The AAO
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FORUM FOR OSTEOPATHIC THOUGHT
Official Publication of the American Academy of Osteopathy®
TRADITION SHAPES THE FUTURE
VOLUME 20 NUMBER 1 MARCH 2010

Case Study: Exhalation Somatic Dysfunction after Multiple Rib Fractures and Pneumothorax

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Pediatric Constipation: An Osteopathic Approach

When: Thursday March 18, 2010
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Location: Please check your convocation program for location details

Schedule:

5:00-5:15 *SIG Introduction and Practice Survey Distribution*
Gregg Lund DO & Harry Friedman DO

5:15-6:00 The Pediatric GI Nervous System
Frank Willard PhD

6:00-6:30 Nutritional Management of Pediatric Constipation
Ali Carine DO

6:30-6:45 *Break*

6:45-8:00 OMM for the constipated child
Jane Carreiro DO & Hugh Ettlinger DO

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TRADITION SHAPES THE FUTURE • VOLUME 20 NUMBER 1 • MARCH 2010

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Contributors

SV Novoseltsev and DB Vcherashny, from the Saint Petersburg Medical Academy for Post-graduate Education, Institute of Osteopathic Medicine, and the Saint Petersburg State University in Saint Petersburg, Russia, have honored us with their article, "Biomechanical disorders in the patients with lumbar discal hernias and their osteopathic correction", in which they present their interesting perspective on the osteopathic manipulative management of lumbar disc herniation. They include not only a discussion of their treatment methods but also an evidence base of data to support their results.

Michael Mesisca, DO, Keasha N. Hoffman, DO, Gregory Fenati, OMS III, and Raymond J. Hruby, DO, MS, FAAO as faculty mentor, present "Osteopathic Manipulative Treatment In the Emergency Department: A Two-Dimensional Curriculum". This article is a publication based on Dr. Mesisca's thesis for his Master of Science degree in Health Sciences. Drs. Mesisca and Hoffman are graduates of the Western University of Health Sciences College of Osteopathic Medicine of the Pacific (COMP) in Pomona, California. Both were Predoctoral Teaching Fellows in the Department of Osteopathic Manipulative Medicine at COMP, and both are currently Emergency Medicine residents at the Arrowhead Regional Medical Center in Colton, California. Mr. Fenati is currently an OMS III at COMP. Dr. Hruby is a professor of OMM at COMP.

Jessica Calman, DO, LT, MC(FS), USN, has submitted a case study entitled "Exhalation Somatic Dysfunction after Multiple Rib Fractures and Pneumothorax". In this fascinating report she shows us how powerful and valuable our commonly used OMT techniques can be.

Murray R. Berkowitz, DO, MA, MS, MPH, our Associate Editor, has contributed his article, "Holistic Osteopathic Approach Reveals Unusual Etiology for Vertigo with Co-morbid Headache: A Case Report." The case presented demonstrates how taking a holistic osteopathic result can enable us to provide fuller care and resolve some problems that have an unusual etiology.

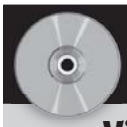
Regular Features

"Dig On"

Carolyn Thompson, OMS V, Jose Dalprat OMS V, and Raymond J. Hruby, DO, MS, FAAO as faculty mentor present "The effect of early clinical exposure on future OMT use." In this study, the authors show how early exposure of students to the use of OMT can affect their future use of these distinctive osteopathic procedures. Ms. Thompson and Mr. Dalprat are both OMM Predoctoral Teaching Fellows at the Western University of Health Sciences College of Osteopathic Medicine of the Pacific in Pomona, California.

From the Archives.

With this issue we present the first 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 XLVIII, "Facet Separation", in which the author gives his thoughts on the mechanism of action of what we now call high velocity low amplitude OMT. In particular, he makes reference to "joint popping" and its role (or non-role) in the alleviation of somatic dysfunction. Enjoy this and stay tuned for the next two excerpts, coming up in future issues of the AAOJ, for more interesting discussion about the mechanism of action of this type of OMT and the nature and purpose of the "joint popping" phenomenon.



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Viola M. Frymann D.O., F.A.A.O., F.C.A., renowned osteopathic physician, founder of the Osteopathic Center for Children and Families, and direct student of William Garner Sutherland D.O., founder of Osteopathy in the Cranial Field has commissioned the publication on DVD, of the complete, unedited 40 hour version of her highly regarded course "**Expanding the Osteopathic Concept into the Cranial Field**". In this course students are introduced to and taught the basic and expanded principles and techniques of Osteopathy in the Cranial Field as taught to her by Dr. William G. Sutherland.

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View From the Pyramids
Getting to Know Andrew Taylor Still, MD, DO

Raymond J. Hruby

Over the years, I have met more than a few students who have developed quite a passion for osteopathy. These students soon realize that exploring some of the historical writings of osteopathy can give them a great deal of insight into the true nature and understanding of the profession. I have often been asked by some of these interested students where they should start their exploration of the history and development of osteopathy. Of course, there are many ways to do this, and while I'm happy to share my thoughts on this matter, I do urge the students to ask the opinion of others as well. This is in keeping with my observation that if you ask ten DOs a question you will receive somewhere in the vicinity of twelve different answers. Nevertheless, I think it all adds up to valuable advice and good guidelines for starting the lifelong journey of exploration into the nature of osteopathy.

My first advice is to start with the writings of Dr. Still himself. My preferences for the beginner are to read *Still's Autobiography* and *Philosophy of Osteopathy* first. I think reading these two books first lays a better foundation for reading his *Philosophy and Mechanical Principles of Osteopathy and Research and Practice*. After reading these books (or in some cases before reading them) I would suggest reading *The Lengthening Shadow of Andrew Taylor Still*, by Hildreth. Grant Hildreth, DO grew up as a neighbor of Still and knew him and his family quite well. He later became one of the early student's at the American School of Osteopathy and learned directly from Still, so I believe his book gives an excellent account of osteopathy and Dr. Still in the early days of the profession.

Many others, of course, have written books about Dr. Still and about osteopathy in its infancy, but I think one book that closely follows what Still must have been teaching is *The Principles of Osteopathy* by Hulett. A number of my own mentors taught me that this book is considered to be one that closely describes what Still taught to his first students, so this information should be most valuable to anyone interested in probing the depths of osteopathy.

I would also recommend *Principles of Osteopathy* by Page, and the numerous interesting writings collected over the years in the *American Academy of Osteopathy Yearbooks*. Finally, I would also recommend reading the *History of Osteopathy and Twentieth Century Medicine* by Booth. This book gives interesting insights into the origin and development of osteopathic medicine relative to the practice of medicine at that time, and also gives fascinating information about Dr. Still that I have not found in other sources.

I don't know how many people get around to actually reading all of this, but even if they don't, I do know that most students, by the time they read even part of this collection of books, have discovered other resources and have embarked on their own personal journey into the world of osteopathy. That is, of course, the ultimate goal.

So that's my two-and-a-half cents' worth on this topic. What are your thoughts? What would you advise the interested student to read? Write us a Letter to the Editor and let us know. In the meantime, let me leave you with one of my most favorite quotes from Dr. Still, one which I've been pondering for many years: "What is death but a birth from the second placenta to which life has been attached?"

Happy exploring!

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

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March 18-March 20, 2010

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Complete set By Louisa Burns: *Basic Principles* (1907), Autographed by Louisa Burns; *The Nerve Center* (1911); *The Physiology of Consciousness*. 1911; and *Cells of the Blood*. 1931. Starting bid $1,000

Contact Phyllis McNamara at the American Academy of Osteopathy
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Admitting Allopathic Physicians to Osteopathic Graduate Medical Education Programs: the Case for Competency-Based NMM/OMM Training in OGME

Murray R. Berkowitz

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

Allopathic and osteopathic physicians are the only unlimited and fully licensed physicians recognized in the United States. Possessing an unlimited license, allopathic physicians are allowed by law to perform and administer osteopathic manipulative treatment (OMT) and various numbers have been trained in limited aspects of osteopathy (e.g., training in Osteopathy in the Cranial Field by the Cranial Academy, Sutherland Cranial Teaching Foundation, etc.). A small number of MDs have achieved sufficient competency in OMT that they actively teach as faculty in the OMM Departments of Colleges of Osteopathic Medicine.

Allopathic physicians are not accepted into Osteopathic Graduate Medical Education (OGME) residencies. Historic animus and "politics" aside, one of the reasons given for this policy has been the absence of previous pre-doctoral medical education in OMM/OMT by allopathic physicians. Clearly, the above demonstrates that allopathic physicians can achieve needed competencies in OMM/OMT. Thus, the stated rationale for this policy fails and should be discarded by the osteopathic profession. Our founder, Andrew Taylor Still, MD, DO, sought to bring our capabilities to then mainstream medicine and only later, after years of rejection of his ideas, did he create an institution for teaching what would become our osteopathic profession. If members of currently existing mainstream, allopathic medicine wish to learn our osteopathic principles and manipulative treatments and integrate them into their practices and improve patient care, what better place to begin this learning than in an OGME residency? We should discard the current policy and begin accepting allopathic graduates into our osteopathic residencies.

The question of how best to provide the needed education and training in NMM/OMM to allopathic physicians remains to be fully answered. Passing of COMLEX Part II-PE by the allopathic physician resident may be one way of assessing mastery of osteopathic principles at the level of a newly graduated DO. Our Academy has historically provided Level I training to provide the basics of manipulation to non-osteopathic physicians before they can take other continuing medical education courses sponsored by the Academy. Many of our distinguished FAAOs have routinely taught hands-on courses in osteopathic manipulation to allopathic physicians both in the United States and internationally. These capabilities can be adapted to provide the needed training during the OGME residency undertaken by an allopathic physician. This may require that the period of training of the allopathic physician be increased to allow sufficient time for mastery to be demonstrated.

To those allopathic physicians who wish to learn osteopathic principles and manipulative medicine and integrate them into patient care, I say a hearty, "welcome." To our osteopathic profession, I say let us teach our allopathic colleagues, let us develop the tools and instruments to measure and assess their competencies, and let us apply the teachings and philosophy of our Founder, Andrew Taylor Still, MD, DO and further enhance and improve total patient health.

Murray R. Berkowitz, DO, MA, MS, MPH
Associate Editor

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Oklahoma State University Center for Health Sciences, College of Osteopathic Medicine is seeking to fill a full-time, non-tenure (clinical) faculty position and a full-time tenure-track faculty position in the Department of OMM. These positions are actively involved in patient care and teaching medical students and residents at College ambulatory clinics, as well as the hospital inpatient service. Appropriate effort and activity in clinical research and service will also be necessary as well as a clinical record of sufficient depth to qualify for faculty appointment at the rank of Assistant/ Associate / Professor. Positions require a D.O. degree, eligibility for licensure in the state of Oklahoma, and a devoted interest in education. NMM/OMM Board eligibility required and NMM/OMM residency trained is preferred. Must apply online at: https://jobs.okstate.edu, search Health Sciences campus. Oklahoma State University is an AA/EEO/E-Verify employer committed to diversity.

Dig On:

The Effect of Early Clinical Exposure on Future OMT Use

Jose Dalprat, Carolyn Thompson and Raymond Hruby

Abstract

Osteopathic manipulative treatment (OMT) is a significant component of the first and second year osteopathic medical student didactic curriculum; however, only some students go on to use OMT in their third and fourth year clinical rotations and beyond. Researchers interested in learning why some osteopathic medical students use OMT while others do not surveyed osteopathic medical students at Western University of Health Sciences College of Osteopathic Medicine of the Pacific (COMP) regarding their use of OMT. COMP (class of 2009) students were surveyed about their clinical experiences using OMT before and during their core rotations. Their responses indicated that early clinical exposure to OMT makes students more likely to perform OMT on clinical rotations.

Introduction

A distinctive aspect of the curriculum in every osteopathic medical school is the teaching of Osteopathic Principles and Practices (OPP). Osteopathic manipulative treatment is one of the key components of OPP. Despite this, the use of osteopathic manipulative treatment (OMT) by osteopathic physicians is decreasing. A 1995 survey found that 6.2% of osteopathic physicians used OMT on more than half of their patients, and nearly one third used OMT on less than 5% of their patients.[1] One possible explanation of this is that many osteopathic physicians no longer believe that OMT is a useful skill that can be effectively integrated into daily practice.[2]

One study found that student attitudes toward the use of OMT and their perceived confidence in their OMT skills improved after undergoing a required clinical OMT rotation.[3] However, other studies have shown great variability in the use of OMT by osteopathic medical students depending on the clinical rotation.[4] Are there ways of influencing students during their didactic years of medical school to use more OMT both in clinical rotations and later in their careers?

Studies have shown that student confidence in their OMT skills can be improved by providing them supervised and successful experiences in OMT with community patients.[5] However, it is not clear whether this increase in confidence influences future behaviors.

An opportunity to study this correlation presented itself at COMP because of the many opportunities for early clinical OMT exposure available. For this study we chose to use a survey to measure the influence of these early OMT experiences on student's future behavior and hypothesized the following: does student participation in a clinical OMT experience during their didactic years make students more likely to perform OMT during their clinical years?

Methods

To test the hypothesis, an OMT participation specific survey was created (Figure 1). Third year osteopathic medical students (Class of 2009) at Western University – College of Osteopathic Medicine of the Pacific (COMP) were asked to fill out this survey after completing their core rotations. The COMP core rotations that were considered in this survey included: family medicine, general surgery, internal medicine, obstetrics and gynecology, and pediatrics. Students at COMP are required to attend three didactic weeks during their third year, during which they are required to attend lectures and take shelf exams for completed core rotations. The surveys were distributed during the last two didactic sessions of the 2007-2008 school year and were given only to students who had completed all required core rotations.

The survey (Figure 1) first asked students to estimate the number of times they performed OMT during each of the required core rotations. It also asked students if they had participated in a clinical experience in which they used OMT during either of their first two years of medical school. If the student answered yes to the clinical experience question, they were then asked to identify which clinical experience they had participated in during those first two didactic years. Possibilities from which the student could choose included: shadowing an osteopathic physician who used OMT, being treated with OMT by a DO, attending UAAO workshops, attending AAO Convocation, participating in osteopathic manipulative medicine (OMM) night at a local student run clinic, being treated at the COMP Pre-Doctoral Teaching Fellows clinic, or participating in COMP.[2] COMP[2] is an abbreviation for College of Osteopathic Medicine of the Pacific Clinical Osteopathic Medicine Practicum and is a program offered to first and second year students who are interested in furthering their OMT knowledge and skills. Students participating in this voluntary program are required to complete two didactic and two clinical sessions during the semester of chosen participation. For this question, students were not limited to one choice of clinical experience, but instead could select as many experiences as they had participated in during their didactic years. Finally, the survey asked students to express their level of interest for further clinical OMT experiences to be offered during their didactic years.

