The AAO

Forum for Osteopathic Thought

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Tradition Shapes the Future

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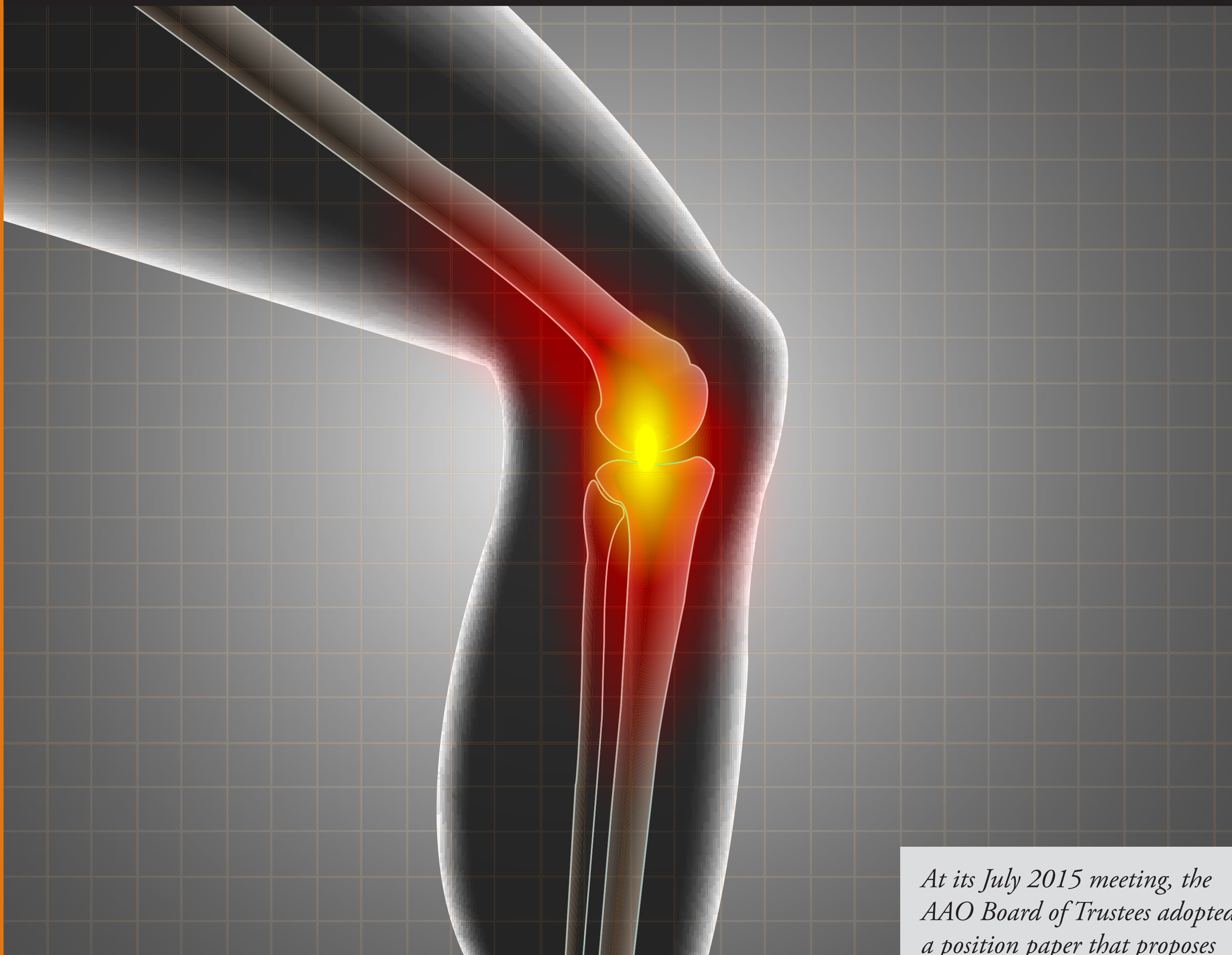

Osteoarthritis of the knee is one of the leading causes of disability in the United States. In the case study that starts on page 27, Karen T. Snider, DO, FAAO, describes how osteopathic manipulative medicine benefited a 69-year-old female patient who experienced pain and swelling in her knee after cleaning out her garage.

At its July 2015 meeting, the AAO Board of Trustees adopted a position paper that proposes eligibility requirements for those entering all residencies with osteopathic recognition accredited by the Accreditation Council for Graduate Medical Education. Read the AAO's position paper, which starts on page 6 of this issue.

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in teaching, promoting, and researching the science, art, and philosophy of osteopathic medicine, with the goal of integrating osteopathic principles and osteopathic manipulative treatment in patient care.

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- discounts on books in the AAO's online store.
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- complimentary subscription to the online *AAO Member News*, published 8 times annually.
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- practice promotion materials, such as the AAO-supported "American Health Front!" segment on OMM.
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- the fellow designation of FAAO, which recognizes DOs for promoting OMM through teaching, writing, and professional service and which is the only earned fellowship in the osteopathic medical profession.
- promotion of research on the efficacy of OMM.
- support for the future of the profession through the Student American Academy of Osteopathy, the National Undergraduate Fellows Association, and the Postgraduate American Academy of Osteopathy.

If you have any questions regarding membership or membership renewal, contact AAO Membership Liaison Susan Lightle at SLightle@academyofosteopathy.org or at (317) 879-1881, ext. 217.

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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.

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AAO Calendar of Events

Mark your calendar for these upcoming Academy meetings and educational courses.

2015

Oct. 3	Committee on Fellowship in the American Academy of Osteopathy's meeting and examinations—AAO office, Indianapolis
Oct. 15	AAO Board of Trustees' meeting, 9 a.m. to 5 p.m.—Hyatt Regency Orlando in Florida
Oct. 16	AAO Leadership Forum, 9 a.m. to 4 p.m.—Hyatt Regency Orlando in Florida
Oct. 17	AAO Education Committee's meeting, 9 to 10:30 a.m.—Hyatt Regency Orlando in Florida
Oct. 17	AAO Osteopathic Medical Economics Committee's meeting, noon to 1:30.m.—Orange County Convention Center in Florida
Oct. 17	AAO Publications Committee's meeting, 3 to 4:30 p.m.—Hyatt Regency Orlando in Florida
Oct. 17-19	AAO program at OMED: Osteopathic Considerations in Performing Arts Medicine—Sajid A. Surve, DO, program chair—Orange County Convention Center, Orlando, Florida

Do you plan to attend OMED? If so, be sure to register as an AAO member to automatically earn NMM- and FP-specific continuing medical education credits and to ensure that the Academy is appropriately credited for your attendance.

Dec. 4-6	Peripheral Nerves: Lower Body—Kenneth J. Lossing, DO, program chair—Midwestern University/Arizona College of Osteopathic Medicine in Glendale

2016

Jan. 14-17	An Introduction to Osteopathic Manipulative Medicine—Lisa Ann DeStefano, DO, program chair—University of North Texas Health Science Center Texas College of Osteopathic Medicine in Fort Worth
Feb. 12-14	Clinically Coordinated Counterstrain—William H. Devine, DO, program chair—Midwestern University/Arizona College of Osteopathic Medicine in Glendale
March 12-15	Pre-Convocation course: Basic Visceral Course—Kenneth J. Lossing, DO, program chair—Rosen Shingle Creek, Orlando, Florida
March 13-15	Pre-Convocation course: Brain 2—Brain Tissue, Nuclei, Fluid and Reticular Alarm System—Bruno J. Chikly, MD, DO (France), prgoram chair—Rosen Shingle Creek, Orlando, Florida
March 13-15	Pre-Convocation course: Fascial Distortion Model—Treatment of the Upper Extremities, Lower Extremities, and Head Region—Todd A. Capistrant, DO, MHA, program chair—Rosen Shingle Creek, Orlando, Florida
March 16-20	AAO Convocation—Somatic Dysfunction and Emotional Well-being: An Osteopathic Approach to Mental Health—Millicent King Channell, DO, FAAO, program chair—Rosen Shingle Creek, Orlando, Florida
March 20	Post-Convocation Residency Program Directors' Workshop—Michael P. Rowane, DO, FAAO, program chair—Rosen Shingle Creek, Orlando, Florida
July 29-31	Walking Toward Health: New Evaluations of Gait—Edward G. Stiles, DO, FAAO, and Charles A. Beck, DO, FAAO, program chairs—Pyramid Three, Indianapolis
Sept. 17-19	AAO program at OMED: Osteopathic Neuromusculoskeletal Medicine in the 21st Century—Daniel G. Williams, DO, program chair—Anaheim (California) Convention Center

View From the Pyramids: Thoughts on Perception

AAOJ Scientific Editor Brian E. Kaufman, DO, FACOI, FACP

For years, I have critically read the editorial messages in *The AAO Journal*, but I had never considered what "View from the Pyramids" meant. I had simply assumed that this was an allusion to looking upon Egypt's gateway to the desert and the great answers that lay beyond. Recently, I had the privilege of visiting the AAO headquarters in Indianapolis, Indiana. As I neared the great mothership, I viewed 3, 1970s' era, creative architectural phase buildings that are shaped as pyramids. The entire complex is called The Pyramids. The true answer to the sphinx riddle was provided at last.

The experience of having an everyday assumption challenged caused an avalanche of self-reflection. How many misconceptions—or worse, instances of selective ignorance—am I manifesting at each moment?

William Blake wrote, "If the doors of perception were cleansed, everything would appear to man as it is, infinite."[1] This line, from Blake's poem *The Marriage of Heaven and Hell*, inspired The Doors' band name (via Aldous Huxley's *The Doors of Perception*).[2] As osteopathic physicians, we perceive great quantities of knowledge about our patients so that we may better assist them in their health recovery. Because we are osteopathic physicians, our doors of perception are not limited to our eyes, but they also include our ears and, most important, our "thinking, seeing, feeling, knowing fingers."[3]

Each of us is bombarded daily with gigabytes of information, and our brains prioritize and filter all of it.[4] Our senses constantly collect experiences and interactions, and the data are processed and assimilated into a coherent scheme. Sophisticated algorithms that take into account genetics, background, interest, and emotional states at any given moment determine which information reaches our conscious thoughts.

As physicians, we are asked by patients to gather data, to assimilate and process that data coherently, and to then interpret the data in a way that can illuminate our patients' issues. This process leads to treatments and cures, and it is how we bake our daily bread.

> "Reject your sense of injury and the injury itself disappears."
> — Marcus Aurelius, *Meditations*[5]

The office of the American Academy of Osteopathy is located in the Pyramids in Indianapolis. (Photo courtesy of Cushman & Wakefield)

But what are we not seeing? What data are presented to us that are automatically filtered out of our perception? Are we blind to the elephant noisily juggling coconuts in the center of the room? We can see blind spots in our patients and others, but we struggle with our own inadequacy in this arena. This lack of perception is the essence of the conundrum that has confronted philosophers for centuries.

