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Sensory integration syndrome or developmental coordination disorder: A case report...pg. 8

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THE AAO JOURNAL
FORUM FOR OSTEOPATHIC THOUGHT
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TRADITION SHAPES THE FUTURE • VOLUME 23 NUMBER 1 • MARCH 2013

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.

IN THIS ISSUE:

View From the Pyramids

New graduate medical education opportunities found – and lost

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

Some very interesting things have been happening in medical education. One of the interesting "sequalae" to the recent political fallout of an Accreditation Council for Graduate Medical Education (ACGME) policy that might have precluded DO graduates of osteopathic graduate medical education (OGME) program was the agreement to unite both "match" programs. Yes, there will only be one match, and this will allow for improvements based on economies of scale. This is reportedly taking effect with the match that will take place in 2015. As has been mentioned in various places, including this column, there is a great need to increase the number of GME opportunities – both ACGME and American Osteopathic Association (AOA) – to accommodate the increased class sizes and numbers of medical schools that have come about since enactment of the Balanced Budget Act of 1997 limited the number of residency slots paid for by the Centers for Medicare and Medicaid Services (CMS).

The suburban Atlanta county where I live and work has a two-campus major medical center that has never had any GME programs. Accordingly, it is a prime candidate for creating the permitted de novo GME programs. It is doing so, and the programs will be dually accredited ACGME-AOA residencies; however, it is limiting itself to only two residency training programs – Family Medicine (6-6-6) and Internal Medicine (either 5-5-5 or 6-6-6). In doing this, the center will forever after be limited to 33 or 36 total residency slots across all training years in all specialties. At least that is how it stands under current laws and funding policies. My bias is that the medical center should capitalize on this opportunity to create even more residencies in even more specialties. They need to do this and populate these programs now; the rules permit programs to be decreased, but not increased. Once this initial three-year window passes, all training slots are "fixed," and there is a "zero-sum" rule that applies to any programmatic changes. Also, the AOA gave its approval over a year ago; the medical center is still waiting on ACGME approval to proceed. Yes, if the medical center had been willing to implement only AOA OGME programs, we could have already had residency training programs operating now!

When the Georgia campus of Philadelphia College of Osteopathic Medicine opened in 2005, this same medical center did not want to allow DO faculty or DO students to work or train in its facilities. This has since abated, but there are still vestiges of old anti-DO biases present here. There are various areas where the osteopathic profession has demonstrated leadership, but it has not been until the MDs have come around to proposing the same thing that the idea(s) seem to see the light of day. As one example, the December 2012 issue of *Academic Medicine* published several commentaries[1,2] and an article about community teaching health centers as the basis for a "new" way of doing GME. Chen, Chen, and Mullan even wrote about this as a Kuhnian "paradigm shift."[3] Rich and Reynolds touted this idea as a "path to graduate medical education reform"[2] and "an idea whose time has come."[1]

The reality is that the osteopathic community has been doing these things for more than 20 years! Yet, there is no acknowledgement of the predecessor "priority" of OCGME leadership in any of these papers. This same issue also published a commentary about community-based primary care-oriented medical student education.[4] Again, the osteopathic medical schools have led in implementing this community-based education of medical students since at least the late 1980s and early 1990s. Watson mentions that the Florida State University School of Medicine is the "first new MD-granting medical school created in the United States" since 1975, and that its mission is medical student education and not research focused. He also lauds the "regional community-based model" of medical student education.[4] Again, no mention of the more than 20 years of success with the same model by the osteopathic medical schools.

Lead on, my osteopathic physician colleagues!

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Millenial times: Women in osteopathic medicine

Kate McCaffrey, DO

Dr. Still commented, "I opened wide the doors of my first school for ladies…Why not elevate our sisters' mentality, qualify her to fill all places of trust and honor, place her hand and head with the skilled arts?"[1]

A.T. Still, DO, believed in equality. In fact, the first class of osteopathic medicine at the American School of Osteopathy accepted women. Jeanette Bolles, DO, was the first woman to be granted the DO degree. Louisa M. Burns, DO, was a prominent researcher in the osteopathic profession. Barbara Ross-Lee, DO, became the first African-American woman to be appointed the dean of a United States medical school.

