered from patients with similar surgical histories in order to link specific dysfunctions with this illness. If location and motion characteristics are similar, a stronger relationship can be formed.[14] This could lead to research on measures that can be taken to prevent post-operative complications.

References:

(Endnotes)

1. Dowling DJ, Oliverio MF. "Gastrointestinal Applications" in DiGiovanna EL, Schiowitz S, Dowling DJ. *An Osteopathic Approach to Diagnosis and Treatment* (3rd ed.); Lippincott Williams & Wilkins, Philadelphia, PA: 2005, pp631-638
2. Ettlinger H. "Treatment of the Acutely Ill Hospitalized Patient" in Ward RC (Ed.), *Foundations of Osteopathic Medicine* (2nd ed.); Lippincott Williams &Wilkins, Philadelphia, PA: 2002, pp1126-1135
3. Beal MC. Palpatory testing for somatic dysfunction in patients with cardiovascular disease. *Journal of the American Osteopathic Association*. 1983. 82(11): 822-831
4. Johnston WL, Kelso AF, Hollandsworth DL, Karrat JJ. Somatic manifestations in renal disease: A clinical research study. *Journal of the American Osteopathic Association*. 1987. 87(1): 22-35
5. Beal MC, Kleiber GE. Somatic dysfunction as a predictor of coronary artery disease. *Journal of the American Osteopathic Association*. 1985. 85(5): 302-307
6. Beal MC, Morlock JW. Somatic dysfunction associated with pulmonary disease. *Journal of the American Osteopathic Association*. 1984. 84(2): 179-183
7. Beal MC. Viscerosomatic reflexes: A review. *Journal of the American Osteopathic Association*. 1985. 85(12): 786-801
8. Willard FH. "Autonomic Nervous System" in Ward RC (Ed.), *Foundations of Osteopathic Medicine* (2nd ed.); Lippincott Williams &Wilkins, Philadelphia, PA: 2002, pp 90-112
9. Owyang Chung, "Chapter 290. Irritable Bowel Syndrome" (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison's Principles

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Low Back Pain in Rowers

Regina K. Fleming and Karen T. Snider

Introduction

Low back pain affects most people including athletes at some point in their life. Population based studies have indicated that the point prevalence in the general population may vary from 5.6% to 28.7%.[1] Published rates of low back pain in athletes vary from 1% to >30%.[2] While in intercollegiate rowers, the prevalence of low back pain was found to be 32%[1] leaving the question as to why the higher prevalence of low back pain in rowers than in the other types of athletes and as well as the general population.

History of Chief Complaint

A 28-year-old Caucasian female presents complaining of low back pain. Symptoms began about 3.5 years ago when the patient was rowing on a competitive crew team. Her back pain has improved since she stopped rowing. "Popping" her back makes it feel better. Rowing, running long distances, driving long distances, and standing make her back pain worse. She rates her back pain currently as a 3/10 on the pain scale. Patient denies any radiculopathy, muscle weakness, or numbness. Patient also complains of stiffness in the upper back and cervical regions. She denies any radiation of pain or numbness into the arms or legs. An MRI preformed three years ago revealed left foraminal L4-5 disc protrusion with encroachment of the L5 and L4 nerve roots, mild facet arthropathy, and ligamentum flavum hypertrophy.

Past Medical/Surgical History

Patient denies any current medical problems. Nine years ago the patient had an ACL tear to the right knee with subsequent arthroscopic surgery and ACL reconstruction.

Family History

Mother: one knee replacement in her early 50's. Father – bilateral hip replacement in his early 50's.

Social History

Alcohol – One drink/week. Caffeine – One can of pop/day. Patient denies smoking and illicit drug use.

Allergies

Penicillin, Zantac, and Erythromycin all cause a rash.

Medications

Multivitamin; Methylsulfonylmethane (MSM) 1000 mgs for arthritis; Famotidine 20 mgs for stomach problems.

Physical Exam

B/P: 120/78, HR: 72, RR: 16, Ht: 5'11", Wt: 200 lbs. Patient is a 28-year old healthy appearing Caucasian female in no acute distress. No abnormalities are noted upon examination of the ENT, cardiac, respiratory, or vascular systems. Neurologic: Cranial Nerves II-IX grossly intact. DTR's are +2/4 in upper and lower extremities bilaterally. There is no deviation in gait. Musculoskeletal: Spurling's Test, Straight Leg Test, and Patrick FABER test negative bilaterally. Muscle Strength: +5/5 upper and lower extremities bilaterally. Tissue textures changes noted in the lumbar region, worse on the right than the left. Right quadratus lumborum in spasm. C2-3 extended, rotated left and sidebent left; C7 extended, rotated right and sidebent right; T2 flexed, sidebent left and rotated left. T4 extended, rotated right and sidebent right; T7 flexed, sidebent right and rotated right; L2 extended, sidebent right and rotated right. She had a right anterior innominate and left rotation on left oblique axis sacrum. The iliotibial bands, hamstrings, iliopsoas, and the internal rotators were tight bilaterally, but all worse on the right.