In this issue of the *AAOJ*, Jorge E. Estevez, PhD, MA, BSc (Ost), DO (United Kingdom), presents a thought piece titled "Embodied Clinical Decision-Making in Osteopathic Manipulative Medicine" that explores some of the issues with which we contend on a daily basis related to our perceptual bias. The article provides insight into the process of the osteopathic diagnosis.

We must make many important decisions each day as osteopathic physicians, community leaders, legislative watchdogs and patient—and humanity—advocates. This issue of the *AAOJ* includes a reprinted article from Stephen C. Shannon, DO, MPH, the president and chief executive officer of the American Association of Colleges of Osteopathic Medicine (AACOM). In his article, which was originally published in the March 2015 issue of AACOM's *Inside OME*, Dr Shannon encourages all osteopathic internships

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AAO Position Paper:

Recommended Knowledge Base for Entering ACGME Residencies With Osteopathic Recognition

American Academy of Osteopathy's Board of Trustees

Abstract

With the advent of the unified system for accreditation of graduate medical education (GME), health care in the United States is at a turning point that offers exciting possibilities to expand access to osteopathic care to more patients than ever before. With this opportunity for growth also comes the need to vigilantly preserve the qualities of osteopathic GME that honor our heritage and that are likely to secure our future. Regardless of whether those entering residency programs with osteopathic recognition are doctors of osteopathic medicine (DOs) or medical doctors (MDs), making sure that all of these residents begin their training with a baseline level of knowledge and skill in osteopathic medicine can only enhance the quality of these programs and the quality of the care provided by their graduates.

This position paper was adopted by the American Academy of Osteopathy's Board of Trustees during its July 11-12, 2015, meeting. This paper proposes eligibility requirements for those entering all residencies with osteopathic recognition accredited by the Accreditation Council for Graduate Medical Education.

As with other *AAOJ* articles, publication does not necessarily indicate that the *Journal* endorses the position paper.

The paper has been edited to adhere to the style guidelines of *The AAO Journal*.

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Background

Ensuring that MD graduates entering residencies with osteopathic recognition accredited by the Accreditation Council for Graduate Medical Education (ACGME) have a consistent knowledge base presents an interesting conundrum, given that the curricula at the osteopathic medical colleges accredited by the American Osteopathic Association's Commission on Osteopathic College Accreditation (COCA) vary widely in the number of hours of education devoted to osteopathic manipulative medicine (OMM).

According to data from the 2012-13 academic year compiled by the American Association of Colleges of Osteopathic Medicine (AACOM), osteopathic medical students receive an average of 82 total hours of lectures on OMM during their first two years of undergraduate medical education. Depending on the osteopathic medical college, the lecture hours range from 19 to 161, with the majority of schools falling between 42 to 116 hours. In addition, first- and second-year students receive an average of 140 hours of laboratory instruction and hands-on practice in OMM. The range is even broader for laboratory time than lecture time, ranging from 83 to 332 hours, with the majority of the colleges falling between 83 and 186 hours.[1]

In a white paper outlining its recommendations for the transition to the single GME-accreditation system, AACOM suggests that MD graduates will need a basic understanding of osteopathic philosophy and technique approaches to enter ACGME-accredited residencies with osteopathic recognition. To achieve this, AACOM is proposing that MD graduates could undergo separate training in OMM during the first year of their residency training, with the goal of reaching the knowledge and skill levels DOs have upon graduating from osteopathic medical colleges.[2]

In establishing program requirements for GME programs with osteopathic recognition, the ACGME's Osteopathic Principles Committee (OPC) outlined basic eligibility requirements for residents entering these programs.[3] Although the OPC's program requirements are all-encompassing, they are insufficiently specific to ensure that MD residents will have adequate knowledge and skill to participate in these programs in a meaningful way.

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Recognized as the "keeper of the flame of OMM" by many in the osteopathic medical profession, the American Academy of Osteopathy (AAO) determined that it should put forth its recommendations for the baseline knowledge in osteopathic medicine that DO and MD graduates should attain prior to entering ACGME-accredited residencies with osteopathic recognition, regardless of specialty.

Position

In determining its recommendations for requisite fundamentals of osteopathic knowledge, the AAO first reviewed the following documents:

- the curricula of several osteopathic medical colleges.
- the basic educational modules of the Educational Council on Osteopathic Principles, the AACOM council charged with creating guidelines for OMM instruction for all first- and second-year students at COCA-accredited colleges.[4]
- the National Board of Osteopathic Medical Examiners' testable somatic dysfunction and osteopathic technique lists.

Based on its assessment of those documents' strengths and weaknesses, the AAO proposes that all DOs and MDs entering ACGME-accredited residencies with osteopathic recognition receive both didactic and practical education in the following 22 areas:

1. osteopathic history
2. osteopathic philosophy and tenets
3. applied anatomy and physiology
4. surface anatomy focused on landmarks used for structural diagnosis
5. palpation of landmarks, as well as skin, fascia, muscle, and bone
6. anatomy of the musculoskeletal, neurologic, and visceral systems
7. principles of somatic dysfunction, including barrier concepts
8. biomechanics of spinal movement and extremities
9. dysfunction of axial, appendicular, and visceral structures
10. cranial anatomy and basic strain pattern dysfunctions
11. basic principles of manipulation, including indications, contraindications, and integration with standard medical care
12. five models of osteopathic manipulative treatment (OMT)
13. specifics of OMT techniques, including the physiologic mechanisms and palpatory diagnosis related to the following techniques:
    a. soft tissue
    b. myofascial release
    c. lymphatic
    d. muscle energy
    e. high-velocity, low-amplitude thrust
    f. articulatory
    g. strain-counterstrain
    h. indirect, including balanced ligamentous tension, functional, facilitated positional release, and Still
    i. osteopathic cranial manipulative medicine
    j. visceral
14. concepts of facilitation and viscerosomatic, somatovisceral, viscerovisceral and somatosomatic reflexes
15. Chapman reflexes
16. posture, gait, and motor function
17. exercise prescription
18. Use of OMM in all patient populations, especially the following:
    a. pediatric patients
    b. adults
    c. obstetrical patients
    d. geriatric patients
    e. postoperative and hospitalized patients
19. Use of OMM in treating patients for systemic illnesses of all body systems, especially the following:
    a. cardiovascular
    b. upper and lower respiratory
    c. gastrointestinal
    d. genitourinary
    e. neurologic
    f. musculoskeletal

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20. Use of OMT for treating patients for all common clinical problems and syndromes related to all anatomic regions, especially the following:
    a. cranium
    b. cervical spine
    c. thoracic spine
    d. lumbar spine
    e. sacrum
    f. innominates
    g. rib cage, sternum, and thoracic contents
    h. upper extremities
    i. lower extremities
    j. abdomen, as well as abdominal and pelvic contents

21. research on OMT

22. OMT coding and billing

The AAO recommends that COCA-accredited osteopathic medical colleges review their curricula to ensure that all of the topics above are covered so that DO graduates meet all of the prerequisites to enter ACGME-accredited residencies with osteopathic recognition.

The AAO believes that residents who did not attend COCA-accredited colleges could obtain this knowledge through multiple formats. Several of the topics, for example, could be learned through self-study of recorded lectures and learning modules, which would allow MD students and residents to fit this additional training into their busy schedules. However, palpation and training in OMT techniques clearly would require in-person education and practice time. The AAO advocates that the OPC specify a minimum number of hours of hands-on education for applicants to residency programs with osteopathic recognition.

The AAO further recommends that throughout the education process for baseline knowledge in OMM, periodic assessments be conducted to evaluate residents' competency. A summative assessment of baseline knowledge is recommended at the end of this training so that residency directors have a high level of confidence in accepting MDs who have completed the training.

This baseline training could be separated into the last year of medical school and the first year of residency. Because the first year of most current osteopathic GME programs is very similar to the transitional year in ACGME-accredited residencies, it would be possible for MD residents to use this year to catch up with DO

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residents in terms of OMM training. Regardless of whether MDs complete this baseline training before entering residencies or split the training between their last year of medical school and their first year of residency, the critical goal is that MDs and DOs enter the second year of their residencies with equivalent backgrounds on which to build their osteopathic specialty training.

Conclusion

The AAO believes that the unified GME-accreditation system provides the best opportunity to date for realizing the dream of Andrew Taylor Still, MD, DO, that all patients are treated osteopathically. The new GME system also has great potential for advancing the Academy's new vision statement: "All patients are aware of and have access to osteopathic medical care and osteopathic manipulative medicine for optimal health."[5]

Considerable care, however, must be taken in determining what constitutes the appropriate level of OMM education for MDs so that the essence of osteopathic care remains consistently excellent and true to the spirit of our founder's vision. The AAO supports rigorous, comprehensive, documented education in OMM for all MDs prior to beginning specialty training in ACGME-accredited residencies with osteopathic recognition.

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Implementing the Single Accreditation System for Graduate Medical Education: Seeking Osteopathic Recognition

Stephen C. Shannon, DO, MPH

Stephen C. Shannon, DO, MPH, is the president and chief executive officer of the American Association of Colleges of Osteopathic Medicine (AACOM). This article was originally published in the March 2015 issue of *Inside OME*, AACOM's monthly newsletter.

As with other *AAOJ* articles, publication does not necessarily indicate that the *Journal* endorses the viewpoints in this AACOM article.

Much has been written about the implementation of a Single Accreditation System (SAS) for Graduate Medical Education (GME) specialty training in prior columns and articles within *Inside OME* and elsewhere. Osteopathic GME (OGME) is currently accredited by the American Osteopathic Association (AOA) and other GME is accredited by the Accreditation Council on Graduate Medical Education (ACGME). Graduates of osteopathic medical schools currently pursue both pathways for specialty training, with about 60 percent receiving some or all training in ACGME-accredited programs. All that will change by 2020, when all accreditation will fall under ACGME. The AOA, AACOM, and ACGME agreed to this plan a little over a year ago; over the next few months implementation will begin.

One important element of the agreement was the establishment of a mechanism for ACGME-accredited specialty programs to seek Osteopathic Recognition (OR). Programs seeking this designation would be accredited normally by the ACGME Review Committee overseeing that specialty, but would also provide a curriculum that included and incorporated newly-adopted ACGME standards for OR. For example, ACGME-accredited programs in family medicine, internal medicine, pediatrics, or any other specialties could choose to seek OR. The standards for OR would be established and adherence reviewed by a new committee—the ACGME Osteopathic Principles Committee (OPC)—that has been up-and-running since last fall, preparing for implementation.

Medical education for DOs in both medical school and in AOA-accredited residency and fellowship programs is based upon foundational osteopathic principles and practices. These same principles guided the ACGME's OPC in the development of its standards for OR, and will enable the continuity of osteopathic medical education to take place within the SAS. In addition, under the SAS, these specialty programs will be available to MDs as well as DOs. This will enable a broadening of the training opportunities for all physicians—MDs and DOs—in residency and fellowship training.