I was recently asked by one of my students to participate in a Woman in Medicine Panel at Western University College of Osteopathic Medicine of the Pacific – Northwest in Lebanon, OR. I felt honored and immediately started thinking about what I might share. The student expressed interest in inviting local women physicians who represented all walks of life and specialties to gather informally for wine, cheese and conversation.

I started thinking about my experiences as a "female" physician. Had I experienced acceptance in medicine? Where had I encountered resistance or sexism? What makes my experience of practicing medicine different from my male colleagues? And most importantly, what could I pass on to the next generation to inspire hope, courage and fulfillment?

A couple of thoughts came to mind immediately. A few scenarios were not pleasant at the time but thankfully, benign. I recall being passed over for invitations to play golf with my male classmate on my cardiology rotation in the third year of medical school. He received a higher grade than me, and in this case, I was pretty sure I was smarter than he was. This was probably the harshest overt gesture I experienced during medical training, and again, I count myself lucky. I remember my surgical rotations and the strong women residents who ran the surgical service at Emmanuel Hospital in Portland, OR. I remember wanting to be like them, to talk like them and cut my hair like them. I guess we all want to feel like we belong. I remember assisting a female orthopedic attending, who was a hundred pounds soaking wet, perform a surgical procedure with confidence and finesse. I have yet to see anyone handle a saw like she did!

I remember my emergency room attending at Lutheran Hospital in Cleveland, OH. She taught me about kindness and humanity. She taught me to feel empathy and show respect toward patients that a normal person might pull away from in disgust. She taught me to write about my medical experiences. She taught me about a world out there without borders; that people all over the world need our help to build sustainable healthcare systems. She taught me that most of the world's healthcare is linked to public health, politics and religious beliefs. I encourage my students to visit third-world countries and to start ambulance services and hospitals in countries that have none.

Years ago, I recall seeing one of my mentors stand up in front of 500 people at a national conference and speak to a resolution. I remember bursting with pride that she was from our delegation and she was my friend. I have since become a physician capable of expressing my thoughts succinctly to hundreds of physicians. Somewhere along the way I lost my shell and my shyness thanks to this woman, and women and men like her. Because of her example, I advocate for justice and equality for all physicians and in doing so, our patients.

I recall being coached by a colleague as I made one rookie mistake after another with my first medical student class at Touro University in Vallejo, CA. I now dress the part and practice "restraint of pen and tongue." I strive to act appropriately around students, staff and faculty. It is serious business educating and training the next generation of osteopathic physicians. There may be a few students in my audience who are looking to me to teach them about respect and professionalism in medicine. We rarely glimpse our impact upon others. As physicians we are always "on" and we are held to a higher standard by society.

I would like to take a moment to recognize a few of my women mentors who have helped to make my journey more comfortable; who illuminated the path when it was dark; who unknowingly showed me how to be a caring physician, teacher, advocate and person.

It is these women and many others to whom I say *L'chaim*!: Drs. Janice U. Blumer ("Nettie"), Rachel Brooks, Janet M. Burns ("Burns"), Jane E. Carreiro, Alissa Craft, Paula M. Crone, Lorane M. Dick, Robyn L. Dreibelbis, Viola M. Frymann, Bonnie Gintis, Rebecca E. Giusti, Ann L. Habenicht, A. Kay Kalousek, Susan Macintosh,