Assessment

1. low back pain
2. neck pain
3. muscle spasm
4. somatic dysfunction of the cervical, thoracic, lumbar, pelvis, sacrum, and lower extremity areas

Plan

Based on the physical exam, OMT was performed on the above mentioned somatic dysfunctions using muscle energy, HVLA, myofascial release, soft tissue, counterstrain, Still technique, articulation, and stretching techniques. There was improvement in all the somatic dysfunctions listed, and the patient tolerated the treatment well. Patient was scheduled to follow up in one month. The patient was instructed on how to perform a thoracic flexion stretch to address her T4 extension somatic dysfunction and how to stretch her quadratus lumborum, iliotibial bands, hamstrings, and iliopsoas muscles.

Discussion

Low back pain is the second most common reason for seeing a primary care physician in the United States.[3] Approximately, 97% of low back pain is due to mechanical alterations, meaning that the underlying cause is from the disc, vertebral body, or posterior elements such as lumbar strain, spondylosis, fractures, and degenerative disk disease.[4]

Low back pain in rowers was first reported as a significant problem in 1980 in a review of 29 patients.[5] It was noted that the rowing style had changed from a straight-backed swing to a swing involving flexion and rotation of the lumbar spine at the beginning of the stroke. The lumbar spine is in flexion at the beginning of the stroke and the shoulders rotate to remain parallel to the oar.[5] Sidebending is added to the flexed and rotated spine if the boat rolls, and in this position the rower throws their weight onto the oar.[5]

Rowers are in the flexed position for 70% of the stroke cycle.[6] Rowers reach high levels of lumbar flexion during the stroke, and this combination of a high level of flexion with a compressive load has been identified as the mechanism for injury to the

lumbar spine structures.[7-9] In addition, rotation can place more stress through the facet joint capsules and ligaments and may facilitate damage to the discs.[8, 9]

There are guidelines available to assist with the treatment of low back pain in the general population which can be useful in treating low back pain in rowers. Low back pain may respond to a wide variety of treatment modalities including education, exercise, weight reduction, drugs (such as analgesics, NSAIDS, muscle relaxants, and antidepressants), physical therapy, behavioral therapy, spinal manipulation, other alternative therapies, and surgery.[10, 11] Osteopathic manipulation has been shown to independently reduce low back pain, decrease the use of pain medication, and decrease the need for physical therapy when compared to groups not receiving manipulation.[12, 13] A multimodality approach works best in restoring function and mobility in cases of low back pain.[14] In this case, the patient was treated using several treatment modalities including education, exercise, and osteopathic manipulation. The patient has responded very well to osteopathic manipulative medicine with a decrease in her pain.

References

1. Teitz CC, O'Kane J, Lind BK, et al. Back pain in intercollegiate rowers. *Am J Sports Med.* 2002. 30:674-79
2. Bono CM. Low-back pain in athletes. *The Journal of Bone & Joint Surgery*. 2004. 86:382-396.
3. Binder DS, Nampiaparampil. The provocative lumbar facet joint. *Curr Rev Musculoskelet Med*. 2009. 2:15-24.
4. Licciardone JC. The Unique Role of Osteopathic Physicians in Treating Patients with *Low Back Pain. J Am Osteopath Assoc*. 2004 Nov. 104(11 Suppl 8):S13-8.
5. Stallard MC. Backache in oarsmen. *Br J Sports Med.* 1980 Jul. 14(2-3):105-8.
6. Hosea T, Boland A, McCarthy K, et al. *Rowing Injuries.* Post graduate advances in sports medicine. University of Pennsylvania: Forum Medicum Inc, 1989.
7. Caldwell JS, McNair PJ, Williams M. The effects of repetitive motion on lumbar flexion and erector spinae muscle activity in rowers. *Clinical Biomechanics*. 2003. 18:704 -11
8. Adams M, Dolan P. Recent advances in the lumbar spine mechanics and their clinical significance. *Clinical Biomechanics*. 1995. 10:13-19.
9. Reid DA, McNair PJ. Factors contributing to low back pain in rowers. *Br J Sports Med.* 2000. 34:321-2.
10. Bogduk N. Management of chronic low back pain. *Med J Aust*. 2004. 180:79-83.
11. Speed C. Low Back Pain. *BMJ.* 2004. 328:1119-1121.
12. Licciardone JC, Brimhall AK, King LN. Osteopathic manipulative treatment for low back pain: a systematic review and meta-analysis of randomized controlled trials. *BMC Musculoskeletal Disorders*. 2005;6:43.
13. Andersson GB, Lucente T, Davis AM, et al. A comparison of osteopathic spinal manipulation with standard care for patients with low back pain. *N Engl J Med.* 1999;341:1426-31.
14. Jermyn RT. A nonsurgical approach to low back pain. *JAOA.* 2001. 101:S6-11