One key question being raised in planning the implementation of the SAS is: "Should our program seek to become an ACGME osteopathically-recognized program in the Single Accreditation System?" This is an issue for both programs as well as the institutions in which they are housed. It is a concern of programs that are currently dually accredited by both AOA and ACGME (of which there are several hundred); those programs only accredited by AOA; and those programs only accredited by ACGME. While there are a lot of specific "in the weeds"–type of issues surrounding any decisions along these lines, I want to provide some of my thoughts on this issue.

First, I think DO graduates will prioritize ACGME specialty programs that have osteopathic recognition. There are around 24,500 osteopathic medical students in the nation's growing DO schools today, of which over 5,000 will graduate in 2015 and 7,000 or more are expected to graduate in 2020. These students chose to pursue an osteopathic medical education pathway to become a physician, and I believe most would like to continue to do so during their GME training. What evidence, you might ask, gives me the justification to say that? In a survey of all senior osteopathic medical students (with an 80 percent response rate) a little over a decade ago, 72 percent of graduating seniors responded yes to the statement, "Are dually-accredited (AOA/ACGME) residency programs in your field more appealing than are residency programs accredited by ACGME only?" I don't believe there is

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any evidence to suggest that this sentiment has changed. AACOM conducted a survey in late March of current third-year osteopathic medical students which confirmed that a majority (70.55 percent) would prefer an ACGME-accredited program with osteopathic recognition over one without osteopathic recognition; see full survey results.

I believe that the appropriate conclusion to draw is that if institutions want to be the most competitive for the best, brightest, and most appropriate DO graduates for their residency programs, then they should obtain osteopathic recognition of their ACGME program as they transition into the Single Accreditation System. While the standards for osteopathic recognition have been adopted by ACGME, and the logistics of this process involve several steps, I think that those ACGME programs already dually accredited by AOA should have a clear pathway to maintain that alignment. Likewise, those AOA programs that will be transitioning through ACGME accreditation should have few problems maintaining an osteopathic focus in their programs, since they are already doing so. **I encourage all programs and the institutions in which they operate to consider this important issue as they plan their transition in the Single Accreditation System.**

Of course there are a number of other reasons why it makes sense to pursue OR as well, and here are a few:

- In a time in which renewed focus is rightly placed on the need to have a health care system that is high quality, patient-centered, and focused on health as well as disease prevention and cost-effectiveness, the primary-care focused osteopathic approach is on target. As Robert Cain, DO, Chair, ACGME Osteopathic Principles Committee, articulated during the 25th Annual Osteopathic Medical Education Leadership Conference in Los Angeles, "Patient care delivered within the context of the four tenets of osteopathic medicine, is aligned to patient-centered, high-value care and the needs of our nation's health care system." Maintaining OGME within the SAS is a means to that end.
- Distinctive branding–programs that are AOA-accredited have already invested resources in the osteopathic approach and can capitalize on that investment by maintaining that focus. Being an osteopathically-recognized ACGME program under the single accreditation system will help programs solidify their brand and will provide a tangible credential that will have significant meaning and function as an organizational asset.
- While standards and definitions have long existed governing the principles and practice of osteopathic medicine, the changing framework with the SAS offers a great opportunity. As we move through the transition period and begin to integrate and operationalize osteopathic principles and practices into the ACGME system of accreditation, we can use this as an opportunity to further evaluate, research, define, and codify the unique contributions of the osteopathic medical approach to serving the health care needs of our country.

In a recent column AOA President Robert S. Juhasz, DO, provided a number of thoughts on this very topic. I thought the following particularly noteworthy:

> Market forces in this country are aligning in ways that are driving the value of osteopathic medicine. The significant shortage of primary care physicians; patients seeking our high-touch, high-empathy brand of care; our distinctive training and practice of medicine, which aligns neatly with the national demand to deliver high-quality care in a cost-effective way—all of these factors underscore the need for more DO training.

Clearly, we are living through interesting times. Our profession and its education model are undergoing change. We are provided with the opportunity to engage on a larger stage to deliver the best we have to offer for the health of our country's residents. ■

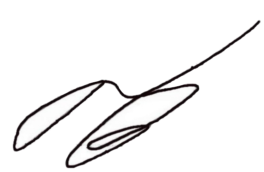
View From the Pyramids *(continued from page 5)*

and residencies to obtain osteopathic recognition from the ACGME. As guardians of the osteopathic medical profession, we need to be vigilant to ensure osteopathic medicine has the future we desire, and as leaders and advocates, we need to be alert to "changing weather."

This issue of the *AAOJ* also includes a position paper from the AAO Board of Trustees that outlines the framework and criteria that address the challenge of integrating MD graduates into osteopathic-recognized residency programs.

In addition, we have two excellent clinical articles that explore evaluation and management of patients with knee pain and Larson syndrome. These two articles expand our repertoire of osteopathic manipulative treatment techniques and open our eyes to new ways of approaching patients with these complaints.

In conclusion, we at the *AAOJ* hope that you find this issue illuminating so that yet another veil can be lifted to allow for clearer vision in your daily life and practice.



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AAO Program at OMED 2015

American Academy of Osteopathy®

Osteopathic Contributions to Performing Arts Medicine

Oct. 17-19, 2015

Orange County Convention Center • Orlando, Florida

20.25 credits of NMM- and FP-specific AOA Category 1-A CME anticipated

Performing arts medicine is a fledgling field, encompassing the study and care of performers within the disciplines of music, dance and drama. Osteopathic physicians are uniquely suited to care for these patients. This program will explore the performing arts, featuring lectures and workshops by experts in performing arts medicine.

By the end of the 2015 Osteopathic Medical Conference and Exposition, those who attend the American Academy of Osteopathy's didactic program will be able to recognize the unique medical needs of performing artists, understand the basic principles of providing care to performing artists, and appreciate osteopathic medicine's contributions to performing arts medicine.

With its theme of "Osteopathic Contributions to Performing Arts Medicine," the AAO's program will address hot topics and explain how DOs can use osteopathic manipulative medicine to care for highly talented patients with dysfunctions that arise from singing, dancing and playing musical instruments.

Speakers will include **David William Shoup, DO**, who has played the violin since age 7; former bandleader Kris Chesky, PhD, who currently directs the Texas Center of Music & Medicine; Stephen Austin, PhD, an internationally renowned expert in vocal studies; Richard T. Jermyn, DO, the director of the Rowan University School of Osteopathic Medicine's NeuroMusculoskeletal Institute; and Rebecca Fishman, DO, a former professional dancer and singer.

At OMED 2015, David William Shoup, DO, will demonstrate how playing the violin can contribute to osteopathic dysfunctions.

The AAO's program will run Saturday through Monday to minimize the number of weekdays Academy members are out of their offices. Register as an AAO member to automatically earn NMM- and FP-specific continuing medical education credits and to ensure that the Academy is appropriately credited for your attendance.

Sajid A. Surve, DO
Program chair

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Embodied Clinical Decision-making in Osteopathic Manipulative Medicine

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Introduction

According to authors in the field, osteopathic manipulative medicine (OMM) is practiced according to an articulated and unique philosophy that distinguishes it from other health care professions.[1] Osteopathic clinicians seek to understand the causes of impaired health, with the aim of providing individually tailored care. Within this practice paradigm, it is claimed that the diagnosis of somatic dysfunction is central to clinical decision-making because somatic dysfunction normally indicates impaired or otherwise altered function of the body framework.[1] In contrast, I would argue that the decision-making processes and thinking dispositions of clinicians in the field of OMM are likely to be universal and, therefore, similar to those used in other medical domains and in everyday life.

Although osteopathic models of diagnosis and care imply an element of causality and systematic analytical reasoning, the reality is that our decision-making is largely dominated by intuition. In fact, we make thousands of decisions daily without realizing we make them. We spend approximately 95% of our time in the "intuitive" mode.[2]

Intimately associated with intuition is the diagnosis of somatic dysfunction. Clinicians diagnose somatic dysfunction based on information obtained during subjective and objective examinations of their patients. This information is largely gathered through the clinicians' senses—ie, through the visual, haptic (tactile and proprioceptive), auditory, vestibular, and interoceptive systems. Consequently, the diagnosis is heavily influenced by perceived patterns of tissue dysfunction, which engage clinicians' intuition rather than their analytical skills.

In certain situations, we can comfortably trust our intuition (eg, left-sided arm and chest pain indicates myocardial infarction). However, there are instances in which it would be inappropriate to use anything other than analytical reasoning.[3] When the "wrong" decision-making system is used or when judgments are made without sound evaluation, systematic errors known as *cognitive* and *affective biases* are likely to occur.[4] These biases are likely to

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In 2011, Dr Esteves completed his PhD at Oxford Brookes University. His research focused on examining diagnostic palpation in osteopathy and developing neurocognitive models of expertise. Dr Esteves is interested in investigating how expert osteopaths process and bind together diagnostic data across senses. In particular, he is interested in examining the way in which diagnostic data conveyed by different senses converge in the brain to form a perception of soft tissue dysfunction.

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be highly prevalent in a profession underpinned by a distinctive philosophy of clinical practice that relies heavily on diagnostic palpation.

Clinical decision-making—the thinking and reasoning process that informs and underpins autonomous clinical practice—involves the interrogation and application of declarative knowledge, procedural knowledge, reflection, and evaluation.[5] Considering the current literature on embodied cognition, I would argue that clinical decision-making in OMM is not limited to cognitive processing but rather that it is an embodied experience.

Embodied cognition is a theory in cognitive science that emphasizes the role of embodiment (ie, a wide range of bodily processes including sensorimotor and affective processes in cognition).[6] According to this theory, cognition emerges from dynamical interactions among the brain, the body, and the environment. Importantly, cognition is dependent on the perception of the "self," and cognition should be regarded as a developmental process. Initially, sensations give rise to the sense of body ownership, and then actions (internal actions such as interoception or external actions), agency, and language enable individuals to develop a mental representation of their bodies and a coherent sense of the "self."[7]

I would argue that clinical decision-making is influenced by each clinician's perception of the "self" and that clinical decision-making is dependent on sensorimotor integration, analytical and nonanalytical reasoning, and emotional responses. In addition, clinical decision-making depends on interactions with the patient and with the external environment. In considering this framework, clinicians and students are encouraged to identify how cognitive biases and embodied cognition inform decision-making.

Cognitive and Affective Biases and Decision-making

Clinical decisions about a patient's diagnosis and management in osteopathy are likely to be either intuitive or analytical. During the past 3 decades, researchers have significantly advanced our knowledge regarding decision-making processes. Recently, the *dual process theory* has gained wide acceptance as a model of human reasoning and decision-making.[8] This theory divides decision-making into 2 broad and distinct types of processes: intuitive and analytical. Intuitive decision-making, also known as nonanalytical, is characterized as fast, automatic, abstract, and largely unconscious, while analytical decision-making is characterized as slow, deliberate, rule-based, and conscious.