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AAO 2013 Calendar of Events

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

March 17-19	*Peripheral Nerve: Upper Body* (Pre-Convocation)—Kenneth J. Lossing, DO Rosen Shingle Creek Resort, Orlando, FL
March 18-19	*Treating Children with Common Developmental and Neurological Issues: An International Osteopathic Perspective* (Pre-Convocation)—Jane E. Carreiro, DO—Rosen Shingle Creek Resort, Orlando, FL
March 18-19	*Osteopathic Considerations in Systemic Dysfunction of the Geriatric Patient* (Pre-Convocation) Michael L. Kuchera, DO, FAAO; Hugh M. Ettlinger, DO, FAAO—Rosen Shingle Creek Resort, Orlando, FL
March 19	Fellowship Committee Meeting/Exams, 8 am - 5 pm—Rosen Shingle Creek Resort, Orlando, FL
March 19	Board of Trustees Meeting, 1 pm - 5 pm—Rosen Shingle Creek Resort, Orlando, FL
March 19	Education Committee Meeting, 6 pm - 8 pm—Rosen Shingle Creek Resort, Orlando, FL
March 20	*Cellular Biology and the Cellular Matrix* (Pre-Convocation)–Frank H. Willard, PhD Rosen Shingle Creek Resort, Orlando, FL
March 20-24	AAO Convocation—*Mechanotransduction and the Interstitium: The World in Between* Gregg C. Lund, DO—Rosen Shingle Creek Resort, Orlando, FL
March 20	Board of Governors Meeting, 8 am - 12 pm—Rosen Shingle Creek Resort, Orlando, FL
March 20	AOBNMM Written Re-Certification Exam, 11 am - 2 pm—Rosen Shingle Creek Resort, Orlando, FL
March 20	Residents' In-Service Exam, 11 am - 5 pm—Rosen Shingle Creek Resort, Orlando, FL
March 20	Investment Committee Meeting, 4 pm - 5 pm—Rosen Shingle Creek Resort, Orlando, FL
March 21	Annual Business Meeting, 12 pm - 2:15 pm—Rosen Shingle Creek Resort, Orlando, FL
March 21	Osteopathic Continuous Certification Forum, 5:30 pm - 6:30 pm, Rosen Shingle Creek Resort, Orlando, FL
March 22	FORCE Board Meeting, 6:00 am - 8 am—Rosen Shingle Creek Resort, Orlando, FL
March 22	Membership Committee Meeting, 6:30 am - 8 am—Rosen Shingle Creek Resort, Orlando, FL
March 22	Publications Committee Meeting, 12:30 am - 2 pm—Rosen Shingle Creek Resort, Orlando, FL
March 22	PS&E Committee Meeting, 12:30 pm - 3 pm—Rosen Shingle Creek Resort, Orlando, FL
March 23	AOBNMM Meeting, 8 am - 11 am—Rosen Shingle Creek Resort, Orlando, FL
March 23	Board of Trustees Meeting, 1:30 pm - 3 pm—Rosen Shingle Creek Resort, Orlando, FL
March 24	Residency Program Directors' Workshop, 1 pm - 6 pm—Rosen Shingle Creek Resort, Orlando, FL
May 17-19	*Palpating and Treating the Brain: The Ventricular System and the Brain Nuclei*—Bruno Chikly, MD, DO AZCOM, Glendale, AZ
June 14-16	*Normalization of Muscle Function*—Jay B. Danto, DO—UMDNJSOM, Stratford, NJ
September 29	*Case-Based Osteopathic Sports Medicine* (Pre-OMED)—Kurt P. Heinking, DO, FAAO—Las Vegas, NV
Sep. 30-Oct. 2	*Osteopathic Approach to Common Office Complaints* (AAO Program at OMED) Laura E. Griffin, DO, FAAO—Las Vegas, NV
October 10-12	*Prolotherapy Weekend*—George J. Pasquarello, DO, FAAO; Mark S. Cantieri, DO, FAAO UNECOM, Biddeford, ME
December 6-8	*Osteopathic Approaches to the Heart and Vascular System*—Kenneth J. Lossing, DO AZCOM, Glendale, AZ

continued from page 4

References

1 Reynolds PP. The Teaching Community Health Center: An Idea Whose Time Has Come. *Academic Medicine*. 2012;87(12):1648-1650.

2 Rich EC. Teaching Health Centers and the Path to Graduate Medical Education Reform. *Academic Medicine*. 2012;87(12):1651-1653.

3 Chen C, Chen F, Mullan F. Teach Health Centers: A New Paradigm for Graduate Medical Education; *Academic Medicine*; 2012;87(12):1752-1756.