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of Internal Medicine, 17e: http://www.accessmedicine.com/content.aspx?aID=2899898. Accessed 5/20/2010

10. Nelson KE, Habenicht AL. "The Patient with Gastrointestinal Problems" in Nelson KE (Ed.), Glonek T (Associate Ed.) *Somatic Dysfunction in Osteopathic Family Medicine*; Lippincott Williams & Wilkins, Philadelphia, PA:2007, pp291-300
11. Krettek JM. "The Surgical Patient" in Nelson KE (Ed.), Glonek T (Associate Ed.) *Somatic Dysfunction in Osteopathic Family Medicine*; Lippincott Williams & Wilkins, Philadelphia, PA:2007, pp137-132
12. DiGiovanna EL. "Somatic Dysfunction" in DiGiovanna EL, Schiowitz S, Dowling DJ. *An Osteopathic Approach to Diagnosis and Treatment* (3rd ed.); Lippincott Williams & Wilkins, Philadelphia, PA: 2005, pp16-23
13. Pratt-Harrington D, Neptune-Ceran R. The Effect of Osteopathic Manipulative Treatment in the Post Abdominal Surgical Patient. *American Academy of Osteopathy Journal*. 1995. 5(3):9-13
14. Johnston WL. Segmental definition: III. Definitive basis for distinguishing somatic findings of visceral reflex origin. *Journal of the American Osteopathic Association.* 1988.88(3):347-353

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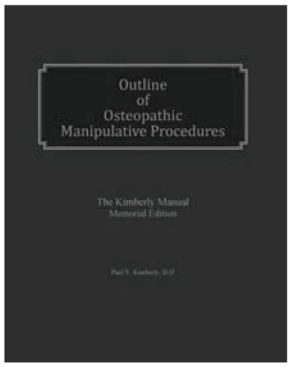
Book Review:

Martin S. Levine



Printed in the United States First Printing August 1980
Memorial Edition 2009

Outline of Osteopathic Manipulative Procedures: The Kimberly Manual Memorial Edition by Paul E. Kimberly, DO, FAAO, Original Editor and Illustrator; Jerry L. Dickey, DO, FAAO, Memorial Edition Editor; Kelly D. Halma, DO, Assistant Editor.

The Kimberly Manual is a time-honored resource of osteopathic manual manipulation for students and professors alike. Several osteopathic manipulative medicine (OMM) departments still require or recommend this manual for incoming first-year osteopathic medical students. This certainly is a sign that OMM departments can rely on this book to help teach osteopathic manipulation to the most naïve practitioners. By capturing osteopathic manipulative treatment (OMT) in photographs and prose, this manual supplements the lecture and lab for OMM in one resource. This edition returns to the original format and terminology used in the first edition published in 1980. Publications between 1980 and 2009, such as the Millennium edition published in 2000 with Steven L. Funk, DO, C-OMM, as Editor-in-Chief, includes photographs of Michael Kuchera, DO, FAAO, as the operator and has descriptive differences and updates of terminology. Both Drs. Funk and Kuchera were classmates of mine and continue to be advocates of Dr. Kimberly's teaching. I do not plan on discussing the specific differences in earlier editions further, but rather intend to succinctly describe why everyone should have The Kimberly Manual.