Intuitive processes are largely based on pattern recognition, which enables individuals to associate already-known patterns with particular decisions and actions. Reasoning does not occur in the intuitive mode. Instead, cognitive systems simply respond to the perceived pattern.[3] Intuitive judgments are highly effective and essential in everyday clinical practice. But they are more likely to fail, and they are more likely to be associated with cognitive and affective biases and diagnostic errors. Therefore removing, or at least mitigating, biases is critical to providing safe and optimal patient care.

To date, more than 100 cognitive biases (eg, confirmation bias, halo effect, and anchoring effect) and 12 affective biases (eg, visceral bias and countertransference of both negative and positive feelings toward patients) have been identified.

Biases associated with intuitive judgment are largely attributed to innate, hard-wired biases that developed in our evolutionary past, as well as those acquired during our professional development and in our work environments.[4] Moreover, factors such as context, fatigue, affective state, cognitive overload, gender, and rationality are likely to predispose clinicians to biases.[4]

Whereas intuitive judgment has low computational load, analytical decision-making requires a significant amount of attention. Analytical decision-making tends to be slow, and it can interfere with simultaneous thoughts and actions.[9] As a consequence, the cognitive system tends to default to the state requiring minimal cognitive effort (ie, intuitive decision-making).

Individuals' predispositions to resort to heuristics or shortcuts in their decision-making is largely hard-wired. However, expertise in clinical practice is likely to magnify this phenomenon. Experts are particularly prone to confirmation bias because they tend to trust prior decisions and evidence while ignoring new and relevant evidence. In contrast, novices might make the right decision because the problem is unknown to them and, consequently, their judgment is reached using analytical processes primarily.

Cognitive and affective debiasing strategies enable clinicians to identify the sources of their biases and, ultimately, reduce diagnostic error. Debiasing strategies include developing insight and self-awareness; acquiring metacognitive competencies, such as a critical reflective approach to problem-solving; and adopting cognitive forcing strategies, such as diagnostic checklists.[10] Using cognitive and affective debiasing strategies enables clinicians to recognize the sources of bias and ways to manage them. Most important, these strategies will enable clinicians to override

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inadequate intuitive judgments and improve the quality of the care they provide.

Embodiment and Decision-making

Palpation lies at the heart of osteopathic diagnosis, care, and professional identity. Although I agree that cognitive systems play a central role in decision-making, I would argue that embodied cognition is central to osteopathic clinical decision-making.

In osteopathic diagnosis and care, a definite distinction between perceiver and perceived is absent. During palpation, the haptic sense interacts with other senses to enable clinicians to discern patients' clinical problems. Importantly, in perception, haptics differ from vision and other senses because we are unable to perceive the world tactilely without perceiving ourselves in the process.[11] Haptic perception combines multisensory and motor elements, and it is inescapably intertwined with a sense of body position and movement.[11] Therefore, it can be argued that decision-making is influenced by each clinician's embodied "self" (including elements of body schema, body awareness, and body image) through bodily interactions with a patient and the environment.

In support of this viewpoint, Øberg et al[6] recently argued that in physical therapy, the bodies of both the clinician and patient should be regarded as bodily agents, which together play an active role in the clinical decision-making process. Consequently, clinical decision-making should be regarded partly as an intersubjective bodily practice, not simply as a dialectic of instrumental and narrative practice.

The *Figure* (below) represents the proposed embodied model of clinical decision-making in OMM in which a clinician's body, internal environment, and neurocognitive systems interact dynamically with the world and a patient's agency to allow the clinician to reach a diagnosis.

In OMM, a clinician's hands are crucial instruments of the mind. As the clinician's hands explore a patient's body, they detect areas

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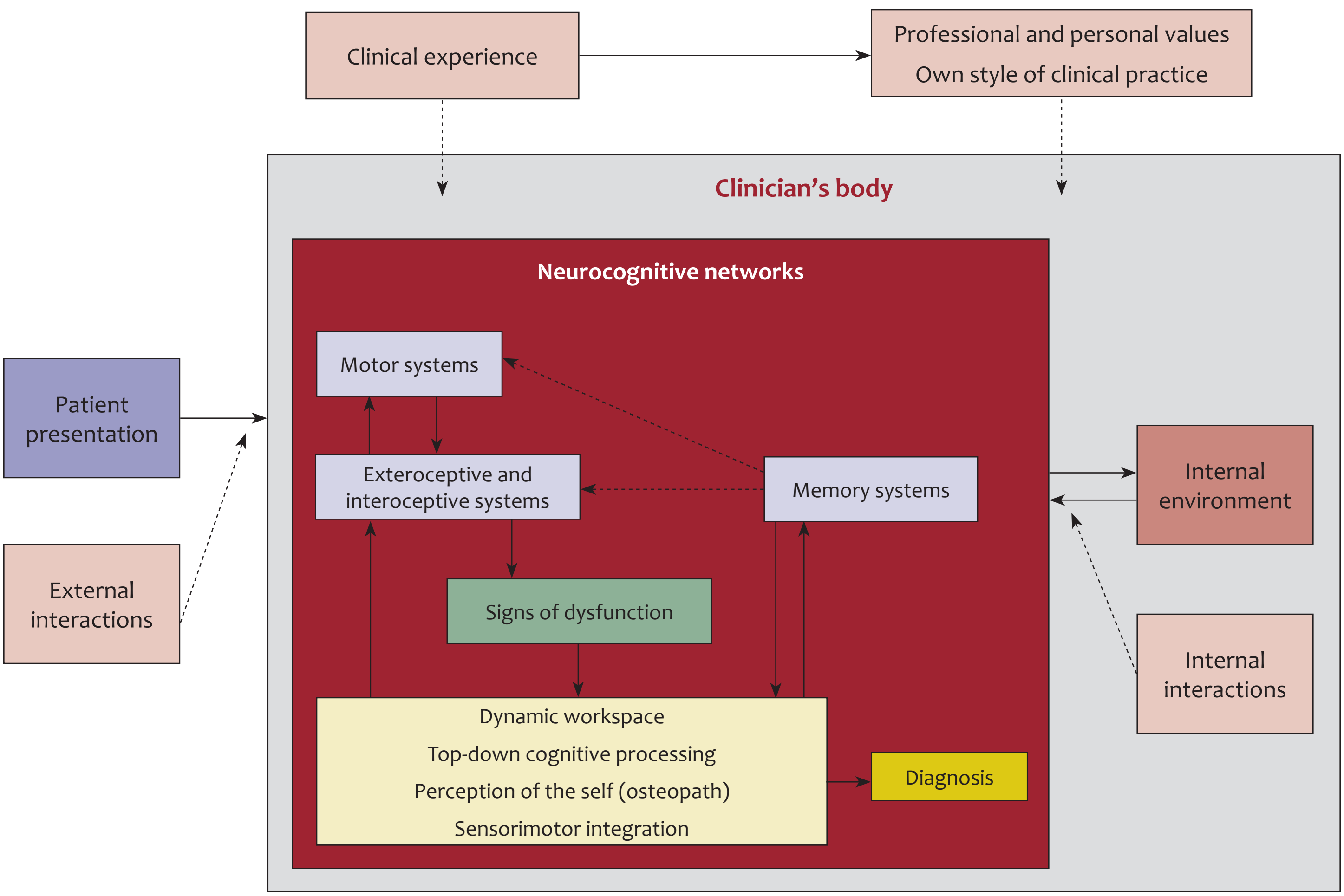
Figure. *A clinician's personal experiences, internal environment, and neurocognitive network combine with input from a patient to lead the clinician to a diagnosis.*



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of dysfunction, and the clinician uses mental imagery to identify problems based on the patterns of dysfunction that are stored in the clinician's mind.

Importantly, mental images used to perceive objects result from changes that occur in the body and brain during physical interaction with the objects.[12] It has been proposed that cognitive systems are embodied and that the internal body plays an important role in perception.[13] Based on that proposal, cognition emerges from dynamical interactions among the brain, body, and the world, and cognition is largely action oriented. With this in mind, it is likely that an osteopath's cognitive systems partner with his or her hands to form a functional unit that engages with the agent's environment.

Although some decisions are likely to involve analytical processes, the vast majority are likely to be intuitive. Interestingly, Radman[14] proposes that the hands possess an embodied faculty to explore the environment without engaging a conscious thinker.

Conclusion

Clinical decision-making in OMM is an embodied experience. In particular, the perception of tissue dysfunction is not only generated in the brain, but it also emerges from clinicians' interactions with patients and the environment. This embodied model enables clinicians to understand each patient as a living body actively engaged in the environment rather than as a biological organism that needs to be fixed either by clinicians or in collaboration with the patient.[6]

Despite what some osteopathic clinicians believe, the majority of their clinical decisions are likely to be based on intuition that arises from pattern recognition. Although intuitive judgments are highly effective and essential in everyday clinical practice, clinical decision-making is prone to cognitive and affective biases.

If it is human nature to default to intuitive thinking in which systematic errors are likely to be made, we need to recognize that and mitigate its influence. We have a deliberate "self" that can reflect on who we are and on the existence and dominance of intuitive decision-making processes.[15] As a consequence, clinicians should use cognitive and affective debiasing strategies that enable them to mitigate errors and to make more sound decisions.

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Peripheral Nerves: Lower Body

Dec. 4-6, 2015 • Midwestern University/Arizona College of Osteopathic Medicine

Course Description

Using principles developed by Jean-Pierre Barral, DO (France), participants in this course will examine the peripheral nerves of the lower body. Kenneth J. Lossing, DO, will demonstrate visceral manipulation techniques to identify and treat dysfunctions in the general anatomy, including those affecting vascular supply, innervation, axonal transport and mechanical aspects, as well as dysfunctions resulting from lesions and trauma.

Participants will learn palpation methods for finding a nerve and for determining dysfunction by identifying lack of pliability, hardness, and nerve "buds." In addition, participants will learn treatment approaches, effects of treatment, indications and contraindications.

Dr. Lossing will discuss diagnostic and treatment techniques for the lumbar plexus, the sacral plexus, the genitofemoral nerve, the lateral femoral cutaneous nerve, the obturator nerve, the femoral nerve, the saphenous nerve, the superior gluteal nerve, the sciatic nerve, the tibial nerve, the medial sural cutaneous nerve, the lateral dorsal cutaneous nerve, the medial and lateral plantar nerves, the fibular nerve and the intercostal nerves.

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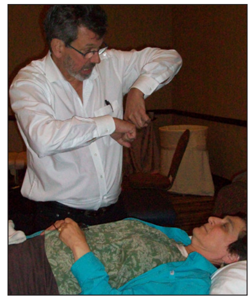

Program Chair

Kenneth J. Lossing, DO, studied visceral manipulation with Jean-Pierre Barral, DO (France). An internationally recognized lecturer, Dr. Lossing contributed to the second and third editions of the American Osteopathic Association's *Foundations of Osteopathic Medicine* textbook.

As the Academy's 2014-15 president, Dr. Lossing starred in a two-minute segment of "American Health Front!" that focused on osteopathic manipulative medicine. The segment debuted on New York City's WCBS-TV on Sunday, May 18, 2014, and AAO members have been using it since July 2014 to educate existing and prospective patients.