Analysis of Data

The survey data was analyzed by two different methods. A one-tailed t-test was performed on question one and two of the survey to determine the relationship between participation in a clinical OMT experience and the number of OMM treatments performed on third year core rotations. The data was analyzed for each core rotation separately and also for total number of OMM treatments performed collectively, throughout all core rotations. Because of the variability in number of treatments during those rotations, a Mann-Whitney test was also used. The Mann-Whitney method of data analysis reduces variability across groups by using ratios instead of raw numbers. Frequencies were calculated on

Figure 1 – Survey

1. While on the following rotations, indicate how many patients you treated with OMT.
   a. _____ Internal Medicine
   b. _____ General Surgery
   c. _____ Pediatrics
   d. _____ Obstetrics/Gynecology
   e. _____ Family Practice
2. Prior to beginning your 3rd year rotations, either before starting medical school or during the 1st or 2nd years of medical school, did you participate in any clinical OMT experiences?
   a. Yes
   b. No
3. If yes, what kind of clinical experience did you have?
   a. Shadowing a DO who used OMT
   b. Being treated with OMT by a DO
   c. Undergraduate American Academy of Osteopathy (UAAO) workshops
   d. Attending American Academy of Osteopathy (AAO) Convocation
   e. Montclair Clinic* – OMM night
   f. Being treated at the Pre-Doctoral Teaching Fellow's Clinic
   g. College of Osteopathic Medicine of the Pacific Clinical Osteopathic Medicine Practicum (COMP^2)
4. If given the opportunity, would you have participated in more clinical OMT experiences during your didactic years?
   a. Yes
   b. No

* Montclair clinic is a part of the Montclair Community Collaborative and provides services to community members who have no private insurance or government medical assistance.

question three to observe the type of early clinical OMT exposure in which students participated. Frequencies were also calculated on question four to determine students' interest in having more clinical experiences offered during their didactic years.

Results

Investigators received 83 properly completed surveys out of a possible 194, for a response rate of 43%. The surveys indicated that 48 out of 83 students had some type of early clinical OMT exposure. The mean number of patients treated with OMT is indicated in Table 1. There was a significant difference in the total number of patients treated with OMT between those who had an early clinical OMT exposure and those who did not ($p<.05$). When considering the individual rotations, there is a significant difference in the family practice rotation ($p <.05$), and a trend is seen in the surgery, pediatrics, and OB/Gyn rotations.

The type of early clinical exposure students participated in is described in Figure 2. It was found that 68% of students with an early clinical OMT exposure participated in the Montclair Clinic OMM night. 65% shadowed a DO who used OMT and 65% were treated by an osteopathic physician. 50% of students participated in the COMP^2 program and 38% were treated at the fellows' clinic. Regardless of participation, 65% of students indicated an interest in having more clinical OMT experiences offered during their didactic years (Table 2).

Limitations

There are several limitations of this survey, which were considered when analyzing the data and should be used when designing future surveys. First, students who completed this voluntary survey may have been more likely to complete and return the survey if they had a significant interest in OMT. As such, the outcomes from this survey may have been somewhat biased toward the use of OMT on core rotations. Also, the survey did not select for core rotations completed at specific hospitals. Students at COMP^2 are sent to a number of different facilities throughout their third year to complete core rotations. There are approximately 10 facilities at which students may have rotated, and these facilities likely had varying levels of encouragement and time allowed for

Table 1 - Mean number of patientes treatmed with OMT

	Early Clinical Experience			
Rotation	No (n=53)	Yes (n=48)	t-test P value	Mann-Whitney P Value
Internal Medicine	3.71	4.81	0.19	0.27
Surgery	1.54	2.94	0.08	0.06
Pediatrics	0.83	1.90	0.15	0.08
OB/Gyn	0.40	1.02	0.04	0.07
Family Practice	2.51	4.35	0.05	0.02
Total	9.00	15.02	0.02	0.02

Figure 2 – Type of early clinical exposure

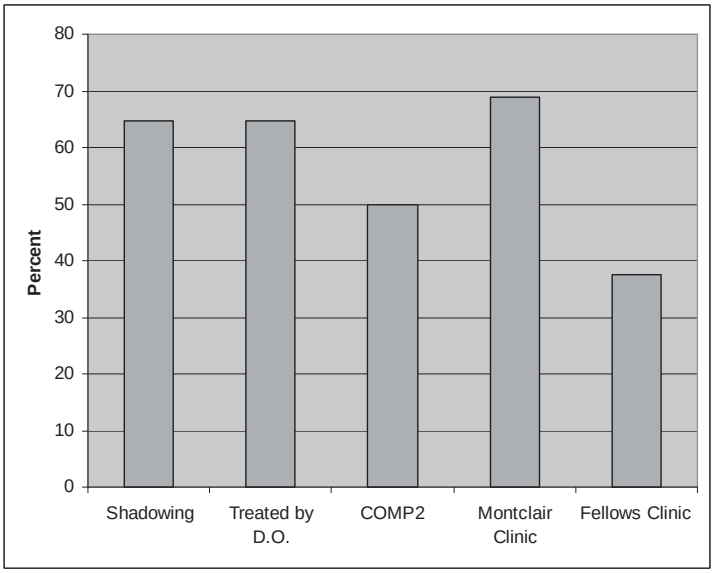

Table 2 - Interest in more clinical OMT experiences	
Clinical Experience	Percent
Yes	79.2
No	45.7
Total	65.1

performing OMT. Another possible limitation of this survey was the way question three was worded. Because students were able to select multiple clinical experiences in which they participated, there was no way to determine which clinical experiences were more likely to encourage future OMT use on core rotations.

The limitations of this survey however, present possibilities for future investigation. The researchers would like to investigate why there is more OMT performed in some rotations and not others.

Conclusions

Previous surveys have shown that participation in clinical experiences can encourage motivation and confidence for clinical practice. Similarly, this survey showed the ability of a clinical OMT experience to encourage third year medical students to use OMM when treating patients during their core rotations. However, students' use of OMT varied depending on the rotation, with more OMT performed during the family practice and internal medicine rotations. One explanation for this may be that most of the clinical experiences available to students are in a Family Practice setting. As such, students received more exposure to the use and effectiveness of OMT in the family practice setting as compared with other specialties.

Despite the variety of clinical opportunities available to students, it was interesting to find that 45% of students who did not participate in a clinical OMT experience expressed an interest in seeing more clinical experiences offered. These students most likely believed that OMT is a useful skill and would like more opportunity to learn how to effectively incorporate this skill into their practice.

As such, investigators would consider future OPP curriculum changes to include more early clinical OMT experiences, both for students who did not participate but showed interest in participation and for students who did participate and in fact performed OMT with more frequency and confidence than their peers. Also, investigators would consider further study into the use of OMT in settings other than family practice.

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CME QUIZ

The purpose of the quiz found on page 36 is to provide a convenient means of self-assessment for your reading of the scientific content in "The Effect of Early Clinical Exposure on Future OMT Use" by Jose Dalprat, OMS V; Raymond J. Hruby, DO, MS, FAAO; and Carolyn Thompson, OMS V

Answer each question listed. The correct answers will be published in the June 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 36. 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.

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Biomechanical Disorders in the Patients with Lumbar Discal Hernias and Their Osteopathic Correction

SV Novoseltsev and DB Vcherashny

It is considered that osteochondrosis is a polyetiologic but monopathogenetic degenerative-dystrophic disease of the vertebral column, the base of which is formed by the affection of intervertebral discs. But a significant role in the formation of pain syndrome is played by local and regional biomechanic disorders in the organism. Modern diagnosis and correction of pathobiomechanical changes in the vertebral column, pelvis and peripheral nervous system make it possible to increase significantly the effectiveness of treatment of this pathologic condition. The paper presents the peculiarities of pathobiomechanical changes and the therapeutic tactics for the patients with lumbar discal hernias. The results concerning clinical effectiveness of osteopathic correction in this group of patients are given.

Key words: discal hernia, biomechanical disorders of the vertebral column, lumbar osteochodrosis, effectiveness of osteopathic correction.

The problem of epidemiology, timely and high-quality diagnosis of neurological complications caused by lumbar osteochondrosis and also differentiated treatment of this pathological condition is a national task for modern neurology, neurosurgery, roentgenology and rehabilitology (Odinak MM, 2006).

Osteochondrosis of the vertebral column is a polyetiologic degenerative-dystrophic process starting in the intervertebral disc, spreading to bodies of vertebrae, intervertebral joints and ligaments. At present neurological manifestations of lumbar osteochodrosis are the most often cause for taking medical advice. According to data of WHO, two thirds of the population of the globe suffer from pains in the loin (Sitel AB, 1993). Lumbar osteochondrosis affects up to 90-97% of the adult population (Tabachnikov VA, 1997). 12-20% of all cases of diseases of the nervous system and 60-70% of disorders of the peripheral nervous system fall to the share of this pathological condition (Shystin A et al., 1985; Antonov IP, 1987; Krylov VV et al., 2001; Andersson et al., 1983; Bonica Y, 1991; Blank J, 1995). Discogenic diseases of the vertebral column are revealed in 38-44% of the population (Kholodov SA, 2002).

Medical and social-economical significance of the problem of diagnosis and treatment of lumbar discal hernias is determined by several causes. Osteochondrosis of the lumbosacral spine is observed the most often in the people of the most active social group at the age of 30-50 years. According to LA Bogacheva (1997), back pain is the second most often cause for taking medical advice and the third most often (after respiratory diseases) cause for hospitalization. In the general structure of disablement caused by diseases of the osteoarticluar system, 20.4% is taken by the degenerative-dystrophic diseases of the vertebral column. During the last 10-15 years the morbidity from degenerative changes in the vertebral column is increasing, which takes the problem of their diagnosis, treatment and prophylaxis to the level of a national task (Dmitriev AE et al., 1987; Vasiliev AYu, Vitko NK, 2000).

In spite of numerous studies devoted to investigation of the pathogenesis of neurological symptoms in the patients with lumbar osteochodrosis, agreement in this problem is not achieved until now. So, lately it became known that there is no direct dependence between the degree of manifestations in the roentgenological picture of lumbar osteochondrosis and the intensity of pain syndrome (Skoromets AA, 1999). Comparatively not long ago there appeared reports on the fact that "within the limits of the vertebral column there is no such region where radices of the spinal nerves or the nerves themselves can be injured by osteochondrosis excrescences or discal hernias" (Zharkov PL, 2006). The author based on the comparative analysis of roentgenological and pathomorphological data, as a result of which he has made a conclusion that dystrophically changed paravertebral soft tissues, in particular, ligaments, are the cause of pain syndromes in the patients with lumbar osteochondrosis. According to VV Belyakova, AB Sitel et al. (2002), the formation of radiculopathy in the lumbar spine takes place due to compression of epidural venous plexuses with development of local epiduritis and venous stasis.

Selection of the therapeutic tactics depends in many respects on precise diagnosis of revealed pathomorphological substrates, pathogenetic situations and clinical phases of lumbar osteochondrosis connected with them (Khemlinskikh AM, 2000; Perlmutter OA, 2000; Toptygin SV, 2003).

Inconsistency of the data obtained by roentgenologists, pathomorphologists and neurosurgeons leaves the question on expediency and effectiveness of using the manual therapy in the patients with reflex and, especially, radicular syndromes of lumbar osteochondrosis open (Drivotinov BV, Ban DS, 2006). The leading cause of clinical disorders is not revealed always also with the help of modern neural visualization methods: computed tomography and magnet resonance imaging (Lysachev AG et al., 1993; Shulev YuA et al., 1999; Weisel S et al., 1984; Bernard T, 1990; Greenspan A, 1992; Pfirrmann C et al., 1999). Different interpretation of findings obtained by clinical and radiation diagnosis often leads to selection of alternative treatment methods including surgical methods. Traditional decompressing operations are among the most widespread operations (Shustin VA et al., 1985; Brekhov AN, 1991, 2001; Parfenov VE et al., 2001; Padua R, et al., 1999).

At the same time neurosurgeons improve surgical methods for treatment of discal hernias as an extreme manifestation of lumbar osteochondrosis. Endoscopic neurosurgical methods as the least traumatic are widely put into practice with the purpose of increasing the quality of surgical treatment (Arestov SO, 2006).

Unsatisfactory results of surgical interventions and considerable number of disease relapses requiring repeated surgical correction stipulate the search of ways to improve the conservative treatment of discogenic neural-vascular compression at the lumbar level.

It is quite evident that in the patients with lumbar osteochondrosis different biomechanical changes are observed, which have local

or generalized nature. In other words, the postural balance of the human body, i.e. its position in the space, is changed. The study of DE Mokhov (2002) may be considered as one of the first attempts of the systemic approach in understanding of the pathogenesis of neurological syndromes caused by lumbar osteochondrosis. The author considered lumboischialgia in connection with disturbance of feet proprioception and, as a result of this, postural disbalance.

It is difficult not to agree with the fact that, if it is necessary to change the posture of the patient and to balance tension in the body, one should change the scale of his therapeutic work. When examining the patient, osteopaths, along with classical tests and palpation, use the assessment of gravitation lines, each of which gives specific information on disorders in the body. Finally, there are certain zones, the problems of which inevitably distort gravitation lines. Such zones are the following: hip joints, pelvic diaphragm, coccygeal bone, L3, Th12, Th11, Th4 and occipital bone (Jaubert J, 2005). The examination includes tests for assessment of the posture (volumetric, mechanical and emotional), what agrees with the main principles of modern biopsychosocial disease model. It is evident that it is impossible not to take into account the emotional condition of the patient during examination and treatment. In 85% of cases the patients suffering from lumboischialgia have light depression (V Raikh).

Social status of man dictates an appropriate life-style but some common factors observed practically in every patient suffering from pains in the vertebral column should be noted. They include: absence of specific exercise stress on the vertebral column, not getting enough sleep, irregular and incorrect nourishment. Vascular supply of intervertebral discs completely reduces by 20-23 years of age, the only one, extremely unfavorable type of supply, i.e. diffusion, remains (Chelnokov VA, 1998), consequently, physical exercises are urgent. Not getting enough sleep gives no possibility of disc rehydration, and also does not allow the muscles to recover. According to Sitel AB (2006), the recovery of muscles requires no less than 9-11 hours of sleep. Non-observance of the diet also reflects on the disc condition, especially, if we take into account the fact that the inflow of nutrients to the disc considerably dominates over outflow.

The conservative treatment of neurological symptoms of lumbar osteochondrosis is also supported by some literature data that for the most part discal hernia is being resolved or contracted in the course of time (2-6 years) (Sitel AB, 2006; Katz DS, Math KR, Groskin SA, 1998).

At present, the following manual therapeutic approaches are used in the treatment of spondylogenic neurological syndromes: manual therapy (Lewit K, 1987; Maitland G, 1992; Ivanichev GA; Sitel AB, 1998; Skoromets AA, 2000), osteopathy (Still A, 1910; Sutherland W, 1939; Mitchell F, 2001; Barral JP, 1991), craniosacral therapy (Upledger D, 1983), biodynamics (Sills F, 2004; Jaubert J, 2005), traditional Chinese medicine (Guiliani JP, 1997) and also different types of massage.