I appreciate the Memorial edition of *The Kimberly Manual* and these original photographs for personal reasons. Having graduated from Kirksville College of Osteopathic Medicine (KCOM) in 1980, I was there when students referred to Dr. Kimberly as "Tall Paul" and he was chair of the OMM department. I fondly recall the other department members, Drs. Larry Bader, Jerry Dickey, Edna Lay, and Ira Rumney, for their ability to teach varied techniques, each in their own inimitable way. I had the pleasure of having each department member treat me at least once while I was at KCOM either during class instruction as a subject or for any excuse I could conjure up. These interactions enabled me as a student/patient to "feel" what the treatment was supposed to be like. Many of the photographs in this manual show Dr. Kimberly's hands personally demonstrating techniques. Dr. Kimberly had superb hands. His thumbs were somewhat flattened and enlarged at the distal pads and were very powerful. His demeanor was strong and deliberate as well as soothing and reassuring, and his knowledge of anatomy meant he always knew how to apply pressure and where to hold secure when performing OMT so the patient could relax and let the physician perform the treatment. He has been quoted as having said many times: "You should be able to treat any problem in three positions with three methods, or you are inadequate!"

For those in the osteopathic profession and those interested in osteopathic manipulation, this manual is an excellent resource for learning OMT. It is separated into easy-to-digest sections for the cervical, thoracic, and lumbar spines as well as the pelvis, lower and upper extremities, and the rib cage. The first section of the manual, "Somatic Dysfunction and Principles of Manipulative Treatment," was originally written at a time when the osteopathic profession became aware that the nomenclature of osteopathic terminology had to be consistent across all the schools and in all research publications. This section continues to contain a basic narrative of definitions and a glossary of terms and techniques as well as a basic tutorial for evaluation of patients in any and all circumstances. All patient encounters, regardless of place, can follow the basic principles outlined in this section. I encourage my students on a daily basis to "think osteopathically" regardless of presenting complaint because it can only add information that will help apply principles that make the patient better.

Each treatment section begins with specific somatic dysfunctions and techniques, which are outlined with photographs and captions pertinent to the operator's specific body, hand, and finger placements, including the application of pressure with directions and forces. Many of the techniques are direct methods: articulatory, high velocity low amplitude (thrust), muscle energy, and traction and respiratory cooperation. But, indirect inherent and/or respiratory force is also included in these photographs, with Dr. Kimberly as the operator. The reader has all the information

required to apply the principles discussed and illustrated to adapt any technique into their armamentarium. Easily understood and followed, each technique can also be applied or adapted to different patient positions. The treatment is predicated on the examination of the patient and specific diagnoses that have been obtained. This becomes helpful in treating patients in a variety of positions and in a variety of facilities. Until I was reintroduced to this version of The Kimberly Manual for purposes of review, I didn't realize how much I had learned and continue to learn from Dr. Kimberly. The techniques I've used on hospitalized and house call patients, most of whom couldn't move easily enough to change position, were done in the supine and sitting positions, respectively. Wheelchair-bound patients especially have usually not been treated or have been told they must "get on the table" before an adequate examination, let alone a manual treatment, can be done. Efficiency dictates that one learns different techniques suited for all positions. The photographs and directions in this manual are clear and concise and can be extrapolated to somatic dysfunction not described in the manual as long as the principles outlined in the first section are followed. This gives the manual a prescriptive treatment plan for somatic dysfunction specifically mentioned and an open invitation to use osteopathic manipulation on any somatic dysfunction one would encounter in the practice of medicine.

The Memorial edition of The Kimberly Manual is well suited to stand in any osteopathic physician's office for the occasional teaching moment, to refresh their own knowledge of a particular technique, or to apply a new one. It continues to be a resource for osteopathic students at all levels of training.

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Complete the quiz below by circling the correct answer. Mail your completed answer sheet to the AAO. The AAO will forward your completed test results to the AOA. You must have a 70-percent accuracy in order to receive CME credits.

1. Median arcuate syndrome is also known as:
   A. Wilson syndrome
   B. Dunbar syndrome
   C. Perthe's syndrome
   D. Korsakof syndrome

2. The median arcuate ligament is associated with:
   A. The plantar fascia
   B. The dura mater
   C. The thoracoabdominal diaphragm
   D. The carpal tunnel

3. Abdominal pain is a symptom associated with median arcuate syndrome.
   A. TRUE
   B. FALSE

4. Median arcuate syndrome is found predominantly in children.
   A. TRUE
   B. FALSE

March 2010 AAOJ CME quiz answers:

1. D
2. A
3. A

Answer sheet to June 2010 AAOJ CME quiz will appear in the September 2010 issue.

From The Archives

From: McCole, GM. *An Analysis of the Osteopathic Lesion*. Great Falls, Montana: Geo. M. McCole, Publisher, 1925, pp. 259-264.