4 Watson RT. Discovering a Different Model of Medical Student Education. *Academic Medicine*. 2012;87(12):1662-1664.

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Wendy Neal, Maud H. Nerman, Natalie A. Nevins, Karen J. Nichols, Judith A. O'Connell, Geraldine T. O'Shea, Sandra L. Sleszynski, Michelle Veneziano ("Micha"), Stephanie White, and to all the osteopathic physicians of the future!

Reference

1 Still AT. Dr. A.T. Still's Department. *Journal of Osteopathy*.

Sutherland Cranial Teaching Foundation Upcoming Courses

SCTF Intermediate Course:
Beyond the Basics: Additional Sutherland Procedures
October 11th (beginning at noon), 12th and 13th, 2013
Midwestern University • Glendale, Arizona
Register Prior to August 31, 2013: $750
Register After September 1, 2013: $825
Prerequisites: Successful completion of two (2) Basic Courses. One (1) must have been an SCTF Basic Course.
Course Director: Edna Lay, DO, FAAO
20 Hrs 1A CME anticipated

Hotel: Embassy Suites Hotel Phoenix – North
2577 West Greenway Road
Phoenix, AZ 85023

Visit our website for enrollment forms and course details: www.sctf.com
Contact: Joy Cunningham 509-758-8090
Email: jcunningham4715@yahoo.com

Sensory integration syndrome or developmental coordination disorder: A case report

Wm. Thomas Crow, DO, FAAO

Abstract

"Sensory integration syndrome" is a term coined by occupational therapist AJ Ayres to describe children who have problems with motor coordination or delayed motor skills. These problems are sometimes referred to as "clumsy children syndrome." Epidemiologic studies have demonstrated a five to 15 percent incidence of motor clumsiness in children. Perinatal complications occurred more frequently in the clumsy group when compared with general birth statistics.

This case looks at a child with sensory integration syndrome and her dramatic improvement in fine motor skills and strength.

Research on the treatment of children with "sensory integration disorders" or "developmental coordination disorder" using osteopathic manipulative techniques would be an interesting study using standardized and validated tests, as well as hand strength grip testing, which would give us valid, objective data upon which to base the research.

Introduction

"Sensory integration syndrome" is a term coined by occupational therapist AJ Ayres to describe children who have problems with motor coordination or delayed motor skills. These problems are sometimes referred to as "clumsy children syndrome."[1,2] This term seems to be restricted to occupational therapists. The diagnosis is controversial among pediatricians, who state, "Occupational therapy, with the use of sensory-based therapies, may be acceptable as one of the components of a comprehensive treatment plan. However, parents should be informed that the amount of research regarding the effectiveness of sensory integration therapy is limited and inconclusive"[3]

The American Psychiatric Association classifies children with motor control issues as having "developmental coordination disorder."[4] The major feature of developmental coordination disorder is poor skill in daily motor activities given a child's age and intellectual ability. Impairments can be seen both in gross motor activities, such as running, kicking or catching a ball, as well as in fine motor coordination, resulting in poor handwriting or the inability to handle a cup or silverware well.[5] (Table 1). The tenth revision of the World Health Organization International Statistical Classification of Diseases and Related Health Problems (WHO ICD-10) Classification of Mental and Behavioral Disorders defines this disorder as "Specific Developmental Disorder of Motor Function."[6] (Table 2).

Case

Chief complaint: The mother stated, "My daughter has a sensory integration syndrome."

History of chief complaint: The mother stated the child has difficulty buttoning or snapping her pants, writing and doing all kinds of fine motor activities. She becomes anxious when her feet leave the ground. She avoids climbing and jumping. She moves from activity to activity. She doesn't like to be enclosed nor have her head covered as suggested by her therapists. The mother stated her labor was more than 36 hours before the child was delivered by low forceps. The mother had pre-eclampsia. The child was a floppy baby and had problems with feeding. Colic was noted in the first year of life.