A 1994 graduate of what is now the A.T. Still University–Kirksville College of Osteopathic Medicine, Dr. Lossing served an internship and a combined residency in neuromusculoskeletal medicine and family medicine through the Ohio University Heritage College of Osteopathic Medicine in Athens. He is board certified in both neuromusculoskeletal medicine and family medicine.

Dr. Lossing and his wife, Margret Klein, OA, run a private practice in San Rafael, California.

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Peripheral Nerves: Lower Body

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Larson Syndrome of Dysautonomia in Parkinson Disease Managed With Osteopathic Manipulative Treatment: A Case Report

Muhammad Durrani, DO, MS; Jayme D. Mancini, DO, PhD, FAWM; and Theodore B. Flaum, DO, FACOFP

Abstract

A 77-year-old Caucasian male patient with Parkinson disease was diagnosed with Larson syndrome. Somatic dysfunctions and associated autonomic nerve dysfunctions were noted primarily in the patient's right upper thorax. Osteopathic manipulative treatment (OMT) was performed using cranial, facilitated positional release, balanced ligamentous tension, myofascial release, doming of the diaphragm, and rib-raising techniques to normalize autonomic nervous system balance. Three sessions of OMT resolved the patient's symptoms of right upper back pain, right frontal headaches, diaphoresis, regional hyperhidrosis, weakness to the right upper and bilateral lower extremities, and difficulty sleeping.

From the New York Institute of Technology College of Osteopathic Medicine in Old Westbury

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Background

Larson syndrome, a functional vasomotor hemiparesthesia, is an acute sensory and sympathetic nerve disorder primarily localized to the upper thorax. As with the prevalence of most regional sensory and autonomic nerve disorders, the prevalence of Larson syndrome is unclear in the United States.[1] The clinical presentation of the syndrome was first described by Norman J. Larson, DO, FAAO, in 1970. The syndrome's symptoms and its neurological exam findings include the following:

- numbness; tingling; inaccurate sensation of local cold; decreased discrimination of light touch, pinprick, and 2-point stimulation; and diminished proprioception.
- dysesthesias, including crawling sensation, tightness, stiffness, and allodynia.
- constant or intermittent burning or aching.
- sharp or dull pain that may radiate.
- corresponding changes in patients' somatic tissues.[1]

These clinical findings are caused by paravertebral somatic dysfunctions of the ipsilateral body region.[1] Furthermore, somatic dysfunctions in the upper thoracic segmental levels, most commonly thoracic levels 2-4, are characteristic in Larson syndrome, but no particular pattern of somatic dysfunctions has been characterized as pathognomonic.[1]

Clinical studies and other research suggest that because the sympathetic nervous system houses a large concentration of interactive neurons at the upper thoracic levels, any abnormality or dysfunction at these levels can contribute to an abnormal functional state of the sympathetic nervous system via somatovisceral reflexes, which will produce effects on the peripheral tissues and structure of the body.[1-3] The amplified stimulation of the sympathetic system leads to overstimulation of the efferent pathway, causing muscle tension, somatic dysfunctions, and a distorted sympathetic effect on the vasculature and nerves. Patients experience remarkable stiffness with active and passive joint range of motion in the affected region. Muscles may initially increase in girth due to swelling and then slowly atrophy with fibrotic scarring, as is found in chronic muscle damage.

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With healthy muscle, acute injury produces rapid and controlled inflammation in which infiltrating inflammatory cells and resident stem cells remove dead and damaged myofibers and promote replacement of injured muscle. In the early stages of muscle repair, proinflammatory (M1) macrophages act to clear the damage. Anti-inflammatory (M2c) macrophages and alternatively activated (M2a) macrophages are believed to resume inflammation, extracellular matrix deposition, and tissue repair. M2c and M2a macrophages release anti-inflammatory cytokines and profibrotic molecules such as transforming growth factor beta (TGF-β), which in turn activate fibroblasts in a regulated manner to produce extracellular matrix components and remodeling factors by such means as autocrine production of TGF-β, collagen, fibronectin, serine proteases, and metalloproteinases and their inhibitors.

With chronic tissue damage, however, the increased and persistent presence of macrophages modifies the intensity, duration, and interactions of these released remodeling factors. This leads to excessive accumulation of extracellular matrix components, which inhibits myogenic repair and leads to muscle being replaced by fibrotic, or scar, tissue.[4]

Early in Larson syndrome, erythema develops, after which microcirculation becomes compromised and nerve distribution may experience ischemic injury. These three symptoms can be identified by rapid capillary blanching and delayed refilling. For a list of signs and symptoms, see the *Figure* on pages 19 and 20.

The progressive impairment of vasomotor control in Larson syndrome will lead to further release of inflammatory substances that change the body's functioning. If these inflammatory substances are not addressed, continued sympathetic stimulation will lead to additional anatomical changes in the vertebral segments via viscerosomatic reflexes, changes in how the body's tissues respond to signals, and altered tissue health of the nerves.[1]

Osteopathic manipulative treatment (OMT) has previously been used to reduce the symptoms and signs of Larson syndrome.[1,2]

Report of Case

A 77-year-old Caucasian male patient visited the Academic Health Care Center at the New York Institute of Technology College of Osteopathic Medicine in Old Westbury. The patient was referred by his neurologist for complaints of back pain, headaches, and hyperhidrosis.

The patient reported that his back pain and headaches started 3 to 4 months earlier, subsequent to undergoing radiation therapy for prostate cancer.

The patient described his back pain as a constant, dull, nonradiating burning sensation. He noted that the pain was worst in the right upper and middle thorax. Walking made the pain worse, and nothing alleviated the pain.

The patient described his headache as an intermittent, achy, nonradiating pain in the right frontal area. The patient could not identify any inciting factors, events, or triggers that precipitated the headaches. Nor could the patient identify any factors that alleviated the headaches.

The patient complained of progressively increasing sweating in his right upper torso throughout the day and night for the last month. Sweating was exacerbated by physical activity and stressors. It was a cause of embarrassment for the patient, and he reported frequently

Figure. *Unless an osteopathic structural examination is performed, physicians can mistake Larson syndrome for chronic regional pain syndrome. This figure compares and contrasts characteristics of Larson syndrome and CRPS for a differential diagnosis.*

Differential Diagnosis

	Larson syndrome	Chronic regional pain syndrome (CRPS)
Description	Larson syndrome is a disorder that affects one-half of the body. ■ Symptoms in the **upper extremities** commonly occur from the middle of one forearm, extending distally to include hands and fingers. ■ Symptoms in the **lower extremities** commonly occur from one knee, extending distally to the ankle, feet, and toes. ■ Symptoms can also occur in just **one upper quadrant of the body**, affecting half of the head, face, neck, and upper torso.	CRPS is a disorder of a body region. ■ Symptoms commonly occur in either the **upper** or the **lower extremities.** ■ Involvement of both upper and lower extremities is unusual. There are **2 types** of CRPS: ■ **Type 1** does not have a distinct nerve lesion or deficit. ■ **Type 2** has a definable nerve lesion or deficit.

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Differential Diagnosis		
	Larson syndrome	**Chronic regional pain syndrome (CRPS)**
Characteristics	■ pain ■ dysesthesia ■ swelling ■ limited range of motion ■ vasomotor instability ■ skin changes ■ sensory disturbances	■ pain ■ dysesthesia ■ swelling ■ limited range of motion ■ vasomotor instability ■ skin changes ■ patchy bone demineralization

Etiology	Somatic dysfunctions affecting the upper thoracic spine and ribs are specific to this clinical condition.
	■ Typical somatic dysfunctions include ipsilateral changes at:
	  ■ T2, T3, or T4.
	  ■ paravertebral soft tissue findings.
	  ■ associated rib somatic dysfunctions.
	The pathogenesis is thought to involve the sympathetic nervous system.
		CRPS is frequently associated with an injury, surgery, or a vascular event.
		The pathogenesis is thought to involve a reflex arc after an inciting event involving the sympathetic nervous system.

Clinical manifestation	■ burning, aching, sharp, or dull pain ■ sensitivity to cold, heat, or sunlight ■ crawling sensation affecting the skin ■ feeling of tightness in soft tissues ■ hypersensitivity to minimal touch or palpation ■ numbness, tingling, and limb heaviness of affected extremity Soft tissue findings are less intense than expected given the patient's presentation. Focal pressure on the patient's dysfunctional paravertebral tissues will reproduce the patient's peripheral pain and dysesthesia. *Acute physical changes* ■ early erythema at site of greatest complaint ■ no actual edema ■ increased soft tissue turgor *Chronic physical changes* ■ decreased tissue compliance ■ skin discoloration ■ swelling of deeper connective tissues, fascia, and muscles	*Stage 1* ■ burning, throbbing pain ■ diffuse aching ■ sensitivity to touch or cold ■ localized edema ■ vasomotor disturbances, such as cyanosis, and increased sweating *Stage 2* ■ progression of soft tissue edema ■ thickening of skin and soft tissue ■ muscle wasting *Stage 3* ■ limitation of movement ■ frozen shoulder ■ digit contraction ■ severe bone demineralization
Diagnosis	The patient's response to osteopathic manipulative treatment (OMT) provides an important clue to the diagnosis. If Larson syndrome is not treated effectively, prolonged pathological changes will manifest as muscle atrophy and fibrotic scarring, leading to reduced active and passive movement	The patient's response to a regional sympathetic nerve block or intravenous regional anesthesia provides an important clue to diagnosis. If a patient experiences abrupt relief from pain and dysesthesia after receiving a nerve block or regional anesthesia, the patient is likely to have CRPS.
Treatment	The response to OMT is dramatic and rapid. Emphasis should be on vertebral and rib mobilization. ■ Direct procedures and articulation may be required to improve motion. ■ Subjective symptoms may remain, or they may return over several days. ■ The patient's condition commonly improves after 4 to 6 OMT sessions.	Regional sympathetic nerve block or intravenous regional anesthesia may be useful therapeutically, as well as diagnostically.

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changing clothes due to sweating. He did not specify how often he changed his clothes each day.

The combination of these autonomic nervous system symptoms suggested the patient had dysautonomia.

The patient's medical history consisted of the following:

- prostate cancer, for which the patient was treated both with leuprorelin acetate, a gonadotropin-releasing hormone agonist, and with radiation therapy, the nature of which was unknown to the patient
- a cerebrovascular accident without any sequelae notable on physical examination
- Parkinson disease
- chronic low back pain
- hypertension
- migraine cephalgia
- muscle tightness
- gastroesophageal reflux disease
- insomnia
- constipation
- bronchitis

The patient's surgical history consisted of cataract removal and placement of a spinal nerve stimulator 3 years prior for low back pain. He also had been hospitalized for a spontaneous pneumothorax 30 years prior.

The patient reported that he had never used tobacco or recreational drugs, but he admitted to drinking alcohol (less than 1 serving monthly) and caffeine (1 cup of coffee daily).

The patient had no known drug allergies.