We have examined and treated 572 patients with dorsalgia in the low back at the age of 15 – 67 years.

The object of the study was to investigate biomechanical disturbances in the patients with spondylogenic pain syndromes having lumbar discal hernias and also their dynamics when using osteopathic correction. In the course of results processing we excluded the patients having in anamnesis destructive processes in the vertebral column, pronounced osteoporosis, severe concomitant diseases (severe degree of arterial hypertension, coronary disease exertion angina pectoris of the functional class II and above, myocardial infarction in anamnesis), heart valvular disease, cerebrovascular disease, cardio-vascular, respiratory and renal insufficiency, not compensated diabetes mellitus, rheumatologic diseases in active phase, chronic infectious diseases, psychic diseases, neurosurgical manipulations on the vertebral column in anamnesis, suspicion to ischemic genesis of the disease, traumas of the vertebral column in anamnesis, availability of data on alcohol or drug abuse. The criteria for inclusion into the group were: age of no less than 30 years and no more than 50 years, disease anamnesis of no less than one-year, lumalgia/lumboischialgia syndrome, MR-signs of degenerative-dystrophic changes in the lumbosacral spine.

As a result of selection of the patients we formed the group of 295 patients with neurological symptoms of lumbar osteochondrosis at the age of 31 – 50 years.

The test group comprised 143 patients (68 men and 74 women). The comparison group included 152 patients (72 men and 89 women). All patients had neurological examination as per classic scheme, osteopathic examination and testing, magnet-resonance imaging of lumbosacral spine (MRI). The test group of the patients received only osteopathic treatment, and traditional pharmacotherapy (anti-inflammatory, vascular therapy, therapy with vitamins etc.) was administered to the patients of the comparison group.

The following symptoms prevailed in the patients of the test group:

- pain in the lumbar spine: 81.11% (116 cases);
- discomfort in the lumbar region: 18.88% (27 cases);
- significant limitation of mobility in the lumbar spine: 71.32% (102 cases). Limitation of forward inclination prevailed in 41.25% of them (59 cases); inclination to the right in 18.18% (26 cases), inclination to the left in 11.88% (17 cases).
- radicular pains in the lower extremities: 28.67% (41 cases);
- disturbances of sensitivity in the lower extremities: 37.06% (53 cases);
- weakness in the lower extremities: 44.75% (64 cases);
- pain in the sacral bone: 21.67% (31 cases);

Only 13 patients had in anamnesis direct trauma of the vertebral column.

The following complaints prevailed in the patients of the comparison group:

- pain in the lumbar spine: 70.39% (107 cases);
- discomfort in the lumbar region: 19.07% (29 cases);
- significant limitation of mobility in the lumbar spine: 64.47% (98 cases).

Limitation of forward inclination prevailed in 40.13% of them (61 cases); inclination to the right in 14.47% (22 cases), inclination to the left in 9.86% (15 cases);

- radicular pains in the lower extremities: 24.34% (37 cases);
- disturbances of sensitivity in the lower extremities: 36.18% (55 cases);
- weakness in the lower extremities: 39.47% (60 cases);
- pain in the sacral bone: 22.36% (34 cases).

Direct trauma of the vertebral column in anamnesis was observed in 10 cases.

The osteopathic examination of the test group revealed the following biomechanic changes: flatness of physiological lordosis in 133 patients (93%), unilateral or bilateral tension of the paravertebral muscles in 124 patients (86.71% of cases), and also dysfunction in flexion, rotation and lateroflexion (FRS) of vertebral-motor segments L5-S1 in 108 patients (75.52%), L4-L5 in 37 patients (25.87%), L3-L4 in 16 patients (11.18%). Functional block of the sacroiliac joint (SIJ) was observed in 100% of cases. Block of the left SIJ was observed in 63.63% of them (91 cases), dysfunction of the right SIJ was revealed in 17.48% (25 cases). Bilateral block of the sacroiliac joints was observed in 27 patients (18.88%). Functional block of the left SIJ was often combined with dysfunction of the left iliac bone in posterior rotation and shortening of the left lower extremity. It is interesting that this sign often correlated with lateralization of pain in the lumbar region. 129 patients showed pathological torsion of the sacral bone to the left along the right axis (posterior torsion of the sacral bone) (90.20% of cases).

For the palpation examination of the peripheral nerves of the lower extremities we used a method suggested by D.S. Butler (1991). 124 patients (86.71%) showed painfulness in tension points of the sciatic nerve and its branches (popliteal space, gluteal fold, piriform muscle and medial surface of the heel bone). In the control group this symptom was revealed in 113 patients (79.02%).

All examined patients also showed kinetic dysfunctions of the iliac bones, foot bones (especially, talus), cervical spine and also dural tensions at different levels.

During the first three to five days from beginning of the pain syndrome the patients often showed ligament strain at the level of L4-S1 with involvement of yellow ligaments in the process. It is known that vertical elastic fibers of yellow ligaments have the maximum power at the inferior lumbar level, where their thickness is 4-5 mm. It is important to have in mind that elastic properties of yellow ligaments allow them to stretch during forward inclination of the body and to contract during straightening, thus playing the most important role in biomechanics of the vertebral column.

Among other functional blocks of vertebral-motor segments the patients of the test group showed the following: C0-C1 in 48.95% (70 cases); C3-C4 in 35.66% (51 cases); C4-C5 in 38.46% (55 cases), C5-C6 in 27.27% (39 cases), C6-C7 in 15.38% (22 cases). Kinetic dysfunctions of the thoracic segments were noted in 61 patients (42.65%). Often that had group nature and involved the level of Th4-Th6, Th12-L1.

MRI-picture was characterized by significant polymorphism. Different MR-signs of degenerative-dystrophic changes (from flatness of lumbar lordosis and lowered disc height to herniation) were observed in most lumbar vertebral-motor segments. Lumbar discal herhias were noted in 103 patients (72.02%). Often one patient had two or three discal hernias. Discal hernias were revealed the most often at the level of L5-S1 [in 56 patients (54.36%)], L4-L5 [in 38 patients (36.89%)], L3-L4 [in 7 patients (6.79%)]. More often these were posterior diffuse or paramedian hernias.

Before starting the treatment, craniosacral rhythm (CSR) was assessed in each patient in different regions of the body. The patients with radiculopathy showed confident lowering of CSR parameters in the concerned lower extremity. In other cases craniosacral rhythm did not change considerably.

Dysfunctions of the sphenobasilar synchondrosis (SBS) were adaptive to dysfunctions of the cervical spine. Among them right-side torsion of SBS (52 cases) was revealed the most often.

When analyzing MRI of the lumbar spine we revealed availability of three discal hernias in 52 patients (17.62%), two hernias in 27 patients (9.15%), single hernia was revealed in 68 patients (23.05%). It is interesting that lumbar discal hernias were revealed nearly in one half of all patients.

Taking into account the findings of anamnesis, neurological and osteopathic examination and also MR-picture, the appropriate treatment was developed and administered; it included several main stages:

1. Fascial correction of posterior torsion of the sacral bone.
2. Correcting dysfunctions of pelvic bones.
3. Decompression of L5-S1.
4. Correcting the ligament strain in the lumbar spine.
5. Mobilizing the peripheral nerves of the lower extremities.
6. Soft tissue treatment of the lumbar region.
7. Correcting dysfunctions of the cervical spine with decompression of C0-C1.
8. Occipital-sacral balancing.
9. Compression of the 4th ventricle (CV4) (directed liquid version).

In spite of this therapeutic algorithm, two stages of work may be distinguished principally in the treatment of the patients with discal hernias. The first one is local work with affected tissues; it is used in the acute period of the disease with the purpose not to overload the patient's organism. The second stage is global work with the patient's body; it is used in subacute and recovery periods. Balancing of gravitation lines and kinematical chains is performed at this stage.

Also it is possible to distinguish four main therapeutic levels of work with the tissues:

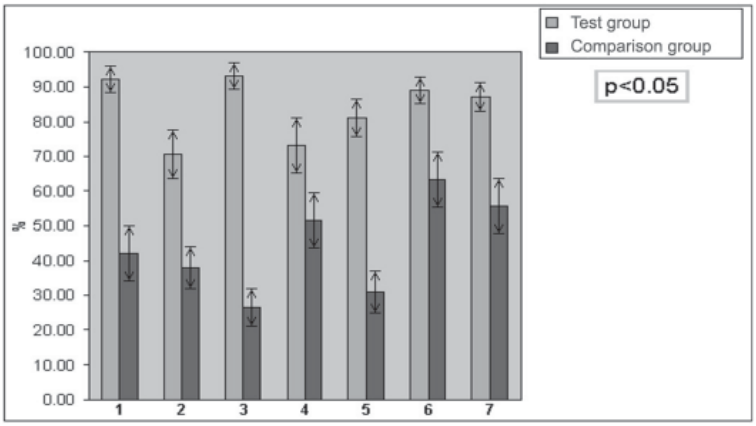
1. Correcting the soft tissues including muscles and ligaments.
2. Correcting the joints of the lumbar spine and pelvis.
3. Using liquid methods and correcting the pachymeninx.
4. Biodynamic level (energetic and embryologic methods).

It is very important to understand that different levels of work with the tissues demand sufficiently high skills in palpation and perception from the physician, what is determined by the possibility to change the physician's consciousness.

Table 1 - Dynamics of clinical symptoms of osteochondrosis in the patients with lumbar discal hernias

No	Syndrome	Test group			Comparison group		
		Before treatment	After treatment	%	Before treatment	After treatment	%
1.	Pain in the lumbar spine	116	9	92.25	107	62	42.06
2.	Discomfort in the lumbar region	27	8	70.38	29	18	37.93
3.	Significant limitations of mobility	102	7	93.14	98	72	26.53
4.	Radicular pains in the lower extremities	41	11	73.18	37	18	51.35
5.	Disturbances of sensitivity in the lower extremities	53	10	81.13	55	38	30.91
6.	Weakness in the lower extremities	64	7	89.06	60	22	63.33
7.	Pain in the sacral bone	31	4	87.10	34	15	55.88

Figure 1 - Comparison diagram of clinical picture before and after the treatment in the test and comparison group



Confidence intervals are plotted for the probability value of 95%. Basing on the fact that in any case they are not overlapped, $p < 0.05$.

Table 2 - Dynamics of osteopathic status before and after the treatment in the test and comparison groups

	Test group			Comparison group		
	Before treatment	After treatment	%	Before treatment	After treatment	%
Flatness of physiological lordosis	133	61	54.14	140	121	13.57
Tension of paravertebral muscles	124	15	87.90	127	103	18.90
Dysfunction FRS of L5-S1	108	10	90.74	101	92	8.91
Dysfunction FRS of L4-L5	37	5	86.49	35	27	22.86
Dysfunction FRS of L3-L4	16	2	87.50	20	15	25.00
Functional block of the left SIJ	91	4	95.60	83	75	9.64
Functional block of the right SIJ	25	2	92.00	28	19	32.14
Bilateral block of SIJ	27	21	22.22	24	20	16.67
Posterior torsion of the sacral bone	129	11	91.47	135	113	16.30
Functional block in C0-C1	70	7	90.00	63	58	7.94
Functional block in C3-C4	51	9	82.35	47	41	12.77
Functional block in C4-C5	55	12	78.18	49	47	7.08
Functional block in C5-C6	39	10	74.36	43	35	18.60
Functional block in C6-C7	22	11	50.00	29	23	20.69
Kinetic dysfunctions in the thoracic vertebral-motor segments	61	8	86.89	70	61	12.86
Painfulness in nerve tension points	124	4	96.77	113	101	10.62

One should note extraordinary effectiveness of fascial correction method of the sacral bone and CV4 torsion. Excellent power of these methods often determined the positive outcome of the treatment. The confident improvement of the clinical picture was observed after correction of revealed biomechanic disorders. The positive effect in the test group occurred just during the procedure in 74.12% of cases (106 patients). It was expressed as significant relief of pain, increased range of movements in the lumbar spine. In average the osteopathic therapeutic course included 6 procedures with the interval of seven days. Disturbances of sensitivity in the lower extremities persisted in 7.6% of cases, which, evidently, was determined by the duration of the disease.

After administered treatment the patient received recommendations to perform exercises for mobilization of the peripheral nervous system, which required neither much time, nor special conditions for performing.

Preventive examination once a month for 2 years convincingly proved the effectiveness and stability of the treatment results. The repeated therapeutic course was administered to only 12 patients and was connected with trauma of the vertebral column.

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The Pediatric Head:
Developmental Changes, Clinical Implications, Diagnosis and Treatment

April 30 - May 2, 2010 at UNECOM

Course Description:

This course will discuss the pre and postnatal development of the head and it's implications in the diagnosis and treatment of common pediatric conditions. The 20 hour course is intensively hands-on with a focus on the balanced membranous tension techniques described by William Sutherland.

Presenting:

Jane Carreiro, DO

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

Friday, April 30 ..... 9:00 am - 6:30 pm
Saturday, May 1 ..... 9:00 am - 7:00 pm
Sunday, May 2 ..... 9:00 am - 1:30 pm

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

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Case Study: Exhalation Somatic Dysfunction after Multiple Rib Fractures and Pneumothorax

Jessica Calman

Introduction

Blunt trauma to the chest has the potential to cause a myriad of injuries affecting the chest wall and the components of the thoracic cavity. Fractures of the chest wall are most commonly encountered during blunt trauma and can be a significant source of respiratory dysfunction secondary to pain and tissue disruption (i.e. pneumothorax). The standard of care for chest wall fractures focuses on effective pain control during the acute stages of healing with the goal of preventing secondary pulmonary complications due to splinting. Derangements of the chest wall can also lead to chronic pain and inefficient respiration, which can be remedied or even avoided with osteopathic manipulative treatment, alone or in conjunction with pharmacotherapy.

Report of Case

A 43 year-old Active Duty USMC Major was involved in a high-speed motorcycle accident in January of 2009 where he sustained multiple right-sided rib fractures and a right-sided pneumothorax. A tube thoracostomy was performed and was left in place for four days. He spent five days in the hospital and was then released home on convalescent leave. He was referred to the Sports Medicine clinic in early February with the intention of rehabilitating and returning to work as soon as possible. He was noted to have right-sided rib pain, specifically ribs eight-12, with inhalation, rotation of the torso, getting in and out of bed, and had been unable to return to his previous level of physical activity. He was given a basic stretching program, which was not significantly helpful. He was subsequently placed on a limited duty status, and was referred to physical therapy for core strengthening and stabilization. Non-steroidal anti-inflammatory drugs (NSAIDs) were avoided due to his past history of anaphylaxis following naproxen use. His pain was managed with at-home thermal techniques, with an emphasis on the application of ice three to five times a day.