Chapter XLIX

Facet Separation (continued)

Opposition to Facet Separation

by George M. McCole, DO

Lesions without infiltration or thickening may be corrected without facet separation. Nature alone corrects some lesions. As stated before, however, we do not know that any lesion is corrected until we have tested the joint with a careful, quick separation of facets. This is the true test of freedom of joint flexibility and motion.

It is freely admitted that quick joint separation with tissue tug can be overdone. Too much tissue tug, just as too much twisting of a joint without facet separation, is a possibility which must be recognized.

Those who oppose the quick separation of joint surfaces with the incidental pop and who advocate forcible stretching of joint tissue without facet separation often call this forcible stretching "normal motion". It does not seem that slow, forcible stretching can properly be called normal motion any more than can quick, forcible stretching which separates joint surfaces. Either one done too forcibly or too often produces trauma. My observation is that a forcible stretching of tissues without facet surface separation and without the incidental pop is just as dangerous as forcible stretching with facet surface separation. In fact, forcible stretching of joint muscles and ligaments without facet separation may cause more trauma and pain than joint adjustment with seal breaking and the incidental pop.

The fact is that any forcible motion used in adjusting a lesion, especially a lesion of articular fixation, can hardly be called a normal motion.

LeClere says, "Edith Ashmore condemned the popping habit. She taught us to use only normal spinal movements in the correction of lesions. A favorite precept of hers was that the vertebra should be made to retrace the path over which it traveled in the production of the lesion. That is, in the case of a flexion lesion the principle of correction is extension; in an extension lesion the principle of correction is flexion; in a rotation-side-bending lesion to the right the principle of correction should be forced rotation-side-bending to the left, etc. In such normal, passive movements of the spine, the pop occasionally occurs but it is unusual. On the same principle some patients complain of creakings and pops in the joints during active movements, but such sounds are unusual."

Questionaire sent out by Dr. LeClere

Question 1

Do you consider the popping or snapping of a joint necessary for adjustment?

"Never necessary though occasionally unavoidable." — Amussen.

"It is impossible to correct some lesions without a snapping noise. Others are corrected very easily without any noise at all. It doesn't matter whether they snap or do not snap."—Brigham.

"Not in all cases. Doubtless putting the joint through its normal movements with sufficient force will often tend to increase the range of mobility and work towards adjustment. Also with suitable leverage it is doubtless possible to stretch to the point of straining the periarticular structures without producing any pop." —Chandler.

Question 2

Do you think that the mere act of popping has any beneficial results aside from its psychological effect?

"No. There is no doubt that the popping is a powerful stimulus, but I believe that it is in the nature of a shock which is partly harmful. Fortunately, popping is always accompanied by movements, and the benefits of movement may outweigh the shock of the popping. " —Amussen.

"I think popping merely incidental, but I am quite well satisfied that many of the lesions I have observed cannot be corrected without more or less of the popping noise." – Brigham.

"Yes. (1) It sets up a vigorous train of afferent impulses not otherwise securable; (2) through neural mechanism fairly well worked out it breaks up self-perpetuating segmental contractions in a specific way not otherwise possible."—Chandler.

"None except a possible nerve stimulant. I'm not sure of this." — Gaddis.

"In a few cases it is necessary to adjust in a manner that will resemble what you refer to as 'popping,' although I do not like the word. I would say that any method of adjusting should not be for spectacular purposes, but to get results." – Millard.

"No, except to pop requires a more thorough stretching." — Ruddy

Question 3

Do you think there is danger that the sudden separation of the articular surfaces, which results in the popping sound, may strain the articular ligaments in such a way that the movement obtained will not be an unmixed blessing?

"Yes. We have all had patients who have had their joints popped so often that we cannot move them without getting pops. I think this shows that frequent popping has robbed the capsular ligaments of normal tone." —Amussen.

"I think that a sudden separation of the articular surfaces may result in some irritation of the synovial membranes and that, if

repeated a vast number of times, it may so increase the circulation that the synovial membrane is actually thickened." —Brigham.

"No more danger of straining ligaments with popping than by excessive and unskillful manipulations without popping." —Chandler.

"Too much amplitude of motion with or without popping has been osteopathy's main curse. Accumulative force, if correctly given, does not strain the articulation and is safer." —Downing.

"Any sudden stretch of any tissue may cause trauma. In fact, I have adjusted more than one neck injured by untrained manipulators." —Ruddy.