The patient's medications consisted of omeprazole, 40 mg daily; clonidine hydrochloride, 0.1 mg daily; melatonin, 3 mg at bedtime; zolpidem tartrate, 10 mg at bedtime; carbidopa-levodopa, 50/200 mg twice daily; loratadine, 10 mg daily; escitalopram oxalate, 10 mg daily; tamsulosin hydrochloride, 0.4 mg daily; progesterone, 25 mg daily; oxycodone-acetaminophen 20/650 mg twice daily; and magnesium, 500 mg at bedtime.

A review of the patient's systems revealed weight gain of unknown time or amount, loss of appetite, chronic diaphoresis, sleeping difficulty, constipation, headaches, anxiety, dizziness, gait abnormality, and generalized lower-limb weakness.

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The patient's vital signs were as follows:

- weight: 214.4 lbs
- height: 5 ft, 9.5 in
- temperature: 98.4 degrees Fahrenheit
- heart rate: 79 beats per minute
- blood pressure: 148/80 mm Hg
- body mass index: 31.2
- oxygen saturation: 96% on room air

The patient was awake; alert; and oriented to person, time, and place. He was not in acute distress. However, he did have masked facies. A postural examination revealed gait favoring his right side, increased thoracic kyphosis, and decreased lumbar lordosis. Pretibial, nonpitting edema was present.

A musculoskeletal exam revealed that the patient had a right torsion strain of the sphenobasilar synchondrosis of the head, restrictive compression of the right masto-occipital suture, a right trapezius muscle spasm in the neck and upper back, and hypertonic posterior right thoracic musculature, including bogginess associated with the rhomboid muscle from T2 to T6. In addition, T2 and T3 were flexed, rotated right, and sidebent right. Right ribs 3 to 5 had inhalation dysfunction. Copious diaphoresis was present in the right upper back as evidenced by the fact that the patient's shirt was soaked from sweat. Right psoas and quadratus lumborum muscle spasms and bilateral iliosacral restrictions were present. The biomechanics were not further diagnosed prior to treatment. Myofascial restrictions extended bilaterally throughout the lower extremities.

These somatic dysfunctions, combined with the autonomic nervous system symptoms suggesting dysautonomia, led to a diagnosis of Larson syndrome in the presence of Parkinson disease.

The following OMT techniques were applied to the patient's cranial, cervical, thoracic, lumbar, and pelvic regions and to his extremities: cranial, facilitated positional release, balanced ligamentous tension, myofascial release, doming of the diaphragm, lymphatic pump, and rib raising. The patient was treated weekly for 3 weeks.

Results

After 3 weekly sessions of OMT, the patient reported that his back pain, headache, and insomnia had resolved. His nonpitting edema decreased by 25% to 50%, and he reported fewer clothing and towel changes because of dramatically improved diaphoretic responses to ambient temperature changes.

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Despite reporting that his appetite had improved, the patient lost 8.6 lbs during the treatment period, which may be due to decreased edema. The rib-raising technique, which affects the sympathetic nervous system,[9] was particularly effective in reducing the patient's symptoms of hyperhidrosis, elevated blood pressure, and pain.

In addition, the patient had a distinct response to the initial OMT directed to the somatic dysfunctions associated with the patient's dysautonomia, which confirmed that Larson syndrome was an accurate diagnosis.[1]

Case Discussion

In this case, the symptoms of Larson syndrome were hyperhidrosis, elevated blood pressure, insomnia, constipation, and nonpitting edema. The affected systems are regulated by the autonomic nervous system.

The sympathetic nervous system controls sweating, which results from cholinergic fibers stimulating eccrine sweat glands. The eccrine sweat glands in the forehead provide the greatest thermoregulation, followed by those in the upper limbs and finally those in the trunk and lower limbs. Sweating on the palms of the hands and soles of the feet is controlled by the limbic system as a manifestation of emotions.

In Larson syndrome, somatovisceral reflexes from somatic dysfunction at T2 to T4 can cause localized excessive stimulation of the eccrine sweat glands, as was seen in this case.

Although the exact neurological pathways responsible for sweating in humans are not fully understood, animal studies suggest that efferent signals from the preoptic hypothalamus travel via the tegmentum of the pons and the medullary raphe regions to the intermediolateral cell column of the spinal cord.[5] In the spinal cord, neurons emerge from the ventral horn, pass through the white ramus communicans, and synapse in the sympathetic ganglia.[5] Postganglionic nonmyelinated C fibers pass through the gray ramus communicans, combine with peripheral nerves and travel to sweat glands.[5] An imbalance involving facilitation of the sympathetic preganglionic neurons and disinhibition of the inhibitory local interneurons can lead to segmental hyperactivity of the sympathetic nerves.[3]

Autonomic nervous system dysfunction has been found in Parkinson disease, and symptom severity appears to worsen with disease severity.[6] The gastrointestinal and urinary systems appear to be the most affected,[6] although the central nervous system networks involved in the autonomic nervous system may also be affected.

Continuing Medical Education Quiz

The purpose of the September 2015 quiz—found on page 25—is to provide a convenient means of self-assessing your comprehension of the scientific content in the article "Larson Syndrome of Dysautonomia in Parkinson Disease Managed With Osteopathic Manipulative Treatment: A Case Report" by Muhammad Durrani, DO, MS; Jayme D. Mancini, DO, PhD, FAWM; and Theodore B. Flaum, DO, FACOFP.

Be sure to answer each question in the quiz. The correct answers will be published in the next issue of the *AAOJ*.

To apply for 2 credits of AOA Category 2-B continuing medical education, fill out the form on page 25 and submit it to the American Academy of Osteopathy. The AAO will note that you submitted the form and forward your results to the American Osteopathic Association's Division of Continuing Medical Education for documentation.

You must score a 75% or higher on the quiz to receive CME credit.

Along with having autonomic nervous system dysfunction, patients with Parkinson disease experience rigidity and other motor dysfunctions that may increase their risk for developing dysautonomic syndromes.[6] In the current case, the patient's constipation is likely caused by both Parkinson disease and Larson syndrome.

Larson syndrome is distinguishable from the wide array of other autonomic nervous system dysfunctions associated with Parkinson disease by the presence of somatic dysfunctions at T2 through T4, allodynia in the upper thorax, elevated blood pressure, and hyperhidrosis.

The differential diagnosis of Larson syndrome includes such diagnoses as chronic regional pain syndrome (CRPS) type I, which includes reflex sympathetic dystrophy.[7,8] The clinical presentations of Larson syndrome and CRPS type I are very similar, except that CRPS affects only the limbs, starting distally and progressing proximally. In the current case, the patient did not report symptoms in the distal limbs.

CRPS also differs from Larson syndrome in that as CRPS progresses to stage 3, patients experience severely limited movement, frozen shoulder, digit contraction, and severe bone demineralization.

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The differential diagnosis also may include such disorders as cervical nerve root impingement, Pancoast syndrome, vasculitis, migratory osteolysis, arteriovenous fistulae, progressive systemic sclerosis, disuse atrophy, and angioedema.

The work-up for Larson syndrome rests on identifying characteristic ipsilateral upper thoracic somatic dysfunctions coupled with uncovering the signs and symptoms previously described by obtaining a thorough history and physical examination.

Conclusion

The patient in this case had a classic presentation of Larson syndrome. The case was characterized by an autonomic nervous system disorder that could have indicated CRPS. However, the history of the illness; the review of systems; the symptomatology; and the physical exam, especially the osteopathic structural exam, indicated Larson syndrome.

Unless an osteopathic structural exam is performed, Larson syndrome may be misdiagnosed as CRPS. Diagnostic testing of the autonomic nervous system through such means as a resting sweat output test, a resting skin temperature test, and a quantitative sudomotor axon reflex test will not distinguish CRPS from Larson syndrome.

On the other hand, symptom improvement after OMT may be diagnostic for Larson syndrome just as improvement after sympathetic nerve block injections is diagnostic for CRPS. The patient in this case had a therapeutic response to an OMT protocol that has been used specifically to treat patients for Larson syndrome.[1] Reduction in autonomic nervous system dysfunction after OMT has been reported in other case reports and in small clinical trials.[2]

Further research is needed on the efficacy of OMT for treating patients with all autonomic nervous system disorders that do not have causal anatomic injuries or lesions.

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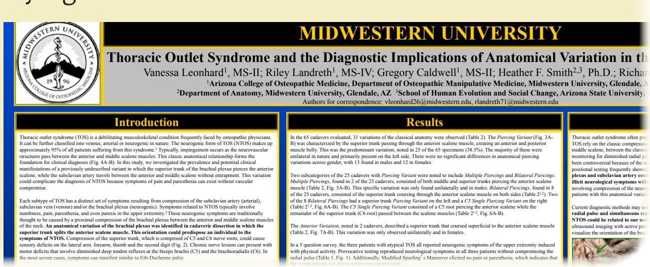
Find AAO's 2015 Posters Online

The winning posters and abstracts for the American Academy of Osteopathy's 2015 poster competition can be viewed online at www.academyofosteopathy.org.

Conducted by the AAO's Louisa Burns Osteopathic Research Committee and the National Undergraduate Fellows Association, the 2015 competition was open to osteopathic medical students, interns, residents, postdoctoral fellows, researchers and practicing physicians. The 2015 competition drew 35 posters on topics ranging from cranial oscillation to nontraditional teaching of osteopathic manipulative medicine.

The online versions of the posters and abstracts have not been edited to conform to *The AAO Journal's* style guidelines.



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Name of article: "Larson Syndrome of Dysautonomia in Parkinson Disease Managed With Osteopathic Manipulative Treatment: A Case Report"

Authors: Muhammad Durrani, DO, MS; Jayme D. Mancini, DO, PhD, FAWM; and Theodore B. Flaum, DO, FACOFP

Publication: *The AAO Journal*, Vol. 25, No. 2, September 2015, pages 18-24, 32

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1. Early in Larson syndrome, _________ develops, after which microcirculation becomes compromised and nerve distribution may experience ischemic injury.
   a. ischemia
   b. blanching
   c. erythema
   d. pallor

2. What is Larson syndrome?
   a. a functional vasomotor hemiparesthesia
   b. a dysesthesia of the sacral plexus
   c. a functional vasoconstriction of celiac plexus
   d. a hepatopulmonary somatovisceral spasm

3. Patchy bone demineralization is typical of Larson syndrome.
   a. true
   b. false

4. A key to differentiating Larson syndrome from chronic regional pain syndrome is:
   a. bone scan
   b. osteopathic structural examination
   c. functional magnetic resonance image
   d. complete blood count with differential

Below are the answers to *The AAO Journal's* June 2015 quiz on the article titled "Osteopathic Manipulative Treatment for Patient With Severe Nausea and Vomiting in Pregnancy: A Case Study" by Katherine Anne Markelz, OMS IV, and Janice Upton Blumer, DO.