He deployed to Afghanistan in early July 2009, while still in a limited duty status. He continued to have generalized, right-sided rib cage discomfort with activity and with deep inspiration.

He was seen at the Combined Aid Station at Camp, not long after his arrival, complaining of an increase in right lower mid-axillary rib pain over the previous week. His medical record from that initial visit does not specify whether or not the donning and prolonged wearing of his Modular Tactical Vest (MTV), more commonly known as a flak jacket caused the exacerbation. The MTV weighs approximately 45 pounds with just the ceramic SAPI plates inserted and can weigh upwards of 60 pounds with a full combat load (i.e. rifle and pistol magazines, individual first aid kit, etc).

His vital signs were as follows: BP 116/83, HR 65, RR xx, SpO2 96%, and he was afebrile. He had point tenderness to palpation over the lower rib angles and corresponding thoracic transverse processes. Rib motion was not initially assessed and his lungs were clear bilaterally. At that time, he was referred to the British Role Three field hospital for orthopedic evaluation. The orthopedic surgeon remarked that he was "subjectively achy after activity" and his exam was unremarkable with the exception of isolated point tenderness at the costochondral junction of ribs 9, 10, and 11. He was cleared for full duty, although he still had significant discomfort. Daily pain control was difficult, in light of his severe allergy to NSAIDs. He was recommended for physical therapy, though he did not participate due to time constraints and mission requirements. He was referred to me, by a colleague, for OMT in early October 2009 for right-sided posterior and mid-axillary rib pain with deep inhalation. He complained that his pain was "initially sharp, but dulls out" as it moved anteriorly, along the rib margin.

Review of Systems: Otherwise unremarkable.

Past Medical History: Adult-onset asthma x 8-9 years (uses rescue inhaler periodically). No other surgeries in the past.

Allergies: Non-steroidal anti-inflammatory drugs (hives and anaphylaxis), Iodine, bee stings

Medications: Doxycycline (malaria chemoprophylaxis)

Social History: Denies alcohol use and smokes an "occasional" cigar. Military occupational Specialty is Explosive Ordinance Disposal Officer.

Exam

Vital Signs: BP 110/72, HR 50, RR 16, T 98.0 F, Pain 2/10 right lower ribs, Ht 68", Wt 175 lbs.

General: Well developed, well nourished, fit male in no acute distress. Non-antalgic gait.

HEENT: Not evaluated.

Neck: Full range of motion of the c-spine, no midline tenderness to palpation.

CV: Rate 50, regular rhythm. Capillary refill <2 seconds distally, in upper extremities.

Resp: RR 16, clear to auscultation bilaterally with good air movement heard in all fields. No crepitus of rib cage on palpation.

Anterior Visual Exam: Clavicles symmetrical. No pectus carinatum or excavatum. No accessory muscle use.

Posterior Visual Exam: Shoulder height symmetrical. No scapular winging. Prominent thoracic paraspinal musculature bilaterally.

Rib Cage/Torso: Right rib motion significantly impaired as compared with the left hemithorax. Right ribs eight, nine, and 10 were restricted in inhalation. Point tenderness to palpation on the T8 transverse process on the right. Right-sided paraspinal muscle fullness from T6-T10. No midline thoracic or lumbar spine tenderness to palpation. Diaphragm moves easily to the right.

Pelvis: Right anteriorly rotated innominate.

On initial evaluation, the patient's somatic dysfunctions were addressed using OMT techniques. His thoracic paraspinal fullness was treated with soft tissue and myofascial release. His exhalation somatic dysfunction was corrected with a high-velocity, low amplitude (HVLA) technique. He reported initial, resting pain (2/10) to the right lower ribs in the mid-axillary line before manipulation and had a subtle decrease in pain following treatment. However, on re-evaluation immediately following manipulation he was noted to have symmetrical rib cage motion. No medications were prescribed, but it was recommended that he follow-up in 48-72 hours.

He returned for follow-up four days later and reported a noticeable decrease in the "sharpness" of the posterior and mid-axillary rib discomfort with deep inhalation. He did report a general, 1/10 "soreness" after wearing his MTV over the previous four days while out on a mission. He still had right thoracic paraspinal fullness that was mildly tender to palpation. Examination of the ribcage and its motion demonstrated persistent exhalation somatic dysfunction with rib 10 being the bottom-most rib. His thoracic somatic dysfunction was treated again with soft tissue and myofascial release techniques. The right rib exhalation somatic dysfunction was treated only with direct supine muscle energy. On post-manipulation re-evaluation, rib motion was restored and the patient remarked at the noticeable improvement in his discomfort at rest and with deep inhalation. He was encouraged to do basic stretches to include focused deep inspirations multiple times over the course of the days. Over the next six weeks, he was treated with the same modalities three additional times. At each evaluation he reported continued improvement and his exam showed less severe somatic dysfunction. His initial concerns of having to live with this discomfort forever have significantly decreased since being treated with OMT. He is encouraged that he will soon reach the point of no longer needing manipulation and be able to optimally perform his duties in combat.

Rib Cage Anatomy

In review, there are seven pairs of true ribs that articulate with the sternum directly (vertebrosternal) and five sets of false ribs, which do not articulate with the sternum directly. Ribs 8 to 10 attach to the seventh rib costal cartilage and the costal cartilages of each other (vertebrochondral), forming the costal arch. The costal arch attaches to the sternum. Ribs 11 and 12 are floating (vertebral) ribs, attaching only to their respective thoracic vertebral transverse processes. Between two adjacent ribs are the intercostal muscles; external, internal, and innermost intercostals. They function to maintain the spacing between adjacent ribs, and have some effect on inspiration and expiration. Intercostal nerves are branches of the thoracic spinal nerves that run along the inferior border of the rib margin with the corresponding intercostal artery and vein. They provide motor fibers to the intercostal muscles anteriorly and sensory fibers to the parietal pleura and skin.[1]

Respiration Mechanics

Inspiration occurs when air moves from the atmosphere, where the barometric pressure is higher into the lungs with a lower alveolar pressure. This pressure gradient is produced when there is an increase in size of the thoracic cavity. The anterior and middle scalenes move rib one superiorly during inspiration. Ribs two to five are termed "pump handle" and move about a costvertebral-costotransverse axis. The posterior scalene influences the motion of the second rib and ribs three to five are influenced by the pectoralis minor. Ribs 6 to 10 are termed "bucket handle" and move about a costovertebral-costosternal axis with contraction of the serratus anterior. The lateral aspect of the rib moves cephalad with inspiration causing an increase in the transverse diameter of the thoracic cavity. The anterior rib moves superiorly during inspiration and posterior angle moves inferiorly.[2] Ribs 11 and 12 have no anterior attachments and rotate externally in the transverse plane, like calipers during inhalation. The diaphragm also flattens during inspiration, facilitating an increase in size of the thoracic cavity. Expiration occurs when the intrathoracic pressure is greater than the barometric pressure, allowing air to passively flow outward.

Examination of the Rib Cage and Thorax

Rib fractures are the most common injury sustained following blunt chest trauma and are rarely life threatening, when isolated.[3] However, they may contribute to or signal a more severe visceral injury inside the abdomen and thorax, such as a pneumothorax, hemothorax, or splenic rupture. The incidence of solid organ injury increases with the number of fractures.[4] Therefore, in the setting of acute chest wall trauma, a thorough, multi-system trauma evaluation is necessary, with stabilization of the patient as the number one priority.

When the patient is stabilized and the condition of the patient allows, a detailed thoracic structural exam should be performed. In addition to auscultation, the structural exam can yield a wealth of information about the underlying condition of the respiratory system and should be included in the physical examination of the patient with respiratory complaints.

The structural exam should include evaluation of the vertebral spine, ribs, diaphragm, pelvis, and sacrum, as they all effect respiration and comprise the structural framework for which the soft tissue container of the abdomen is attached and supported.[2] See Box 1.1 on page 20.

Segmental Diagnosis of Rib Somatic Dysfunction

Examination of the ribs includes a four-quadrant rib screen (Figure 1.1, 1.2)[2] and segmental diagnosis of the atypical ribs one, 10, 11, and 12 (Figure 1.3, 1.4).

Rib somatic dysfunction is named for the motion and axis in which it moves.[2] In an exhalation somatic dysfunction, for example, the posterior angle of the rib is stuck superior/posterior and will not move inferior/anterior with inhalation. This group of ribs moves freely in exhalation. The key rib in exhalation somatic dysfunction (inhalation restriction) is the bottom-most rib of the dysfunctional group and vice versa. This can be easily recalled using the mnemonic, "BITE" or Bottom/Inhalation, Top/Exhalation.

In addition to traumatic causes of rib cage pain, the differential diagnosis for rib cage pain should include degenerative changes, inflammation, neoplasm, infection, and even genetics. See Table 1.

General Management of Chest Wall Fractures

Acutely, patients will usually complain of chest discomfort on inspiration, localized tenderness over the fractured rib or ribs, and there may or may not be palpable crepitus. Pneumothoraces, secondary to parenchymal penetration of a rib fragment, should be recognized quickly and managed with tube thoracostomy. Whether the rib fractures are isolated or in conjunction with visceral injury, effective pain control is the cornerstone of medical therapy.[5] Appropriate pain control will facilitate early mobilization and aggressive pulmonary toilet, important in preventing hypoventilation, atelectasis, and the development of pneumonia. Pharmacotherapy usually includes non-steroidal anti-inflammatory drugs or oral/parenteral narcotics. Ibuprofen is usually the NSAID of choice in most cases, but other NSAIDs such as Ketoprofen, Naproxen, and Acetaminophen are also available. NSAID/opioid combinations are also readily available for moderate to severe discomfort. Morphine sulfate is an effective anxiolytic and analgesic, useful for more severe discomfort associated with rib fractures. See Box 1.2[3, 11]

Although NSAIDs and combination analgesics are usually well tolerated, some patients may have contraindications to their use, such as those with liver or kidney disease and in this patient's case, anaphylaxis. The chronic use of opioid analgesics also presents significant problems for long-term management to include constipation, altered mental status, and possible addiction. Osteopathic manipulative treatment, especially in later stages of rib fracture healing, may be just as effective as pharmacotherapy. In fact, the use of OMT to correct the somatic dysfunction may be a more effective modality than long-term analgesic use.

Osteopathic Manipulative Treatment Modalities

The goal is to restore motion to the dysfunctional group of ribs and associated musculature, thereby increasing chest cage expansion and decreasing pain with inspiration. This is by no means a comprehensive list of techniques or specific treatment protocol to be followed, but rather a few options.

- Supine doming of the diaphragm is a technique that allows the physician to palpate the diaphragm, identify resistance to respiration, and encourage superior movement, or doming, of the diaphragm. The seated thoracic diaphragm myofascial release technique allows unwinding of the diaphragmatic tissue as the position of ease is identified and held. With unwinding, the diaphragm settles into a gentle, rhythmic respiratory motion.[2] Improving thoracoabdominal diaphragmatic motion improves respiratory mechanics and should not be excluded.[6]
- Muscle Energy is an isometric technique where the physician resists the patient's active muscle contraction, thereby allowing the physician to take advantage of the reflex relaxation after the contraction and apply a stretch.[7] During muscle energy of the rib cage, the muscle groups that must be activated correspond to a specific group of dysfunctional ribs. When treating somatic dysfunction at rib one and rib two, the anterior/middle scalenes and posterior scalene, respectively must be contracted. The ipsilateral pectoralis minor must be activated during muscle energy for ribs three to five. The ipsilateral serratus anterior is activated during muscle energy of rib 6 to10 (Figure 1.5). In exhalation muscle energy, the rib angle is pulled inferiorly with the reflex relaxation and a new barrier is confronted each time. The converse is true for inhalation muscle energy, as the rib angle is restricted in exhalation.
- The Still technique for ribs is not quite as aggressive as HVLA and can be useful for patients who cannot tolerate the thrust associated with HVLA. The physician initially moves the patient in to a position of ease. There is a transition through neutral towards the restrictive barrier. In the case of a right lower rib exhalation somatic dysfunction, the physician would bend the seated patient towards the dysfunctional side, rotate down, and posterior until softening of the tissues is noticed. Further softening occurs with downward compression on the shoulder and is maintained as the body is carried through neutral towards the restrictive barrier. Initial positioning for an inhalation somatic dysfunction would be that of side-bending toward the dysfunction, with rotation forward and anterior.[8]
- HVLA is a direct technique, which uses a high velocity/ low amplitude mobilizing force to move the dysfunctional articular segment through the restrictive barrier.[9]

Discussion

The process of respiration is affected by the muscles of the thorax and their relationship to the bony structures of the thorax. When these tissues are in their optimal physiologic state, respiration is most efficient. When optimal motion of the structures is inhibited, respiration suffers, such as in the patient with rib fractures. Respiratory function is compromised to the extent that correlates with the number of ribs fractured.[10] Chronic tissue binding secondary to splinting and fracture healing can be a significant cause of post-traumatic respiratory difficulty and chest cage pain. The use of OMT with or without the use of analgesics is an effective way to treat chest cage somatic dysfunction and offers the patient a chance at a pain-free existence following traumatic injury.

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Box 1.1 Osteopathic Thorax Structural Exam

Anterior and Posterior Visual Inspection:
- Respiratory rate
- Accessory/Intercostal muscle use
- Asymmetries, deformities
- Ecchymoses, edema, color change

Upper thorax:
- Sternum- compression and decompression, especially if trauma involved
- Clavicle – evaluate for proper motion of the clavicle; posterior/superior with inhalation and anterior/inferior with exhalation.
- First rib motion
- Ribs 2-6 – Evaluate pump handle motion
- Scalene, SCM, and trapezius muscles, as well as the paravertebral musculature

Lower Thorax and Diaphragm:
- Ribs 6-10 – Evaluate bucket handle motion.
- Costal margin
- 12th Rib – Evaluate by palpating just lateral to the edge of the erector spinae musculature posteriorly.
- Diaphragm – Evaluate for motion restriction during passive rotation of the diaphragm.