Question 4

Which is more effective in the adjustment of a lesion: the sudden separation of the articular surfaces which gives the popping sound, or putting the joint through its normal movements of flexion, extension, rotation-side-bending and side-bending-rotation according to the direction of lesion?

"The latter. If we want to initiate physiological stimuli, the way to do so is nature's way, that of putting the joints through their physiological or normal movements. If we want to stretch adhesions, we can best do so by the same method. If, for instance, a joint is fixed in a position of rotation-side-bending to the right, We can best stretch those adhesions by forced rotation-side-bending to the left." —Amussen.

"Every case is a law unto itself. Normalizing the range of movement does not always correct a lesion." —Brigham.

"It depends on the nature of the lesion. Reflex lesion is often best corrected by joint surface separation; and chronic traumatic and postural lesions, by judicious forced mobilization.'' —Chandler.

"The latter is more physiological and much more reasonable." —Gaddis

"No articulation can be put through its normal movements until the primary or initial intra-articular inertia, or fixation, is eliminated. Mobilization is, then, of value to stabilize and maintain adjustment by resultant breaking down of soft tissue imbalance." —Downing.

"It must be done. If without force or strain, so much the better." —Swope.

"The latter. A joint with all the movements normal is not in lesion, regardless of the topographic appearance." —Wallace.

"Sometimes one, sometimes the other. I don't believe there is a physician living who could from day to day give real adjustive treatment and never get a joint click." —Willard.

Cohesion of Articular Surfaces

The question has been raised as to why a joint cannot be popped again, immediately after having been popped. Amussen thought that when the cohesive force between the two articular surfaces was overcome and the surfaces separated, a vacuum was formed into which the joint fluid rushed producing the characteristic popping sound. Cohesion could not again occur between the two surfaces until sufficient time had elapsed for the fluid to be dissipated and cohesion again attained, and not until then could the joint be popped.

Downing assumes, and others agree, that a lesion is due to an ab¬normal cohesion between the articular surfaces which must be broken up by direct separation of the surfaces before it is possible to put the joints through their normal movements.

Taplin says that when we first examine a lesion it may be in any stage. There may be spastic tension of the intrinsic muscles of the spine, a gummy cohesion in the joint, or a physical adhesion with fixation of the contacting joint planes. Each state suggests a different method of adjustment.

An occasional suction pop is more or less incidental to the varying behavior of adjustment leverage. It is not an objective but a coincidence. A loud suction pop is certainly the result of a misjudgment of forces.

The claim that the vacuum produced by separating the joint surfaces causes fluid to rush in, thereby producing the popping sound, does not appear to be reasonable. It is most certain that the vacuum formed is but momentary, lasting only a small fraction of a second. Also, there are no fluids to rush because the joint has no access to fluids, except by the slow process of secretion.

Fryette, "To those who are poppers, I should say pop. To those who are non-poppers. I should say do not pop. But for the physician who is trying to normalize an immobilized joint the question of popping is not important. As Taplin has said it is often an incident in treatment but certainly not the end. Some immobilized joints do not pop when they are mobilized; other types practically always do.

"I never saw A. T. Still give a treatment, but from what I have heard I do not think that he felt bad if a joint popped in the process of mobilizing."

Ruddy says, "I have often seen lesions made worse from having been wrongly popped. I have seen many also that have been made worse by being pulled and 'wooled' around too much.

"If I am adjusting a shoulder joint and it pops in the process, it does not matter. The whole question is, 'Did I normalize the joint?' The same applies to any joint."

Albert E. Guy writes, "In the instant following facet separation, the vigilant segmental muscles of the joint, realizing their unwarrantable laxness, slam one process back into contact with the other, with lightning speed, thus producing the pop.

"The apophyseal articulations are for guidance and control of spinal movements. When they are forced apart, the separation is of extremely short duration. The guardian muscles are taken by surprise in relaxation; the physician senses the opportune moment, applies the thrust, and separation results. The controlling muscles, especially the deep muscles and perhaps the contractile ligaments, react at once, forcibly bringing back the articular facets into contact. The result is a shock, with a popping noise of bone against bone.

"The shock starts a reaction by shaking all the involved tissues, and this is followed be a period of re-adjustment affecting

the structures within the intervertebral canals. There is new activity, speeding elimination of waste and freeing the blood supply which bathes the nerve fibers and endings.

"During a period following the correction, it is not possible to secure the same reaction or to repeat the separation with its accompanying popping noise.

"It should always be made clear that the popping is merely incident¬al and not at all corrective. The sound is of value to the operator as proof that after soft tissue preparation and mobilizing effort on the spine, the articulations are at last free to be disengaged.