1. **c.** Exercise is not a typical initial treatment for patients with nausea and vomiting in pregnancy (NVP).
2. **b.** Recommended pharmacotherapy for NVP does not include bupropion.
3. **a.** Metoclopramide increases the risk for tardive dyskinesia and serotonin syndrome.
4. **d.** In this case, treatment techniques included all of the following: balanced membranous tension; high-velocity, low-amplitude thrust; and suboccipital myofascial release.

Answers to the *AAOJ's* September 2015 CME quiz will appear in the next issue.

Walking Toward Health:
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Course Directors

A 1965 graduate of what is now the A.T. Still University–Kirksville College of Osteopathic Medicine in Missouri, **Edward G. Stiles, DO, FAAO**, has a rich and deep understanding of numerous pioneering concepts, events and personalities in osteopathic medicine.

While an osteopathic medical student, Dr. Stiles trained with George Andrew Laughlin, DO, a grandson of Andrew Taylor Still, MD, DO. Early in his medical career, Dr. Stiles took over the Cambridge, Massachusetts, practice of Perrin T. Wilson, DO, an internationally recognized osteopathic physician and the second person to lead the American Academy of Osteopathy. Dr. Stiles established the first hospital-based osteopathic manipulative treatment (OMT) service in the United States, and he helped develop the first OMT billing codes. Additionally, he has been recognized by the American Osteopathic Association as a Great Pioneer in Osteopathic Medicine.

Dr. Stiles has taught at the osteopathic medical colleges at Oklahoma State University, Michigan State University and the University of Pikeville in Kentucky. He has delivered the American Osteopathic Association's Andrew Taylor Still Memorial Address, as well as the Academy's Thomas L. Northup Lecture, its Scott Memorial Lecture and its Harold A. Blood, DO, FAAO, Memorial Lecture. Dr. Stiles also is a recipient of the Academy's highest award, the Andrew Taylor Still Medallion of Honor.

Like Dr. Stiles, **Charles A. Beck, DO, FAAO**, is board certified in neuromusculoskeletal medicine. He earned his DO degree from the University of Pikeville-Kentucky College of Osteopathic Medicine (UP-KYCOM).

Dr. Beck has received many awards, including the Edward G. Stiles Award for Osteopathic Manipulation from UP-KYCOM, and he serves as an adjunct faculty member for several osteopathic medical schools, including the Lake Erie College of Osteopathic Medicine and the Marian University College of Osteopathic Medicine. Dr. Beck is in private practice in Indianapolis at the Meridian Holistic Center.

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Dysfunction in a Patient With Acute Knee Pain and Osteoarthritis: A Case Report

Karen T. Snider, DO, FAAO

Abstract

A 69-year-old female patient with a history of moderate-to-severe generalized primary osteoarthritis and mild-to-moderate bilateral knee osteoarthritis sought care after experiencing acute left knee pain and swelling for 4 days. Physical examination revealed moderate swelling and warmth in her left knee with a mild prepatellar effusion. Somatic dysfunctions found were a left medial meniscus tender point, posterior left proximal fibula, and internally rotated and markedly flexed left tibia. To address the somatic dysfunctions, osteopathic manipulative treatment (OMT) was performed, using articular technique, counterstrain, muscle energy, and myofascial release. While the muscle energy technique was being provided for the patient's flexed left tibia, a large articular "clunk" occurred that was accompanied by restoration of normal tibiofemoral range of motion and resolution of pain. The effusion resolved during the next several days following OMT. This case report demonstrates the role of osteopathic manipulative medicine in the diagnosis and management of patients for acute knee pain in the presence of osteoarthritis.

From the A.T. Still University–Kirksville College of Osteopathic Medicine Missouri

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Introduction

Osteoarthritis (OA) of the knee is a progressive degenerative condition that is one of the leading causes of disability in the United States.[1-3] Patients with OA of the knee experience pain and stiffness owing to loss of articular and meniscal cartilage and joint space narrowing that causes ligamentous instability and bony remodeling.[4] Radiographically, OA of the knee is evidenced by joint space narrowing, subchondral sclerosis, and marginal osteophytes. Acute management of patients for OA of the knee typically focuses on pain management. Long-term management begins with nonpharmacological treatments such as exercise and weight loss, and it progresses to acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroid injections or viscosupplementation, opioids, and surgical intervention.

Clinical studies on using osteopathic manipulative treatment (OMT) to treat patients for knee OA suggest that OMT may also be beneficial for osteoarthritic knee pain and dysfunction.[5-12] This case report demonstrates the role of articular somatic dysfunction and the use of OMT in the diagnosis and management of patients for acute osteoarthritic knee pain.

History

A 69-year-old female patient visited the osteopathic manipulative medicine clinic at the A.T. Still University–Kirksville College of Osteopathic Medicine in Missouri with acute pain and swelling in her left knee. She had cleaned out her garage 6 days earlier, and she began feeling slight knee pain at that time. The patient reported that the knee pain and swelling had worsened markedly over the following 2 days, with the pain and swelling mostly in the posterior aspect of the knee. The patient had similar episodes of knee pain in the past, but she had not experienced any episodes within the previous 12 months.

The patient described her current pain as burning, piercing, and sharp. The pain was of moderate intensity at rest, increasing to severe intensity when bending and when climbing and descending stairs. The pain was relieved with elevation, ice, and rest. Associated symptoms included morning stiffness, crepitus, decreased mobility,

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joint tenderness, limping, popping, and tingling in the legs. There was no bruising.

The patient had been treated at the clinic for neck pain associated with degenerative arthritis 2 weeks before complaining of knee pain. The patient had a history of gastroesophageal reflux; hyperlipidemia; and moderate-to-severe generalized primary OA, with the most symptomatic areas being her hands and cervical spine. Knee radiographs taken during an episode of knee pain 2 years earlier revealed mild-to-moderate medial compartment OA with large joint effusion. At that time, OMT resolved the patient's pain and swelling.

The patient previously underwent surgical repair of stenosing tenosynovitis in both thumbs, surgical repair of detached right retina, and arthroscopic surgery of the right knee for OA. Both of the patient's parents are deceased, and they both had histories of OA. The patient's sister has OA, and the patient's brother has chronic obstructive pulmonary disease. The patient's daughter has type 2 diabetes mellitus.

A married nonsmoker, the patient is retired from a retail department store, and she lives on a farm. She exercises regularly, and she eats a well-balanced diet. She has no known drug allergies, and she takes 20 mg omeprazole, 40 mg simvastatin, and a senior multivitamin daily.

In addition to her current pain and swelling in her left knee, the patient reported having recurrent numbness and tingling in her lower left leg. Previous extensive workup suggests that this condition is due to prior industrial chemical exposure. The patient's B_{12} and fasting blood sugar levels have been normal for the past several years. In addition, the patient reported chronic rhinorrhea associated with environmental allergies. She denied experiencing fever, lethargy, pallor, weight loss, sore throat, recent upper respiratory infection, cough, dyspnea, abdominal pain, constipation, or diarrhea.

Physical Examination

On physical examination, the patient's blood pressure was 144/64 mm Hg, her heart rate was 68 beats per minute, her respiratory rate was 16 breaths per minute, and her body mass index was 24. The patient was oriented to time, place, person, and situation, and she demonstrated appropriate mood, affect, insight, and judgment.

The patient's left knee had visually normal alignment with a normal Q angle patellar position and moderate swelling and warmth. There was a mild prepatellar effusion. A slight reduction of left knee extension was present, but flexibility was otherwise normal. There was no lower extremity muscular weakness, but pain occurred with passive and active left knee flexion and extension. No erythema was noted. Bony enlargement was present in both knees. Maximum tenderness was noted in the popliteal fossa and medial joint line of the left knee.

Left knee stability testing yielded the following results:

- Patellar apprehension was negative.
- Patellar crepitation was mild.
- Lachman test was negative.
- Anterior drawer and posterior drawer were negative.
- Valgus stress was positive for 2-4 mm of laxity.
- Varus stress was negative.

Somatic dysfunctions were a left medial meniscus tender point, posterior left proximal fibula, and internally rotated and markedly flexed left tibia. No somatic dysfunctions were noted of the pelvis, sacrum, or right lower extremity. The patient's deep tendon reflexes were 2/4 in the patella and Achilles, bilaterally. No sensory deficits were noted in the lower extremities.

The patient was diagnosed as having acute knee pain (ICD-9 719.46), knee OA (ICD-9 715.16), and somatic dysfunction of the lower extremities (ICD-9 739.6).

Treatment

Based on the physical examination, OMT was performed to correct the somatic dysfunctions in the lower extremity area, using articular technique, counterstrain, muscle energy, and myofascial release. All articular somatic dysfunctions found on the physical examination improved in terms of symmetry and range of motion after treatment. Tenderness and swelling were reduced but still present.

During the muscle energy technique for the anterior tibia glide preference, a large articular "clunk" was felt. This abrupt change in articular motion was accompanied by complete resolution of pain with motion. Because the pain resolved, a knee radiograph was deferred.

The patient was advised to reduce bending and lifting activities and to apply ice, elevation, and compression to the left knee. Oral naproxen 200 mg every 6-8 hours as needed was recommended for pain and swelling. The patient was instructed to follow up in the clinic in 1 week for re-evaluation.

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The patient returned for follow-up 5 days after her initial visit. At that time, the pain and swelling in her left knee had resolved, and the patient had returned to normal physical activities. She had not taken naproxen.

In the following months, the patient was treated for unrelated neck and shoulder pain, but the knee pain did not recur.

Discussion

Osteoarthritis of the knee is one of the leading causes of disability in the United States.[1-3] Patients with OA of the knee experience progressive degeneration of the articular and meniscal cartilage that is often accompanied by pain and stiffness after excessive activity or periods of inactivity.[4]

Nearly all individuals aged 75 years and older demonstrate radiographic evidence of knee joint space narrowing, subchondral sclerosis, and marginal osteophytes indicating the presence of OA of the knee.[13,14] However, only about 12% of patients aged 60 years and older report symptoms of OA of the knee.[15]

The clinical symptoms of OA of the knee include joint pain and stiffness after periods of inactivity, crepitus, reduced range of motion, locking, and giving way.[16] Patients may feel pain along the medial or lateral joint lines, and effusions may be present.[17] While joint effusions are common among patients with OA of the knee, erythema is uncommon.[17]

Baker cysts, also known as popliteal cysts, may be palpated in the popliteal fossa. These cysts are extensions of the semimembranosus bursae. Baker cysts often maintain direct connections with the synovial cavity, and they may enlarge in the presence of a joint effusion.[18]

In this case, the patient had knee radiographs taken 2 years previously that indicated marginal osteophytes and medial joint space narrowing. The patient has bony enlargement, and she reported morning stiffness and crepitus. However, persistent pain was uncommon for this patient. The acute onset of unilateral knee pain indicated contributing factors beyond the patient's underlying arthritis.