Figure 1.1 - Four quadrant rib screen (ribs 3-5)

Figure 1.2 - Four quadrant rib screen (ribs 6-10)

Table 1 Differential Diagnosis of Rib Cage Pain

Trauma	**Degenerative**	**Infectious**
Rib fracture	Osteoporosis	Pneumonia
Rib contusion	Osteoarthritis	Infection, thoracic actinomycosis
Chest wall injury		Empyema
Pulmonary contusion	**Neoplastic**	Herpes zoster
Intercostal muscle strain	Metastatic bone disease	
	Rib tumor	**Genetic**
Inflammation	Carcinoma, squamous cell	Familial Vitamin D-dependent rickets
Costochondritis	Carcinoma, bronchogenic	

Figure 1.3. - Segmental diagnosis (rib 1)

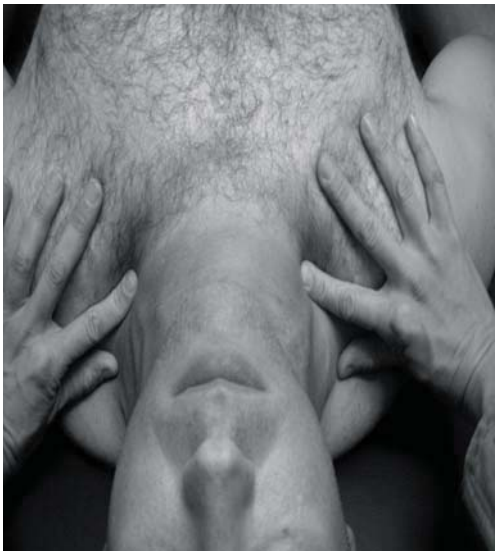

Figure 1.4. - Segmental diagnosis (ribs 10-12)

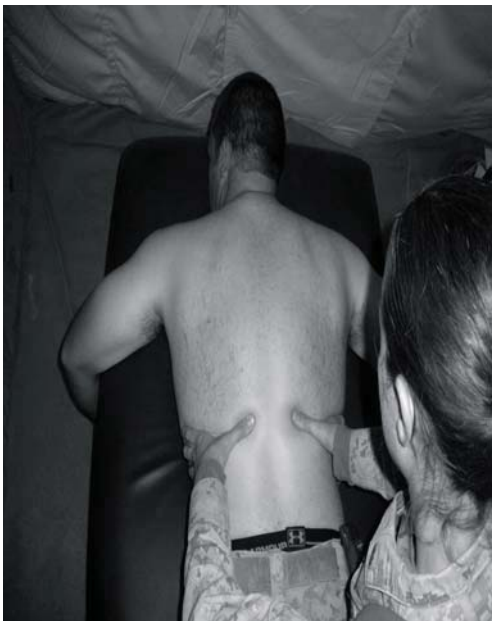

Figure 1.5 Muscle Energy for Exhalation Somatic Dysfunction. Ribs 6-10

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Box 1.2 Pharmacotherapeutic Options

	Drug	Interactions/ Contraindications
NSAIDs	Ibuprofen 600-800mg q 6hrs	Hypersensitivity to compound Peptic Ulcer disease Recent GI bleed
	Naproxen 500mg q 12hrs	Renal Insufficiency May decrease effect of: Hydralazine
	Ketoprofen 75mg po TID	Captopril Beta blockers furosemide
	Ketorolac tromethamine 30-60mg IM x1 dose	thiazides Increase PT w/ administration of: Anticoagulants May increase: Methotrexate toxicity Phenytoin toxicity Lithium toxicity
Non-Opioid Analgesics	Acetaminophen 325-650 p q4-6hrs or 1g q6-8 hrs (not to exceed 4g/day)	Hypersensitivity to compound G-6-PD deficiency Effects decreased by Rifampin Increased risk of liver toxicity w/ Barbituates Carbamazepine
Combination Non-Opioid/Opioids	Acetaminophen/Codeine T#2: 300mg/15mg 1-2 tab p q4-6hrs T#3: 300mg/30mg 1 tab po q4-6hr	Hydantoins Isoniazid Caution in chronic alcoholics Hypersensitivity to compound Increased toxicity with: CNS depressants Tricyclic antidepressants
	Acetaminophen/Hydrocodone 500/5 mg 1-2 tabs po q4-6	Caution in intestinal motility disorders High Altitude Cerebral Edema Elevated intracranial pressure
	Acetaminophen/Oxycodone 500/2.5mg 500/5mg 1-2tabs po q4-6	Caution in Renal or Hepatic dysfunction Vit K deficiency Increases effects of Warfarin Caution in Peptic Ulcer Disease
Opioids		
	Morphine sulfate 2.5-5mg IV q10-15 min prn	Hypersensitivity to drug Hypotension Compromised airway/respiratory Caution in SVT and Atrial flutter Caution in urinary retention

Osteopathic Manipulative Treatment In the Emergency Department: A Two-Dimensional Curriculum

Michael Mesisca, Keasha Hoffman, Gregory Fenati, and Raymond J. Hruby

Abstract

This project posits that a two-dimensional clinical curriculum designed to educate osteopathic emergency physicians (OEPs), residents, and medical students will increase the frequency with which osteopathic examinations and treatments are provided within the emergency department (ED)for selected patient diagnoses.

In spite of clinical evidence supporting OMT use in the ED, there is a large percentage of the profession not using it. Among those who do, the number of indications for which they use and the frequency of use is quite small which is consistent with a growing trend within the osteopathic profession causing some concern that it may be loosing its distinctiveness.

This project reviews the literature regarding OMT in the ED, including the suggested indications and obstacles, offers a curriculum to educate practitioners, develops a means to measure the effectiveness of the curriculum, and discusses potential research opportunities and educational possibilities for increasing the frequency of OMT in the care of the emergency patient.

Overview of Osteopathic Medicine in Acute Care

Patients presenting to the emergency department with an acute or acute on chronic illness often have one or many underlying factors that have precipitated their disease. In the acute care setting, the physician is focused on stabilizing the patient, identifying the cause of disease, and finding the most efficient means to restore the patient to their state of being prior to the acute or exacerbating insult. Unfortunately and far too often, many patients arrive at the ED late in the development of disequilibrium (Adler-Michaelson, 2003). Often, had care been sought earlier then homeostasis could be more readily restored and what should have been a rapid discharge home now becomes a patient admission. Many resources are employed to facilitate this restoration and among those is osteopathic manipulative treatment (OMT).

Nature of the Problem and Purpose of the Project

The majority of individuals practicing OMT do so in primary care settings, and hence the majority of medical students are exposed to the utility of osteopathic care in this setting. Currently, the data from questionnaires to medical students suggests that young osteopathic physicians and students have vary limited exposure during their training to the broad ranging applicability of OMT in multiple clinical settings (Meyer, 1993).

This project is designed to increase the frequency with which OEPs, residents, and rotating medical students perform focused osteopathic examinations and employ manipulative treatment. The project hypothesizes that a clinical curriculum will increase the frequency of OMT use by participating individuals. The hypothesis is supported by a thorough review of medical literature that demonstrates clinical evidence for the judicious use of OMT in the ED and its importance in (GME) programs.

The proposed curriculum involves didactic lectures, clinical teaching rounds, and case based learning directed towards the use of OMT. The two dimensions of this curriculum involve a component for OEPs and residents as well as an element geared towards medical students. A series of meetings (estimated to be five one to two hour sessions) is designed with each group. The sessions will include didactic lectures, small group case based discussions, and manipulation training lab sessions. This article details the contents and rationale for each of these sessions.

Review of the Literature

Manipulation by Primary Care and Specialty Physicians

To assess the perceived utility of manipulation in the ED within the profession, survey data was collected to investigate the frequency of OMT use by all osteopathic practitioners, primary care and specialists (Johnson, 2002; Spaeth, 2003). Johnson and Kurtz (2002) surveyed 3,000 randomly selected DOs (955 respondents) in primary care (defined as family practice), internal medicine, obstetrics and gynecology, osteopathic manipulative medicine, and specialty care services. The survey investigated the frequency of OMT use, percentage of patients treated with OMT in each practice setting, and the average number of conditions for which physicians in each field of practice employed OMT. Table 1 represents a summary of their findings. The data supports most common assumptions that the majority of OMT is provided by family physicians and OMT practitioners. Many specialists do in fact use OMT in their practice, but much less frequently.

Table 1.
Osteopathic Physicians
Use of Osteopathic Manipulative Medicine

Patients, % treated	OMT Specialists	Family Physicians	Non-primary Care Specialists	All Respondents
	No.(%)	No. (%)	No. (%)	No. (%)
< 5	0 (0)	113 (30.2)	290 (76.6)	**513 (53.7)**
5 to 25	1 (2.3)	188 (50)	62 (16.2)	288 (30.1)
51 to 75	7 (15.9)	18 (4.9)	6 (1.6)	34 (3.6)
75 to 100	**35 (79.5)**	11 (3)	8 (2.1)	57 (6)

(Johnson & Kurtz, 2002)

Specialty care physicians using OMT do so for fewer treatment indications than primary care providers, possibly because specialists assume care for a narrower range of disease processes. Of particular interest is the number of conditions that OEPs identified in the survey conducted by Johnston and Kurtz (2002) compared to other fields of medicine. Among all survey respondents, a total of 151 different conditions and body regions were identified by practitioners as indications for the use of manipulation. Table 2 provides a summary of the average number of conditions reported for several of the fields of practice surveyed, with an average of 3.3 conditions for all survey respondents. As expected, OMT specialists reported the highest average number of conditions with five. OEPs reported an average of 2.5 conditions and were below the overall average, but higher than or equal to many of osteopathic specialists surveyed.

This survey also demonstrated that there are a significant number of OEPs that are currently using manipulation. Among the 81 OEP respondents, 45 (55.6%) reported at least one condition for which they use manipulation and identified a total of 114 different conditions indicating OMT use. Table 3 provides a summary comparing the percentage of physicians in several fields of practice using OMT and the total number of conditions treated. (Those fields reported were selected because they are included in most medical student core rotations).

The majority (55.6%) of OEPs responding to the survey used OMT and did so, on average, for two to three different conditions. Inferences to this data are limited by the study, which did not specifically investigate whether these treatments were actually provided in the ED or in a different setting. However, the data reports that many OEPs maintain the skills and confidence to provide OMT for two or more different dysfunctions.

Further research has attempted to gather specific information regarding frequency of OMT use in each specialty. Spaeth and Pheley (2003) surveyed 2,318 (871 responded) osteopathic physicians registered with the Ohio Osteopathic Association. The number of patients treated with OMT in the week prior to the survey was assessed. Among OEPs (n=77) responding, 66% reported no OMT use, while 22% reported treating one to five patients, 5% treated six to 10 patients, 5% treated 11 to 20 patients, and 1% treated 21 to 30 patients. Respondents were also surveyed with respect to the frequency for eight different treatment regions\diagnoses. These were low back, dorsal spine, cervical spine, sciatica, thoracic outlet syndrome, carpal tunnel syndrome, chronic obstructive pulmonary disease, and asthma. Of the OEPs who reported using OMT, the most frequently treated diagnosis included cervical and dorsal spine (approximately 40%) and low back (approximately 30%). Greater than 60% of emergency physicians surveyed identified four indications including carpal tunnel, thoracic outlet syndrome, asthma and COPD, for which they rarely or never use OMT. These findings suggest that OEPs may favor midline or spinal dysfunctions in the use of OMT.

Manipulation Frequency by OEPs

Clinical practice by OEPs with respect to manipulation is seemingly inconsistent. Researchers have sought to expound on the factors contributing to the variability and have suggested that physician training and time in practice are contributing factors. In a national survey of OEPs (4,701 surveyed, 965 respondents), Ray et. al. 2004, reported that 55% of OEPs use OMT in clinical

Table 2.
Average Number of Conditions Treated with OMT By Specialty Per Respondent

Field of Practice	**Emergency Medicine**	Family Medicine	General Surgery	Occupational Medicine	OMT Specialists	Obstetrics & Gynecology	Orthopedic Surgery	Physical Medicine & Rehab	ALL
Avg. Number of Conditions Responded	**2.5**	3.2	2	3.8	5	2.4	2.4	3.6	3.3

(Johnson & Kurtz, 2002)

Table 3.
Osteopathic Physicians Identifying Conditions for Which They Use OMT

Specialty	Respondents No. (%)	Respondents Identifying Conditions No. (%)	Total Responses on treated conditions No.
Emergency Medicine	**81 (8.48)**	**45 (55.6)**	**114**
Family Medicine	375 (39.27)	45 (55.6)	1201
General Surgery	16 (1.68)	7 (43.8)	14
Internal Medicine	83 (8.69)	57 (68.7)	142
Osteopathic Manipulative Treatment	44 (4.61)	44 (100)	224
Obstetrics and Gynecology	41 (4.29)	28 (69)	66
Otolaryngology	12 (1.26)	5 (41.7)	9
Pediatrics	33 (3.46)	20 (60.6)	58
Total	955 (99.96%)	678 (71)	2206

practice, comparable to the findings of the other surveys showing 49% and 55.6% OMT use (Spaeth, 2003; Johnson, 2002). Of those who use OMT, 28.2% use OMT frequently, reported as the sum of "daily" (11.4%) and "weekly" (16.8%) OMT users. Table 4 is a compilation of the use of OMT by OEPs from multiple survey samples.

Influence of Residency Training on Frequency of OMT Use

The survey conducted by Ray et. al. (2004), further demonstrated that there are significant differences in the frequency of use of manipulation by OEPs based on their training, specifically between physicians trained in American Osteopathic Association (AOA) and American Council of Graduate Medical Education (ACGME) accredited programs. Notably, 27.5% of the 579 surveyed OEPs who trained in AOA or dually accredited programs use OMT daily or weekly, as compared to 19.4% of the 232 surveyed physicians who trained in ACGME accredited programs. Of the AOA trained physicians, 41.6% use no OMT compared to 56% of the ACGME trained physicians.

Training is only one variable considered in this study, and may not be the primary factor in the clinical decision of whether or not to employ OMT. For example, there may be variables that precede residency that influence clinical decision making, such as a lack of interest in osteopathic philosophy or manipulation that prompted him or her as a medical student to select an ACGME program for their residency training. Furthermore, physicians training in an ACGME program may practice in hospital settings that employ fewer osteopaths and, therefore, are less supportive of the use of manipulation.

Influence of Time in Practice and OMT

The aforementioned survey also found a positive correlation ($P < 0.05$) between frequency of manipulation use and the number of years practicing in the emergency department. It is not clear whether this represents generational differences in the value for OMT, competency, trends in education and emphasis, or that the individual physician changes during the course of their practice, perhaps increasing their OMT use with growing experience, curiosity, and comfort in the emergency department.

Obstacles to OMT use in the ED

In a survey of OEPs conducted by Ray et. al. (2004), physicians not using OMT in the ED were asked to identify from a list of available options the most significant barriers to OMT use. The top five reasons are listed here with the percentage of physicians reporting each as an obstacle:

1. insufficient time for OMT (50.8%),
2. physicians not comfortable with OMT skills (24.7%),
3. patients unfamiliar with OMT (26.5%),
4. lack of formal guidelines regarding OMT usage (20.8%),
5. liability concerns (10.3%).

The other obstacles reported were: OMT not beneficial to patients in emergency care (9.5%), not reimbursed (10.2%), fellow physicians or administrators discouraged OMT use (3.9%), and other (4.4%). Knowledge of these reported obstacles to OMT use are extremely valuable. Any program attempting to change clinical practice must directly address them, as these reasons are likely what separates the 45-52% of OEPs that use OMT from those who do not. The following five sections address the predominant concerns listed above.