"The fact that a period of re-adjustment follows correction of a spinal lesion leads us to ponder the wisdom of 'The Old Doctor,' who tersely advised his students to find the lesion, to correct it, and to leave it alone. Treatment, powerful in its effect and too often repeated, may interfere with the result desired by continuing a condition of hyperactivity in tissues actually in need of repose."

"There are several things entering into the cause of the 'pop.' Lack of pressure in a joint cavity may cause the capsular ligament and soft tissue to snap into the cavity thus producing the sound." —Fred Taylor.

Why the Pop Cannot be Obtained

"The pop, heard accompanying spinal adjustment, is due to the separation of facet surfaces and is not in itself of importance. In fact, the nearer normal the articulation, the more readily can it be popped. Conversely, if a pop cannot readily be obtained in any spinal joint, there are generally but three explanations possible: the line of force has not been properly applied; the tissues are too congested and painful; or the ligaments are so thickened and tense that the force applied was insufficient to cause a separation of the articular surfaces." —A. S. Hollis.

"In the cadaver of the dissection laboratory, separation of facet surfaces with pop can be secured only on rare occasions and usually by accident. This seems to be true before the appearance, during the state, and after the disappearance of rigor mortis. The facet surfaces seem to be more firmly sealed after death than in life due probably to coagulation of synovial fluid and a change in the nucleus pulposis of the disc. That there is no tonic tension in the segmental muscles guiding the smooth excursion of the articular facets is of course also a factor.' —H. V. Halladay.

Component Society Calendar of Upcoming Events

June 12-16, 2010
Cranial Academy June Introductory Course in Osteopathy in the Cranial Field
La Quinta Resort, Palm Springs, CA
The Cranial Academy
8202 Clearvista Pkwy, #9-D
Indianapolis, IN 46256
317/594-0411 FAX: 317/594-9299
info@cranialacademy.org
Web site: www.cranialacademy.org

June 17-20, 2010
Annual Conference - Dwelling Place: Spirit and Matter in Osteopathy
La Quinta Resort, Palm Springs, CA
The Cranial Academy
8202 Clearvista Pkwy, #9-D
Indianapolis, IN 46256
317/594-0411 FAX: 317/594-9299
info@cranialacademy.org
Web site: www.cranialacademy.org

June 24-227 2010
Annual Conference - Kentucky Osteopathic Medical Association
Hilton Lexington/Downtown
koma@reesgroupinc.com
Web site: www.koma.org

December 3-5, 2010
Indiana Osteopathic Association
29th Annual Winter Update
Marriott Hotel
Indianapolis, IN
800/942-0501

OMT Without an OMT Table

October 24, 2010 in San Francisco, CA

Course Location:
Marriott San Francisco
55 4th Street
San Francisco, CA

Program Chair: Ann L. Habenicht, DO, FAAO
Dr. Habenicht is a 1982 graduate of Midwestern University Chicago College of Osteopathic Medicine. She is both certified in osteopathic manipulative medicine and osteopathic family practice. She is both a Fellow of the American Academy of Osteopathy and the American College of Osteopathic Family Practitioners. Dr. Habenicht currently serves the AAO as a member of the Board of Governors, a member of the Undergraduate Academies, Bylaws and Education committees. Dr. Habenicht is a past president of the AAO and served as a chair of the Education Committee for many years. She is presently a professor of osteopathic manipulative medicine at CCOM/Midwestern Univerisity and is in private practice in Oak Forest and Urgent Care in Orland Park, IL. She serves as the UAAO advisor for CCOM. Dr. Habenicht has been the program chairperson for the Fall OMT Update for the past 16 years.

Please Note: The AOA Convention will run from October 24-28, 2010 at the Moscone Center in San Francisco, CA.

Hotel Information: Please visit http://www.omedconference.org/resources/pdfs/HotelInformationSheet.pdf to view your lodging options.

Travel Arrangements:
Globally Yours Travel
Tina Callahan - (800) 274-5975

Course Description: Many physicians work in an outpatient setting with high tables or carts on which to examine and treat the patient. This presents a challenge: how can the patient be effectively treated with OMT? This course is designed to offer solutions for treating patients in an outpatient setting without an OMT table. The course is designed for primary care, urgent care and emergency medicine physicians who want to treat their patients with OMT but have been frustrated by the office equipment. Participants will treat on chairs and inadequate height tables. OMT utilizing high velocity/low amplitude facilitated positional release, Still, muscle energy, and myofascial release techniques will be included. Common patient complaints will be addressed.