Patients with generalized OA, such as this patient, often have genetic predispositions to oxidative injury, which leads to premature degradation of cartilage.[19] This degradation is visually evident in joint arthroscopy.[19]

Structural malalignment of the knee with the ankle and hip is associated with a risk of progressive joint space narrowing and disability.[4] Specifically, varus malalignment is associated with medial compartment OA progression, and valgus malalignment is associated with lateral compartment progression.[20] Altered load distribution is associated with subchondral bone marrow lesions such as cysts,[21] which in turn are highly associated with cartilage loss, synovitis, joint effusions, and increased pain.[22-26]

Varus deformities are the most common malalignment in OA of the knee.[17] This asymmetry is consistent with an adduction preference of the tibia.[27] In this case, the patient's Q angle was clinically normal. Although she had a visually normal alignment, she had mild laxity of the medial collateral ligament consistent with her medial compartment OA.

Radiologically, this patient's knees had similar severity of OA bilaterally, but she did have significant somatic dysfunction of the tibiofemoral joint and proximal tibiofibular joint on the left side that was not present on the right side. Therefore, initial treatment targeted this somatic dysfunction.

OMT was initiated at the left proximal tibiofibular joint. Fibular motion is coupled with the tibia and the ankle mortise. When the ankle is dorsiflexed and everted, the distal fibula moves posterolaterally, while the proximal fibula moves anteromedially[27,28] and the tibia externally rotates. When the ankle is plantar flexed and inverted, the distal fibula glides anteromedially, while the proximal fibula glides posterolaterally[27,28] and the tibia internally rotates.

In this patient, the proximal fibula showed a posterolateral (posterior) glide preference. The patient was treated for this dysfunction using a postisometric relaxation type of direct muscle energy technique. In the initial setup for this technique, the patient's ankle was positioned in dorsiflexion and eversion with the tibia externally rotated. The patient was then instructed to plantarflex her foot against the physician's resistance.[29,30] This technique resolved the dysfunction in the posterior proximal fibula, but the tibial dysfunction persisted.

The patient's left tibiofemoral joint had reduced extension range of motion with a marked preference for flexion with anterior glide. Also present was a preference for tibial internal rotation with posterolateral glide, but this somatic dysfunction was minor compared with the flexion and anterior glide preference.

For the tibial dysfunctions, OMT focused on the anterior tibia using a joint mobilization–type of muscle energy technique.[29] This technique is the reverse of the technique described for flexion

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restriction (posterior tibia somatic dysfunction) in the muscle energy chapter of the first edition of *Foundations for Osteopathic Medicine*.[31] For the technique used in this case, the patient was seated, and her left knee was flexed from 45° to 60°, with slight external rotation to account for the internal rotation preference. The patient flexed the knee against firm resistance at the ankle, using moderate force. With the extremity stabilized at the ankle, the active contraction of the hamstrings by the patient pulled the tibia posteriorly toward the restrictive barrier. The level of force gapped the joint, which then articulated during the reflex relaxation phase of the technique. The patient's tibiofemoral joint articulated with a palpable "clunk" accompanied by resolution of pain.

The patient was treated for her remaining myofascial dysfunction with gentle counterstrain and myofascial release techniques.[30]

As previously noted, traditional treatment of patients for OA of the knee focuses on optimizing function and pain management and includes exercise, weight loss, acetaminophen, NSAIDs, corticosteroid injections or viscosupplementation, opioids, and surgical intervention.[16] Although NSAIDs are the most commonly prescribed pharmacological interventions,[16] they carry the risk of serious gastrointestinal and renal side effects, and they may increase the risk for myocardial infarction. A meta-analysis from 2012 revealed that most NSAIDs are associated with significantly increased risk of death due to major cardiovascular events and upper gastrointestinal complications, such as perforations and bleeding.[32]

Orthotic insoles or braces can play a role in managing patients for knee pain and disability. Knee braces are helpful for individuals who have ligamentous instability,[33] and insoles can be effective for patients with significant valgus or varus deformities.[4,34]

Research has repeatedly shown diet and exercise to be effective in the long-term management of patients with OA of the knee.[35,36] Weight loss decreases knee pain by reducing the weight load the knees must bear.[37,38] Exercise improves muscular and ligamentous strength and improves the bone mineral density of the subchondral bone.[39] The patient in this case reportedly exercised regularly; maintained a healthy diet; maintained an ideal body weight; and took oral glucosamine, which has had mixed results in the long-term management of patients with OA of the knee.[5]

The osteopathic medical profession advocates using OMT as a nonpharmacological treatment for patients with OA knee pain.[5-7] A systematic literature review in 2012 classified the evidence for manual therapy at level B (fair) for short-term treatment of patients with OA and at level C (lacks direct evidence) for long-term treatment.[8] This systematic review looked at a wide variety of manual interventions, including soft tissue, massage, lymphatic, and mobilization techniques directed at the knee and other areas of the body.

Jardine et al[9] demonstrated that OMT applied to fascial diaphragms and arterial pathways to the knee improved vascular flow, range of motion, and symptoms of OA of the knee.

Several other studies have assessed the efficacy of techniques similar to the ones used in this case report to mobilize the bony articular elements. Moss et al[10] found that oscillatory anteroposterior mobilization of the tibiofemoral joint resulted in decreased pain and increased function in individuals with OA of the knee compared with patients who received placebo and no therapy. Ko et al[11] found that when combined with exercise, mobilization techniques using axial traction in flexion and extension improved OA symptoms and function compared with exercise alone. Pollard et al[12] found that patellar mobilization combined with high-velocity, low-amplitude anteroposterior thrust on the proximal tibia significantly reduced pain and improved function compared with no treatment for participants with OA of the knee. These studies suggest that manipulation of the bony articular structures of the knee can be beneficial for patients with osteoarthritic knee pain and dysfunction.

For the acute management of the symptoms of the patient in this case report, OMT resulted in immediate cessation of pain, with her effusion resolving during the next several days.

Conclusion

This case report demonstrates both the role of articular somatic dysfunction in OA and the use of OMT in the diagnosis and management of somatic dysfunction associated with acute knee pain in patients with OA. Restoration of normal function, even in the presence of abnormal musculoskeletal structure of OA of the knee, has the potential to minimize pain and decrease the use of NSAIDs in the care of patients with OA.

Acknowledgments

Dr Snider originally prepared this case report to meet one of her requirements for earning fellowship in the American Academy of Osteopathy. As a consequence, this manuscript underwent 2 separate peer-review processes: The first was through the Committee on Fellowship in the American Academy of Osteopathy, and the second was through *The AAO Journal*. Dr Snider became a fellow of the AAO in March 2015 during the Academy's Convocation in Louisville, Kentucky.

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CLASSIFIED ADVERTISEMENTS

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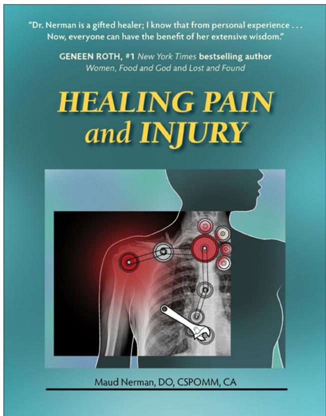

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By Maud Nerman, DO, CSPOMM, CA, 383 pages, paperback, $24.95

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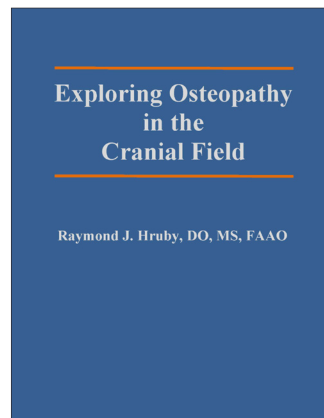

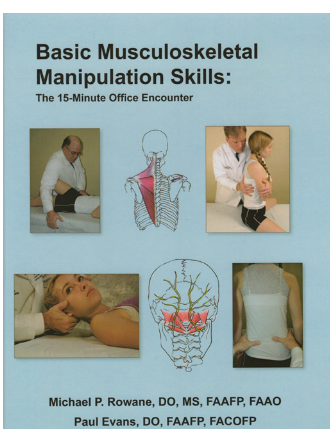

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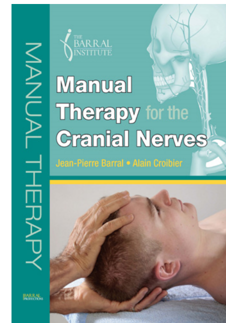
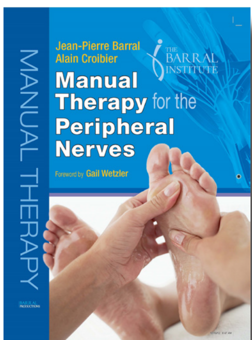
By Jean-Pierre Barral, DO (France), and Alain Croibier, DO (France), 320 pages, hardcover, $80.95





Jean-Pierre Barral, DO (France), and Alain Croibier, DO (France), introduce their new evaluation and therapy concept for the peripheral nerves in *Manual Therapy for the Peripheral Nerves*. Examination and treatment techniques are described step by step and are clarified with a multitude of photographs and illustrations. This book offers all osteopathic physicians and manual therapists the perfect guide to putting this new concept into practice.

By Jean-Pierre Barral, DO (France), and Alain Croibier, DO (France), 288 pages, hardcover, $72. 95

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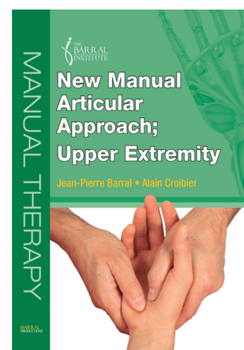
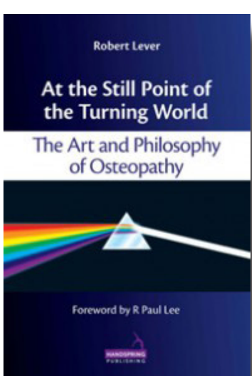
By Jean-Pierre Barral, DO (France), and Alain Croibier, DO (France), 263 pages, hardcover, $79.95





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Sacramento FDM Module 1 Seminar: Introduction to the Fascial Distortion Model
Course director: Todd A. Capistrant, DO, MHA
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Course faculty: Edward K. Goering, DO
Evans Hall, Philadelphia College of Osteopathic Medicine
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Direct Action Thrust: Mobilization With Impulse
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East Lansing, Michigan
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Osteopathic Principles and Practice for the Pregnant Patient
Course director: Laura Anne Tinning, DO
East Lansing, Michigan
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Nov. 6-8, 2015
American Fascial Distortion Model Association
Austin FDM Module 1 Seminar: Introduction to the Fascial Distortion Model
Course director: Gene Lenard, DO
Sonesta Bee Cave, Austin, Texas
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11th annual autumn scientific convention
Amway Grand Plaza
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Nov. 7-8, 2015
Arizona Osteopathic Medical Association
35th annual fall seminar
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Michigan State University College of Osteopathic Medicine
Manual Medicine Related to Sports and Occupational Injuries in the Extremities
Course directors: Mark R. Gugel, DO, and Jake Rowan, DO
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New York Institute of Technology College of Osteopathic Medicine in Old Westbury
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