Insufficient Time for OMT

Given the long wait for medical care and critical shortage of health care providers, many emergency physicians find themselves treating more patients per shift and per hour than ever before. The emergency physician is faced with the growing challenge of allocating medical services to the most critically ill patients first while managing the department staff. As such, the proposed program will attempt to address these time restraints by allocating

Table 4.
Summary of Surveys Obtained and OMT Usage Frequency by Residency Trained Emergency Physicians

Study by Author, Year. Location	Total Survey Respondents No.	Using Any OMT No. (%)	% Never Using OMT No. (%)	% Monthly, Rarely Using OMT No. (%)	Using OMT Frequently (Daily & Weekly) No. (%)
Ray, 2004. National	944	519 (55)	425 (45)	252 (26.7)	267 (28.2)
Spaeth, 2003. Ohio	99	33 (49)*	NR	NR	33 (49)*
Johnson, 2002. National	81	45 (55.6)	NR	NR	NR

*Survey only explored OMT use in the last 7 days. NR = not reported.

the task of performing OMT through three steps:

1. The supervising attending and resident physicians will identify patients determined to be appropriate for OMT and will create treatment plans with the medical students.
2. Medical students and residents will perform the majority of the OMT in the emergency department, with didactic and skill training sessions to assure competency.
3. An osteopathic manipulative medicine (OMM) rotation in the ED can allow for fourth year medical students to spend a month in the department assisting in the delivery of manipulation to patients, in essence serving as a consulting service to the department. This is similar to EM ultrasound rotations underway in many training programs.

Table 5.
Research, Clinical Articles, and Texts Reporting Efficacy of OMT in ED

Source:	Category of Publication	Indications	Proposed Treatment Modalities
Eisenhart, A. W., Gaeta, T. J., Yens, D. P. (2003). Osteopathic manipulative treatment in the EDfor patients with acute ankle injuries. Journal of the American Osteopathic Association. 103 (9), 417-421.	Peer-reviewed Clinical Research	Grade I & II Ankle Sprain	Soft tissue Myofascial Release Muscle Energey Counterstrain, ATF focus Lower Extremity Lymphatic Release Fibular Head, Foot Articulatory (Treatment guided by palpatory findings).
McReynolds, T. M., Sheridan, B. J. (2005). Intramuscular ketorolac versus osteopathic manipulative treatment in the management of acute neck pain in the emergency department: a randomized clinical trial. Journal of the American Osteopathic Association. 105 (2), 57-68.	Peer-reviewed Clinical Research	Non-traumatic Acute Neck Pain	HVLA Muscle Energy Soft Tissue (treatment time less than 5 minutes)
Ray, A. M., Cohen, J. E., Buser, B. R. (2004). OEP training and use of osteopathic manipulative treatment. Journal of the American Osteopathic Association. 104 (1), 15-21.	Clinician Survey	Not Surveyed	Most Common: Soft Tissue HVLA Muscle Energy Counterstrain
Paul, F. A., Buser, B. R. (1996). Osteopathic manipulative treatment applications for the EDpatient. Journal of the American Osteopathic Association. 96 (7), 403-409.	Clinical Journal, Review	Low Back Pain Torticollis Chest Pain Asthma Sinusitis	Screening checklist and treatment suggestions given for each indication
Adler-Michaelson, P., Brandon, B., Garcia, R. (2003). Osteopathic Medicine in the practice of emergency medicine. In Ward, R. C. (Ed) Foundations for Osteopathic Medicine, 2nd ed (pp. 383-398). Philadelphia, PA: Lippincott Williams & Wilkins.	Textbook, Review	Cephalgia Eye Pain Nosebleeds/U.R.I. Neck Pain Chest Pain Abdominal/Pelvic Pain	Screening checklist and treatment suggestions given for each indication

Physician and student education, based on clinical evidence, will challenge the common assumption that effective OMT is necessarily time consuming (Eisenhart et al. 2003).

Physicians Not Comfortable with OMT Skills

Addressing this obstacle is a central focus of this curriculum. Previous studies have demonstrated that clinical curriculum taught to medical residents and attendings is successful both in increasing the confidence level in their osteopathic skill and in significantly increasing the number of the inpatient osteopathic examinations and treatments performed (Danto, 1999 and Shubrook, 2000).

Shubrook and Dooley (2000) reported a significant change in the clinical practice of osteopathic medical students and family practice and internal medicine physicians and residents following a six month OMT curriculum. The training involved monthly bedside teaching rounds and hands-on lectures emphasizing the use of OMT on hospitalized patients. Participants were blinded to the data collection which involved a comparison of patients admitted two months prior to the curriculum implementation compared to those admitted two months after. The data showed a 37.9% increase ($p<0.0001$) in the number of total admissions with osteopathic exams performed (a baseline of 39.8% and post-curriculum measure of 77.7%), and the number of patients receiving OMT in the hospital increased from zero to five. This supports many of the advocates within the osteopathic profession that stress the importance of osteopathic practice exposure during the clinical training years, arguing that this setting is where the greatest strides can be made in integrating the skills acquired during the first two years of osteopathic medical training and in influencing future practice patterns within the profession (Magnus, 1997 and Kasovac, 2001).

Patients Unfamiliar with OMT

While clinical evidence suggests that patients with previous experience with physical manipulation (either osteopathic or chiropractic) can potentially respond more favorably to OMT in the emergency department, patient knowledge base is not essential to a favorable treatment response (McReynolds, 2005). For those indications for which OMT has been demonstrated to be beneficial, the process of patient education should resemble any other procedure performed in the department. Nursing and other personnel should be educated to assist in obtaining consent, the treating physician can provide a brief but thorough explanation of the risks and benefits, and the patient can accept or refuse care.

To become an osteopathic emergency department, special efforts should be made to make OMT a team process, much like every other aspect of the acute care. Physicians should not be inordinately consumed by the preparation for OMT any more than they would be if performing another non-critical procedure.

Lack of Formal Guidelines and Liability Concerns

Osteopathic literature emphasizes the utility of OMT based on diagnoses and treatment plans specific to each patient and their dysfunction(s), with limited emphasis on the clinical setting or specialty service to which patients are likely to present to. While researchers have begun to investigate the utility of OMT in specialty settings, formal guidelines are limited at this point with a few exceptions such as low back pain (Slezynski, 1993).

No formal guidelines exist specific to the ED, however there are numerous texts and clinical articles detailing the osteopathic approach to common complaints frequently seen in emergency medicine. Several recent studies have been conducted assessing the utility of OMT in the ED for conditions such as neck pain and ankle injuries (McReynolds, 2005; Eisenhart, 2003).

Osteopathic physician education emphasizing the utility of OMT in specialty fields and diverse clinical settings will hopefully contribute to a greater use of OMT in patient care and facilitate the production of future research that contributes to the creation of practice guidelines. The use of such guidelines as a protocol could serve to help allay liability concerns.

Documented Utility of OMT in the Emergency Department

Osteopathic physicians from primary and specialty care services who reported using manipulation, identified the most commonly diagnosed regions and\or conditions for which OMT is employed in a write-in portion of the survey (Johnson and Kurtz 2003). The top ten responses are listed below along with the frequency (percentage of all responses given) that each condition or region was reported:

1. low back pain (10.2%)
2. headache, cephalgia, migraine (8.57%)
3. undifferentiated musculoskeletal, somatic dysfunction (8.4%)
4. neck pain (3.6%)
5. cervical strain (2.9%)
6. sinusitis (2.49%)
7. undifferentiated strain (2.1%)
8. thoracic strain (2.1%)
9. cervical body region (1.8%)
10. lumbar strain (1.8%)

All of the diagnoses identified are potentially benefitted by the use of OMT and common patient complaints in the ED.

Summary of the Literature Review

While the majority of conditions presenting to the ED may not be amenable to OMT, it is important for OEPs to know which ones are. Those who have researched the utility of OMT in the ED have consistently reported specific symptoms, regions, and diagnoses for which they have found OMT to have the greatest utility. Table 5 provides a summary of this research.

Methods and Procedure

Course Mission

The mission of this course is to provide osteopathic physicians, residents, and medical students with didactic and clinical training to increase the frequency of OMT use in the ED As previously described, OMT has proven beneficial in specific, acute cases with benefits that include shorter hospitalization and reduced drug therapies, reduced pain, and increased joint range of motion (Radjieski 1998; Noll 2000). Additional benefit may include increased interest and opportunity within the osteopathic

community for multi-center clinical research in this field.

Course Participants and Dimensions

This is a two-dimensional curriculum tailored to different audiences, both aimed at building competency for osteopathic manipulation for acute disease processes. Both curriculums will use cased-based learning. The first dimension will involve an OMT focused review for attending physicians and residents, emphasizing osteopathic diagnosis and treatment. The second dimension will be more general, targeting third and fourth year medical students and will include a thorough discourse of medical care (differential diagnosis, imaging, pharmacology, and osteopathic diagnosis and treatment) for each case. The medical student curriculum will include five modules.

Medical Student Dimension:

The medical student dimension of the curriculum is more inclusive than the physician dimension. Table 6 provides a graphical outline of the five module course content. Each module represents a one to two hour learning session.

Module 1 provides an introduction to the course as a well as the objectives of the curriculum to the students. The content will review the frequency of OMT in the ED as well as a discourse of the material covered in the introduction of this paper. The format will be a didactic lecture with discussion questions throughout the presentation to facilitate active learning.

Modules 2, 3, and 4 will center on case based learning. The emphasis will be on exploring those conditions that presently have a research base for their acute treatment with manipulation. A case study will guide the discussion and will be facilitated by a subject content expert (SCE) that is either a resident with special training in osteopathic manipulation (such as a pre-doctoral OMM fellow or an attending with ongoing use of osteopathic manipulation in their post-graduate years). Throughout the case discussion,

Table 6.
OMT in the ED Curriculum Modules, Content & Format

Module Number & Title	Content	Format
Module 1: Introduction OMT in the ED	Rationale for OMT in the ED Obstacles to using OMT in the ED Factors influencing physician OMT use	Didactic Lecture Discussion
Module 2: Acute Ankle Injuries	Case Presentation Medical Review Radiography Research Article OMT Techniques	Small Group Case Discussion Didactic Lecture Manipulation Lab
Module 3: Low Back Pain	Case Presentation Medical Review Radiography Research Article: OMT Techniques	Small Group Case Discussion Didactic Lecture Manipulation Lab
Module 4: Headache\Neck Pain	Case Presentation Medical Review Radiography Research Article OMT Techniques	Small Group Case Discussion Didactic Lecture Manipulation Lab
Module 5: Student Directed Learning	Student Selected Case Medical Review Radiography Research Support OMT Techniques	Student Demonstrations\ Presentations

a medical review of the diagnosis will occur and will include: (1) a differential diagnosis, (2) medical work-up, including lab tests, imaging studies, pain management selection, and (3) radiographic imaging reading practice with films and step-wise approach to studies appropriate to the case. Then, a discussion of the osteopathic care of the case will occur. This will include a guided complaint specific osteopathic and orthopedic structural examination, discussion of common clinical findings or patterns (such as a posterior fibular head in acute ankle injury), a review of indications and contraindications to OMT, a didactic review of appropriate manipulation techniques, and a practice session for students to practice each technique.

Module 5 will require each student to give a case presentation of a patient with a condition not covered in the previous modules. The patient must have been seen, examined, and treated in the ED under attending and resident supervision. The case will include the clinical findings, including the osteopathic examination, review of indications and contraindications to manipulation as they pertain to the patient and the differential diagnosis, medical management given, and the manipulative techniques employed with their respective outcomes. Additional topics covered may include radiographic findings, review of the medical and osteopathic literature and related research, and potential avenues for future research or investigation pertaining to the osteopathic care.

Physician Dimension

The physician dimension will occur prior to the medical student curriculum and will include attendance from the residents. The first module will be the same as that given to medical students, however, modules two through four will not include the review of medical care or the case discussion. The emphasis will be on the pertinent anatomy, indications and contraindications to OMT, research, and clinical evidence supporting manipulative acute care. Ample time will be given to review and practice manipulation in a laboratory type setting. Many of these physicians may not have employed their manipulative skill for some time, so the time spent on techniques may be variable depending on the baseline skill level of those in attendance.

Several other physician specific objectives will be included in this dimension in an effort to change clinical practice. These include instruction on the following specific practice parameters:

1. Performing and documenting osteopathic structural examinations
2. Frequent and consistent requests for succinct structural findings from residents and medical students during initial physical exam case presentations in the department
3. Billing procedures and benefits for OMT
4. Obtaining consent for OMT and explanation of risks and benefits to the patient.

The goal for the residency program is maintaining consistency amongst physician expectations. Physician support for integrating OMT in the ED is essential to the success of the program, and the contents of the first module will be integral to gaining this support and addressing individual physician concerns and ideas.

Evaluation Methods

Pre-Post Curriculum Survey

A survey adapted from the one published by Ray, Cohen, and Buser (2004), will be administered within one month prior to the implementation of the curriculum. The objective is to obtain a baseline measure of the amount of OMT currently employed in the department, the indications being treated, and range of techniques employed. The same survey will be given at both two months and one year after the curriculum is completed to determine the changes in practice decisions by physicians, residents, and medical students as a result of the program. In addition, the survey will identify if the curriculum increased the use of OMT for the three specific diagnoses addressed during the course. Considerations will include changes to perceived OMT obstacles and changes in billing practices.

Chart Review

With additional resources, a chart review, similar to the one conducted by Shubrook and Dooley (2000), will also be conducted. Physicians participating in the curriculum will be blinded to the fact that an outside researcher (the principal investigator) will review the charts of the patients seen in the ED for the two months prior to and two months after curriculum completion. For the sake of time, the chart review will be limited to six to twelve pre-determined diagnoses, such as those specifically covered in the curriculum and described by previous survey data as the most likely indications for which OMT would be used in the ED.

Perceived Obstacles and Solutions

Lack of Interest or Value

If the osteopathic physicians do not perceive OMT as having a clinical or financial benefit to their patients or personal practice, then technical training will have a purely academic benefit. However, providing a review demonstrating that a significant number of OEPs are using OMT on a regular basis and discussing the evidence supporting the utility of OMT in acute care may potentially serve as a catalyst to increase OMT use.

Closing the Intellectual to Practical Gap & Facility Specific Inquiry

As the course unfolds, efforts will need to be made to integrate osteopathic skill improvement into actual clinical practice. The use of bedside osteopathic rounds is a means to close the intellectual to practical gap. Additional emphasis will be placed on encouraging OEPs to make osteopathic examinations a routine practice for conditions deemed appropriate.

To further close this gap, a specific inquiry should be made prior to the onset of the course to determine the billing procedures for OMT. The cost to benefit analysis that emergency physicians make for each patient must be addressed in a facility specific manner.