Learning Objectives:
1. To perform quick and efficient OMT for common outpatient complaints.
2. To demonstrate ability to treat utilizing in appropriate height tables and carts.
3. To demonstrate ability to treat utilizing chairs.

Prerequisites: The participant should have a basic understanding of functional anatomy.

CME: The program anticipates being approved for 8 hours of AOA Category 1-A CME credit pending approval by the AOA CCME.

Program Time Table:
Sunday, October 24, 2010.....8:00 am - 5:00 pm
(lunch on your own)

Registration Form
OMT Without an OMT Table
October 24, 2010

Name: _____

Nickname for Badge: _____

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_____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

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By releasing your Fax/Email you have given the AAO permission to send marketing information regarding courses via fax or email.

AOA #: _____

Registration Rates
OMT Without an OMT Table

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Instructions to Authors

The American Academy of Osteopathy® (AAO) Journal is a peer-reviewed publication for disseminating information on the science and art of osteopathic manipulative medicine. It is directed toward osteopathic physicians, students, interns and residents, and particularly toward those physicians with a special interest in osteopathic manipulative treatment.

The AAO Journal welcomes contributions in the following categories:

Original Contributions: Clinical or applied research, or basic science research related to clinical practice.

Case Reports: Unusual clinical presentations, newly recognized situations or rarely reported features.

Clinical Practice: Articles about practical applications for general practitioners or specialists.

Special Communications: Items related to the art of practice, such as poems, essays and stories.

Letters to the Editor

Comments on articles published in *The AAO Journal* or new information on clinical topics. Letters must be signed by the author(s). No letters will be published anonymously, or under pseudonyms or pen names.

Book Reviews

Reviews of publications related to osteopathic manipulative medicine and to manipulative medicine in general.

Note

Contributions are accepted from members of the AOA, faculty members in osteopathic medical colleges, osteopathic residents and interns and students of osteopathic colleges. Contributions by others are accepted on an individual basis.

Submission

Submit all papers (in word format) to:

American Academy of Osteopathy
3500 DePauw Blvd, Suite 1080
Indianapolis, IN 46268
Email: editoraaoj@gmail.com

Editorial Review

Papers submitted to The *AAO Journal* may be submitted for review by the Editorial Board. Notification of acceptance or rejection usually is given within three months after receipt of the paper; publication follows as soon as possible thereafter, depending upon the backlog of papers. Some papers may be rejected because of duplication of subject matter or the need to establish priorities on the use of limited space.

Requirements for manuscript submission

Manuscript

1. Type all text, references and tabular material using upper and lower case, double-spaced with one-inch margins. Number all pages consecutively.
2. Submit original plus two copies. Retain one copy for your files.
3. Check that all references, tables and figures are cited in the text and in numerical order.
4. Include a cover letter that gives the author's full name and address, telephone number, institution from which work initiated and academic title or position.
5. Manuscripts must be published with the correct name(s) of the author(s). No manuscripts will be published anonymously, or under pseudonyms or pen names.
6. For human or animal experimental investigations, include proof that the project was approved by an appropriate institutional review board, or when no such board is in place, that the manner in which informed consent was obtained from human subjects.
7. Describe the basic study design; define all statistical methods used; list measurement instruments, methods, and tools used for independent and dependent variables.
8. In the "Materials and Methods" section, identify all interventions that are used which do not comply with approved or standard usage.

FLOPPY, CD-ROM or DVD

We encourage and welcome a floppy, CDROM, or DVD containing the material submitted in hard copy form. Though we prefer receiving materials saved in rich text format on a CD-ROM or via Email, materials submitted in paper format are acceptable.

Abstract

Provide a 150-word abstract that summarizes the main points of the paper and its conclusions.

Illustrations

1. Be sure that illustrations submitted are clearly labeled.
2. Photos and illustrations should be submitted as a 5" x 7" glossy black and white print with high contrast. On the back of each photo, clearly indicate the top of the photo. If photos or illustrations are electronically scanned, they must be scanned in 300 or higher dpi and saved in .jpg format.
3. Include a caption for each figure.

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References

References are required for all material derived from the work of others. Cite all references in numerical order in the text. If there are references used as general source material, but from which no specific information was taken, list them in alphabetical order following the numbered journals.

For journals, include the names of all authors, complete title of the article, name of the journal, volume number, date and inclusive page numbers. For books, include the name(s) of the editor(s), name and location of publisher and year of publication. Give page numbers for exact quotations.

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