Results

Project Endpoint

The success of this program will be decided using self-reported surveys and chart reviews to see if this two-dimensional clinical curriculum will increase the frequency of OMT use in the ED

Some end points will not be measured in this project, such as changes is particiant confidence, skill level, and interest in the use of OMT in the ED.

Project Facilitators

Preliminary discussions have begun to implement the project at Arrowhead Regional Medical Center, Colton, California, under the supervision of Residency Program Director Thomas Minahan. Raymond Hruby, DO, Chairman of the Department of Osteopathic Manipulative Medicine, Western University of Health Sciences, College of Osteopathic Medicine of the Pacific (COMP), Pomona, California, has offered considerable support in the preparation of this project and continued support in the implementation of the project as well. Additional support, including availability as content experts for didactic lectures, includes the Pre-Doctoral Teaching Fellows and OMM clinical teaching faculty at COMP as well.

Discussion

Research Suggestions

Although studies have shown that OEPs with AOA training use manipulations more than physicians with ACGME training, no studies have investigated whether this applies to OMT use in the ED. There have also never been studies assessing the degree that the type of the department (i.e. academic, county, community setting, or national geographic location) influences the frequency of OMT employed. Knowledge of such factors may prove beneficial in designing future clinical research and educational programs pertaining to emergency osteopathy. Figure 8 includes a list of other potential research ideas for expanding the knowledge base of the applicability of OMT in the ED.

Osteopathic medical students face the decision of choosing residency training at osteopathic or allopathic residency programs. Osteopathic program directors are often questioned by these potential applicants about the use of OMT in their department. This curriculum may attract program applicants who wish to maintain an osteopathic distinction in their medical practice. Furthermore, by increasing the frequency of OMT use in the emergency department and the number of physicians performing OMT, there may be a larger group of physicians willing and able to advance the future research needed in this field.

Osteopathic Medical Student Rotations

Medical students represent one possible resource for assisting in the delivery of OMT in the ED This includes pre-doctoral teaching fellows and third and fourth year students who have completed a one-month OMM clinical rotation. The ED could create a one-month OMM rotation. In this scenario, the students would be assigned to residents skilled in OMT Students would work shifts alongside these physicians, performing OMT on designated patients. The structure would be similar to those facilities that have rotations in EM ultrasound. Many universities limit the number of fourth year rotations in a single field and many students are not allowed to rotate in the ED during their third year. Therefore, spending a month in the ED as an OMM rotation may have great appeal.

Resident Elective or Off-Service Resident or Attending

An additional resource to reduce the time spent by emergency physicians providing OMT to patients would be the option of an OMM emergency medicine elective for department residents and off-service residents and attendings. This would work as a consulting service, where the emergency physician identifies patients with conditions amenable to OMT and contacts a resident or identified physician to provide the appropriate care.

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Chief Complaint	**Figure 7.** **Potential Research Hypotheses Exploring the Utility of OMT in the EDfor Diagnostic & Therapeutic Purposes**
Chest Pain	Patients presenting to the ED with a positive cardiac work-up (positive cardiac enzymes, positive stress test, or EKG changes) will have a cardiac Chapman's reflex point and structural examination findings consistent with a cardiac viscero-somatic reflex more frequently than patient's with a negative cardiac work-up.
Acute Asthma Exacerbation	Patients presenting the ED with an acute asthma exacerbation that receive OMT in addition to conventional medical care will show a greater improvement in pulmonary function tests and serology (incentive spirometry, FEV1, and ABG) and will have better clinical outcomes than patients receiving conventional medical care alone.
Ankle Injury	Patients presenting to the ED with an acute ankle sprain, without fracture, receiving OMT will be less likely to re-sprain their ankle at 6 months and 12 months follow-up.

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AAO Calendar of Events

Mark your calendar for these Academy meetings and educational courses.

March 2010

March 14-16:Visceral Approach for the Sacrum and Pelvis, Colorado Springs, CO
March 15-16: Pelvic Pain: Mechanisms and Evidence-Based Diagnosis & Treatment, Colorado Springs, CO
March 16: Committee on Fellowship in the AAO meeting at 12 pm (MST), Colorado Springs, CO
March 17-21: AAO Convocation, Pelvis & Sacrum: Where It All Comes Together, Colorado Springs, CO
March 17: Board of Governors Meeting at 8:00 am (MST), Colorado Springs, CO
March 17: Board of Trustees Meeting, at 1:00pm (MST), Colorado Springs, CO
March 17: Investment Committee Meeting at 6:00 pm (MST), Colorado Springs, CO
March 18: PS&E Committee Meeting at 6:30 am (MST), Colorado Springs, CO
March 18: International Affairs Committee Meeting at 6:30 am (MST), Colorado Springs, CO
March 18: OPTI Liaison Committee Meeting at 6:30 am (MST), Colorado Springs, CO
March 18: Louisa Burns Osteopathic Research Committee Meeting at 6:30 am, Colorado Springs, CO
March 18: AAO Annual Business Meeting Luncheon, Colorado Springs, CO
March 19: Education Committee Meeting at 6:00 am (MST), Colorado Springs, CO
March 19: Osteopathic Medical Economics Committee Meeting at 6:30 am, Colorado Springs, CO
March 19: External Fundraising Committee Meeting at 6:30 am (MST), Colorado Springs, CO
March 19: Informational Technology Committee Meeting at 12:15 pm (MST), Colorado Springs, CO
March 19: OD&TE Committee Meeting at 12:15 pm (MST), Colorado Springs, CO
March 19: Undergraduate Academies Committee Meeting at 12:15 pm (MST), Colorado Springs, CO
March 20: Strategic Planning Meeting at 6:30 am (MST), Colorado Springs, CO
March 20: AOBNMM Board Meeting at 10:30 am (MST), Colorado Springs, CO
March 20: Membership Committee Meeting at 12:30 pm (MST), Colorado Springs, CO
March 20: Publications Committee Meeting at 12:30 pm (MST), Colorado Springs, CO
March 20: C/NMM-OMM Committee Meeting at 12:30 pm (MST), Colorado Springs, CO
March 20: Board of Trustees Meeting at 12:30 pm (MST), Colorado Springs, CO

April 2010

April 29 - May 2: The Pediatric Head: Developmental Changes, Clinical Implications, Diagnosis and Treatment at UNECOM

May 2010

May 21-23: Osteopathic Manipulative Medicine 2010 at Disney's Contemporary Resort, Orlando, FL

June 2010

June 9: PS&E Committee Meeting at 7:30 pm (EST) via teleconference

July 2010

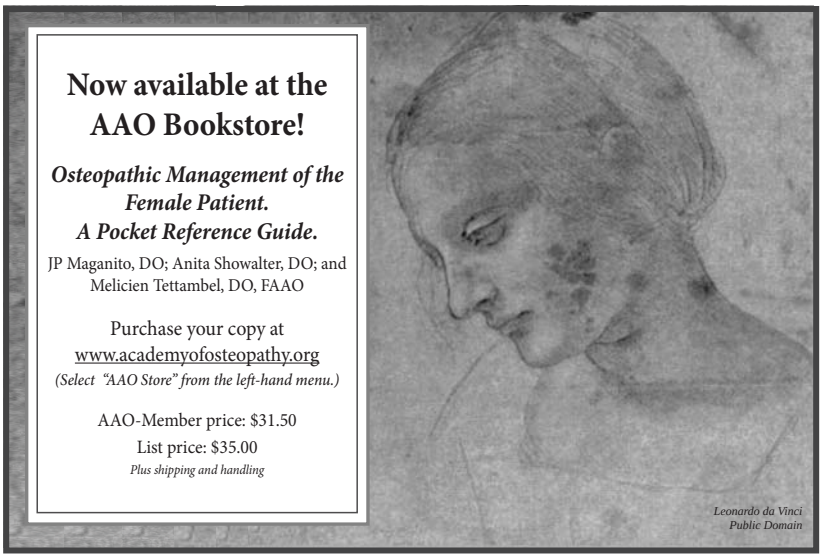
July 10-11: Board of Trustees Meeting, Indianapolis, IN
July 12-18: AOA Annual Meeting of the Board of Trustees & House of Delegates, Chicago, IL

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
October 24: AAO Board of Trustees Meeting in San Francisco, CA
October 24-28: AOA OMED in San Francisco, CA



Holistic Osteopathic Approach Reveals Unusual Etiology for Vertigo with Co-morbid Headache: A Case Report

Murray R. Berkowitz

Abstract

Vertigo is a common presenting problem that can seriously impact the quality of life of those patients afflicted. Osteopathic education and training adds cranial manipulation as a potential treatment component to traditional allopathic approaches to vertigo. There has not been much current medical literature available; however, there have been several recently presented case reports and a case series enhancing the medical literature regarding this topic. A 54-year-old male was seen in the clinic office with recurring episodes of dizziness and headache for over three months. Osteopathic manipulative treatment was applied to the cranial field to successfully treat his problems. Although decreased, his dizziness and headaches returned the second day following treatment. The case presented here is instructive to demonstrate how taking a holistic osteopathic result can enable us to provide fuller care and resolve some problems that have an unusual etiology.

Introduction

Vertigo is a common presenting problem that can seriously impact the quality of life of those patients afflicted. There has not been much current medical literature available; however, there have been several recently presented case reports and a case series enhancing the medical literature regarding this topic.[1, 2, 3]

Fraix recently reported a case study, review of the literature, and pilot study for research regarding osteopathic approaches to the treatment of vertigo.[1] He provided a brief review of the anatomy and pathology of vertigo, especially the possible etiologies of Benign Paroxyzmal Positional Vertigo (BPPV), Meniere's disease, Vestibular Neuritis, and Labrynthitis. Berkowitz reported a case series presenting the application of osteopathy in the cranial field to successfully treat vertigo. Both acute and chronic cases were presented. The epidemiology of vertigo was reviewed and co-morbidities present in cases of vertigo were discussed. The association of vertigo with a not previously reported cranial dysfunction was presented. The need for further large-scale, multi-center research studies was reiterated.[2] Shaw also provided a case study demonstrating the effectiveness of the osteopathic approach to treating vertigo.[3]

As reviewed in Berkowitz[2], vertigo was more frequently reported in female patients than in males and new onset was more frequently reported in the sixth decade of life. Reports of the epidemiology of vertigo add to the confusion of the incidence and prevalence of this problem. Neuhauser reported "one-year prevalence estimates for vertigo" for vertigo in the general population of 4.9%.[4] This statistic is unusual in that incidence is reported for a specific unit of time (that is, the proportion of new cases that occur within that unit of time for a given population); prevalence is the proportion of existing cases compared with the population in question. Neuhauser also estimated migrainous vertigo, Meniere's disease, and BPPV to be 0.89%, 0.51%, and 1.6%, respectively. He reported recurrence rates of 50% at five years and a persistence of dizziness of approximately 33% of patients one year after vestibular neuritis. Karatas reported approximately 20% to 30% of the general population to be affected by dizziness. He further reported that of these, approximately 25% were due to central etiologies.[5] Thus, approximately 5% to 7.5% of the general population suffers from dizziness associated with vertigo due to a central etiology. Hain presented a review of the multifactorial nature of vertigo.[6] He further discussed flaws in the studies reported and his conclusions that the prevalence estimates for vertigo in the medical literature are too high. This would support the findings of Berkowitz, whose review of cases of vertigo treated in his practice yielded a prevalence of less than one percent.[2]

History and Physical

The patient was a 54-year-old male who presented to the clinic office complaining of recurring episodes of dizziness and headache. The patient stated his symptoms began about three to four months ago with the headache episodes awakening him from sleep. He characterized the headache pain as sharp to dull in nature (five out of 10). He described the dizziness as feeling as though the room is spinning to the right and pointed to the area of his headache pain, which was originating at the left temporo-occipital area and radiating into left cervical spine and upper shoulder. The patient stated he awakens in the morning with headaches and admitted to snoring (confirmed by his wife). He stated his pain is partially alleviated with acetaminophen 1000mg every four to six hours. More recently, the patient had noticed blurred vision with exacerbation of the headache episodes. His past medical history was significant for measles, mumps, and rubella as a child. The patient's surgical history is significant only for an appendectomy at age 16. The patient has no food or medication allergies, but suffers from occasional seasonal allergy symptoms. No family history of cardiac, pulmonary, neurologic, or metabolic/endocrine disorders was reported. The patient is married and lives with his wife. He works as a Certified Public Accountant. The patient stated he never used tobacco products or illicit drugs. He consumes caffeine daily (coffee) and drinks alcohol only rarely on social occasions with dinner. The patient denied fever, chills, nausea, vomiting, diarrhea, or loss of consciousness. The review of systems was non-contributory except for the chief complaint and history of present illness.

Physical examination revealed the patient to be a pleasant, well-groomed, married white male, dressed in normal street attire, alert and oriented X 3, not in acute distress. Vital signs were BP = 110/70, P = 64, RR = 14, and afebrile. His height was 5'11" and weight was 155 pounds. His head was normocephalic, atraumatic, normal size, symmetrical. His pupils were equally round and reactive to light. His tympanic membranes were intact, pearly gray, and there was no cerumen bilaterally. Weber and Rinne tests were negative. There was movement of the tympanic membranes bilaterally. His nares were patent, and there was no congestion, discharge, or epistaxis. His throat was moist, pink with tongue and uvula midline without deviation, and there was no erythema, exudate, or tonsilar

hypertrophy. No neck masses, lymphadenopathy, or thyromegally were appreciated. The trachea was midline. Cardiac auscultation revealed a regular rate and rhythm, no murmurs, rubs, or gallops, normal S_1, S_2, with occasional non-pathologic S_3. He had 2+ radial pulses bilaterally. Capillary refill <2 sec, delayed filling ulnar arteries bilaterally. The lungs were clear to auscultation bilaterally and there were no wheezes, rhonchi, or rales. His abdomen was soft, non-tender, with normal bowel sounds; no hepatosplenomegally was appreciated. Neurological examination revealed cranial nerves II-XII to be grossly intact, with deep tendon reflexes 2+ all around. Muscle strength was 5/5 all around, except weakness (4/5) was observed in fifth to first digits opposition (thumb to pinky) bilaterally. Sensation was normal. The patient exhibited a tendency to walk toward the left but compensated with a right angular gait. Heel, toe, tandem walk were all normal, except for minor inflare on left with gait. He was Romberg negative and exhibited negative Phalen and Tinel tests. Adson's and Wright's Tests were negative. The Dix-Hallpike maneuver was negative.

The patient brought laboratory and imaging studies from previous evaluations. His labs were consistent with hypercholesterolemia (total cholesterol = 237, triglycerides = 154, LDL = 155), and eosinophils were 7.6 (normal 0-6.0), otherwise his CBC and chemistries were normal. His MRIs showed a small but significant left posterior disk protrusion extending beyond smaller spurs and causes deformity of the thecal sac and probably minor deformity of the left anterior margin of the spinal cord at C6-7. Mild disk degeneration was noted at C4-5 and C5-6. Mild hypertrophy of the left joint of Luschka at C3-4 with mild narrowing of that foramen was noted. Straightening of the Cervical spine lordosis was also noted. No spinal cord lesions were noted from C7 to T3. MRI of the brain revealed only mild, chronic facial sinusitis with mucosal thickening in the right maxillary antrum and to a lesser degree in the ethmoids. The other sinuses were clear, including mastoids. There was no mass effect or focal lesions. Cervical carotid MRA noted multiple small defects involving both common carotid arteries, and decresed signal strength involving the proximal portion of each internal carotid artery and minor deformities of the proximal portions of the external carotid arteries were noted. Hemodynamically significant disease was noted. Very high-grade stenosis was not indicated; however, significant narrowing and plaque ulceration was deemed quite possible. Correlation with Doppler sonography was recommended by radiology but not ordered by the patient's internist.

Osteopathic structural examination revealed contracted muscles bilaterally at C4-7 with right worse than left and T1-6 on the left. Tender points were found at OA on the left, left mastoid, C8 on the right, T6 on the left, and at the left intercostal space of ribs 5 and 6. Range of motion restrictions were observed as follows: left cervical motion restricted and right sidebending was restricted in the upper-thoracic region. T5-6 FR_LS_L, T7 FR_RS_R, T12-L1 FRLSL, C8 NR_LS_R, elevated right first rib, left posterior innominate, right anterior innominate, left inferior lateral angle, superior right medial malleolus, Positive standing flexion test on right (about ¾ inch). Sphenobasilar symphysis was rotated right. Lateral strain was palpated with the basisphenoid to the left and basiocciput to the right. The right temporal bone was internally rotated. Motion of the left occipitomastoid suture was restricted.

These findings supported diagnoses of cranial somatic dysfunction, cervical somatic dysfunction, thoracic somatic dysfunction, costal somatic dysfunction, lumbo-sacral somatic dysfunction, somatic dysfunction of hip/pelvis, herniated disc C6-7 (by MRI), and cervicalgia. The patient was referred for a night polysomnogram to rule out sleep apnea.

Treatment

Osteopathic Manipulative Treatment (OMT) to the cervical region (muscle energy and Still Techniques), upper thoracics (HVLA), upper ribs (muscle energy), clavicles (Still Techniques), scalene muscles (soft tissue and muscle energy), and shoulder and pectoral girdle muscles (muscle energy), sacrum (muscle energy), lumbar spine (soft tissue, counterstrain, and muscle energy), psoas (muscle energy), hamstrings (muscle energy), and piriformis (muscle energy) was performed. The patient was given exercise and stretching prescription for psoas muscles. OMT to the cranial field was performed to normalize the SBS, occiput, and temporal bones, and release the occiputomastoid suture. The patient was instructed that if he suffered a treatment reaction, he was to take Ibuprofen 800mg three times daily with food for four to five days. He was counseled to increase water consumption. I recommended that the patient have a night polysomnogram to rule out sleep apnea or other sleep disorder and also to have a Doppler sonogram performed to better correlate the MRA findings (noted above). The patient was given a follow-up appointment one week later.

Following treatment of the left temporal bone, the tenderness at the left mastoid resolved. Immediately following treatment, his headaches, neck and upper extremity pain resolved. There was significant improvement in the thumb to fifth digit strength to 5/5. The sacrum and pelvis were normalized and the standing flexion test was negative following treatment. His gait was normalized.

The patient reported at follow-up that he was free of symptoms, except for his headaches that returned on the second day following treatment, but these headaches were not as severe as those previously experienced prior to treatment. He also reported slight dizziness. He reported that his lab studies since the clinic visit showed a 20 point decrease in total cholesterol (217) and a decrease in his triglycerides to 84 (previously 154) – all achieved by diet. Upon further questioning, the patient described the details of his typical daily dietary intake, as follows:

Breakfast:	Metamucil in four-oz orange juice mixed together with four-oz water.
Mid-morning:	Whole wheat toast with 1 egg and black coffee (two hours after breakfast).
Lunch:	Small salad or soup. Occasionally ½ sandwich.
Dinner:	One cup of cottage cheese, mixed with 2 ½ teaspoons of flax seed, together with one cup orange juice, plus blueberries or a banana blended in a mixer and used as his evening meal.

This information led me to consider that his dietary intake was insufficient to meet his nutritional needs. His body was most likely in ketosis, which is consistent with his headaches, neurological symptoms in his upper extremities, and his anxiety/sleep disturbances. He stated that he had pain when he ate, but that this had resolved after treatment the previous week. A review of his diet with a registered dietitian/nutritionist confirmed that his

daily intake was between 600-800 calories per day. His caloric requirements to maintain his weight of 175 pounds is almost 2000 calories per day. The patient was given a diet to gradually increase his caloric intake beginning at 1200 calories per day for about a week to re-acclimate his body to increased intake. This was then increased to 1500 calories per day for a week and finally to 1800-2000 calories per day.

At one-month follow-up, the patient was free of pain, with complete resolution of his headaches and vertigo.

Discussion

Magoun[7] quotes Pritchard, Scott, and Girgis[8] who showed "that minimal motion does exist between the bones of the skull". He presented information from a clinical case regarding displacement and disturbance of the right temporal bone that was sufficient to affect the organ of equilibrium on the side causing dizziness. Magoun further stated that this displacement "need not be of sufficient magnitude to be demonstrable in the X-ray".[7] Immediately following treatment of the SBS, occiput, temporal bones, and occipitomastoid suture, the patient was able to move his gaze in all directions without production of any dizziness. Symptoms of dizziness returned very quickly, although the cranial vault was normalized. This literature is not consistent with the case being treated here.

In the cases of vertigo and tinnitus reported in Berkowitz' case series, there was internal rotation on one side only. In the case of vertigo and no co-morbid tinnitus, there is usually internal rotation on the affected side with external rotation of the contralateral temporal bone. This case was more acute than those reported cases of co-morbid vertigo and tinnitus.[2]

Berkowitz also found that more chronic and long-standing cases of vertigo were associated with the presence of co-morbid cervical and thoracic somatic dysfunctions. These cases demonstrated the presence of scalene and clavicle involvement, with the longest of these cases demonstrating the presence of Thoracic Outlet Syndrome. Given the absence of these dysfunctions in the previously reported acute cases of vertigo, the association was most likely the development of the scalene and clavicular involvement as a possible sequellae to the cranial dysfunction that led to vertigo; the need for more research was clearly stated. These cases also revealed the presence of restriction of the occipitomastoid sutures of the ipsilateral side. This was not previously reported in the literature.[2]

In the case of vertigo with co-morbid headache presented here, review of the osteopathic structural examination revealed the presence of tenderness at T6, including the paraspinal muscles, and at the intercostal space between ribs five and six on the left. This pairing of corresponding dorsal and ventral surface points has been associated with representing the same viscus. Review of Chapman's Reflexes demonstrates that these locations are associated with the stomach, especially the cardiac (gastroesophageal) opening. No hiatal hernia was noted in any of the imaging studies. The patient's post-parandial pain resolved following normalization of his thoracic and costal somatic dysfunctions.

Comment

Once these somatic dysfunctions were treated and his pain resolved, the patient was able to tolerate an appropriate caloric intake and his vertigo and co-morbid headaches had completely resolved. Osteopathic evaluation of patients presenting with vertigo or dizziness should involve examination of the cranial vault to determine appropriate etiologies. The use of the osteopathic structural examination identified an abnormality that could be easily treated with OMT, and which completely resolved the patient's presenting complaints. Had this been done earlier in the patient's evaluation and treatment, preferably as part of the initial work-up, the patient might not have needed all of the expensive and invasive studies that were performed. Given the vast array of tests undergone by this patient, the potential cost savings of the application of the holistic osteopathic approach are great. As illustrated by this case, the holistic osteopathic approach can reveal the presence of somatovisceral reflex as the unusual etiology for the somatic dysfunctions responsible for this patient's vertigo and co-morbid headaches.

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1. E
2. A
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1. Studies have shown that student confidence in their OMT skills can be improved by:
   A. Written exams
   B. Statistical analysis of OMT research studies
   C. Requiring that students do OMT research
   D. Providing them supervised and successful experiences in OMT

2. A survey by Dalprat, Thompson and Hruby showed that:
   A. Participation in clinical experiences can encourage motivation and confidence for clinical practice.
   B. Participation in clinical experiences DOES NOT encourage motivation and confidence for clinical practice.
   C. Interest in OMT by students cannot be improved
   D. OMT should not be done in clinical practice

3. According to the above survey more OMT was performed during the Family Practice and Internal Medicine rotations as compared to other rotations.
   A. True
   B. False

From the Archives

Chapter XLVIII, Facet Separation

From:McCole GM. *An Analysis of the Osteopathic Lesion*. Great Falls, Montana: Geo. M. McCole, Publisher, 1925, pp. 256-258.

Two conditions in spinal muscles must be considered when making adjustment of spinal joint lesions.

First, in all lesions there is the abnormal tension in certain muscle fibers; second, in the chronic lesion there is, in addition to the abnormal tension in muscle fibers, fibrous infiltration in muscles and ligaments as result of congestion and inflammation.

It is agreed that joint adjustment effectively removes the abnormal tension of too great tonic shortening. There is disagreement as to how much, if any repair can be brought about in muscle or ligament tissue that has undergone fibrotic change. It is possible that no actual removal of fibrous tissue occurs but that the improvement in the function of a muscle, ropy and stringy with fibrous infiltration, is not in the fibers that are damaged by fibrotic deposit. The improvement is probably all in the muscle fibers which are in high tonic shortening. On the other hand, it is possible that some fibrotic tissue is softened and dissolved following a vigorous stretching of the muscle which actively forces a supply of fresh lymph into the tissue.

If such resolution of fibrous deposit occurs, it must come about slowly and must be promoted by repeated joint adjustment given over a considerable period of time.

The rapid improvement in muscle which occurs in acute lesions and which is often observed in chronic lesions can only be due to the relaxation of abnormal tonus in otherwise normal muscle fibers.

Stretching of Deep Joint Structures

Adjustment of a spinal joint requires a sharp stretch or tug in the tensed and stiffened muscles and ligaments of the joint. This "tissue tug" immediately follows a separation of articular surfaces (a breaking of the seal) and is recognized by the coincident and incidental pop.

Adjustment with separation of facets and "tissue tug" may not be indicated in the acute traumatic lesion. A lesion with traumatized and acutely inflamed muscle and ligament may require, not specific joint movement, but less vigorous manipulation and even, at times, immobilization until the acute inflammation is relieved.

A muscle or ligament which shows stiffening may be compared to a piece of dry leather. To return dry leather to flexibility it must be stretched back and forth while applying oil until the fibers are soft and pliable. To return a stiffened spinal muscle or a ligament to flexibility it must be stretched vigorously while at the same time more lymph is forced into it.

The Pop in Diagnosis

The "incidental pop" is valuable in lesion diagnosis as well as in noting the progress of adjustment. A joint may be normal and so not need adjustment; but we do not know that it is normal until we have moved it to the limit of its motion, separated the articular facets, and heard the coincident pop. Thus we see that no joint is really adjusted until it has had the "tissue tug" winch is accompanied by the unavoidable "incidental pop." This statement is not fully accepted by some observers.

When Articular Surfaces Cannot Be Separated

If articular surfaces cannot be separated, they are being held in ankylosis or they are kept from making any excursion other than a mere springing of the tissue about them. Thickening, in what should be flexible tissue, is holding the articular surfaces from gliding far enough to allow the separation of those surfaces.

The Pop is Incidental

When the joint adjustment is made, the pop is heard because the articular surfaces separate. The pop comes whether we want it or not. It is simply a normal accompaniment of the breaking of the joint seal. The pop has nothing to do with the adjustment or treatment; it is simply incidental and accompanies correct work.

Method of Stretching

The lesioned joint must first be carried to the limit of its restricted motion. It is then held there an instant or until the patient is given time to relax the muscles of his entire body. At the moment the body of the patient is felt to relax, the firm stretch which is being applied to the spine causes a further slight excursion between the facets and between other bony parts within the joint; and they pass to the full limit of their restricted motion. It is at this instant that the physician finds his opportunity of making effective adjustment. It is at this instant that he applies a quick "thrust" or "stretch effort" or "jerk effort" or "pull" or "push." The name and method vary with the circumstances. IT IS AT THIS INSTANT THAT THE REAL ADJUSTMENT IS MADE.

Joint rigidity means loss of joint function. Loss of joint function means disturbed health. Flexibility means Circulation. Circulation means Function. *F. C. F.*

Steps in Joint Adjustment

The steps in making a vertebral adjustment are as follows: the spine, and especially the joint in lesion, is put on a stretch; the patient's body is caused to relax; bony parts in the joint then pass to the limits of their restricted motion; adjustment force is applied; facets separate and the joint seal is broken; the "incidental pop " is heard; ligaments and muscles receive a quick forcible stretch or "tissue tug;" facet surfaces return to apposition and are in more normal relation; soft tissues are more flexible and circulation is improved.

Results of Joint Adjustment

When a spinal joint lesion receives adjustment by the facet

separation method, abnormal tonic shortening in certain fibers of the muscles of the joint is relieved; fibrotic deposit in other muscle fibers may be softened; ligaments are stretched and pliability induced; lymph of lowered alkalinity is forced out of joint tissues and an increased supply of fresh lymph with normal alkalinity brought in; articular surfaces return to normal apposition and normal range of motion; posture stress is removed; pressure is removed from nerve endings; structures in the intervertebral canals are normalized; normal irritability is re-established in spinal cord centers and in ganglia in relation to the segment.

By general manipulation a lesioned joint may be returned to fairly good position; but its ligaments, capsule, and short muscle fibers are not flexible and well nourished until they have had that stretching, stimulating, and feeding that come with the tissue tug as the joint seal is broken and the articular surfaces separated.

SILENT AUCTION

Portable table used by Harold Magoun Sr., DO, FAAO • 14 x 18 picture of Dr. Still with quote "to find health should be the object of the doctor, anyone can find disease" • 20 x 24 classic picture of Dr. Still • 13 x 18 photo of Dr. Still originally obtained by Harold Magoun Sr., DO, FAAO • 22 x 28 framed picture of famous Osteopathic patients: Mark Twain, Teddy Roosevelt, Buffalo Bill, and Nelson Rockefeller • 22 x 28 framed picture of famous Osteopathic patients: George B. Shaw, William H. Taft, Helen Keller, and William R. Hearst • 22 x 26 picture of the dissection of the complete nervous system; the original in the museum in Kirksville • Plastic models of the foot & ankle, knee, sacrum, sacrum & lumbar spine, shoulder, hand, hip, joint, and cervical spine • Copy of the book *Structured Healing* by Harold I. Magoun Jr., DO, FAAO • Copy of the book *Never Give Up* by Ron Heagy • and much much more...

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