Allergies: None

Medications: None

Injuries: None, except the birth trauma

Surgical history: None

Medical history: Non-contributory

Social history: Two parents in the family, one younger sister in the household who has no problems

Physical exam: General– Awake, alert and oriented to person, place and time. No acute distress. Appears healthy and hydrated. Head, eyes, ears, nose and throat– Unremarkable. Heart– Regular rate and rhythm with slight murmur present. Lungs– Clear to auscultation. Abdomen– Soft, non-tender bowel sounds (+) in the four quadrants, no organomegaly. Extremities– + two pulses bilateral. No gross abnormalities noted. Neurological– Cranial nerve two through 12 grossly intact, deep tendon reflexes two +/four bilateral. Muscle strength in the hands was seven pounds on the right and nine pounds on the left. The patient is right handed.

Manifestations of Developmental Coordination Disorder[18]

Gross motor manifestations

Preschool age

Delays in reaching motor milestones, such as sitting, crawling and walking

Balance problems: Falling, getting bruised frequently and poor toddling

Abnormal gait

Knocking over objects, bumping into things and destructiveness

Primary school age

Difficulty with riding bikes, skipping, hopping, running, jumping and doing somersaults

Awkward or abnormal gait

Older

Poor at sports, throwing, catching, kicking and hitting a ball

Fine motor manifestations

Preschool age

Difficulty learning dressing skills (tying, fastening, zipping and buttoning)

Difficulty learning feeding skills (handling knife, fork or spoon)

Primary school age

Difficulty assembling jigsaw pieces, using scissors, building with blocks, drawing, or tracing

Older

Difficulty with grooming (putting on makeup, blow-drying hair, and doing nails)

Messy or illegible writing

Difficulty using hand tools, sewing, and playing piano

Table 1

ICD-10 Diagnostic Criteria for Specific Developmental Disorder of Motor Function

A. The score on a standardized test of fine or gross motor coordination is at least two standard deviations below the level expected for the child's chronological age.

B. The disturbance described in Criterion A significantly interferes with academic achievement or with activities of daily living.

C. There is no diagnosable neurological disorder.

D. Most commonly used exclusion clause. IQ is below 70 on an individually administered standardized test.

World Health Organization: *The ICD-10 Classification of Mental and Behavioral Disorders: Diagnostic Criteria for Research.* Geneva: World Health Organization; 1993.

Table 2

Structural exam: Head– Cranial Rhythmic Impulse is nine cycles per minute with poor amplitude. Severe compression of the sphenobasilar synchondrosis was noted. Frontal bone is overlapping on the right temporal. Restriction was noted on the occipital mastoid suture on the right. The occipitoatlantal was $S_R R_L$. Cervical– C2 R_R. C3-C4 $R_L S_L$. Thoracics– T2-T4 $R_R S_L$. Sacrum– Moves poorly in cranio-sacral flexion.

Impression

Developmental dyspraxia (Sensory Integration syndrome); somatic dysfunction– cranium, cervical and sacrum.

Treatment Plan

Osteopathy in the Cranial Field was used to decompress the occipitoatlantal, frontal and temporal bone, and sphenobasilar synchondrosis. Ligamentous Articular Strain was used to treat the cervicals. Lumbosacral decompression was performed as well.

Course of Treatment

The patient was seen every two weeks for treatment of the cranial and cervical dysfunctions. Her muscle tone improved over the 14 weeks treatment was provided. The mother stated the child can now snap her pants and button

her clothes. She said her writing skills are much better. In fact, she can now write clearly instead of having her name look like a lot of circles. The child's math skills have improved dramatically. Earlier, the parents had been told to lie on top of the child in order to stimulate her. When this was done, she would scream. The mother tried this after her last visit and the child laughed. Grip strength was checked weekly with the following results:

VISIT	LEFT HAND	RIGHT HAND
One	7 lbs.	9 lbs.
Two	12 lbs.	12 lbs.
Three	14 lbs.	15 lbs.
Four	16 lbs.	18 lbs.
Five	20 lbs.	20 lbs.
Six	20 lbs.	22lbs
Seven	22 lbs.	24 lbs.

Discussion

Clinical research demonstrates that clumsiness can affect a child significantly in multiple arenas. At school, problems with coordination and motor speed can interfere with the child's ability to keep up with his or her peers. Motor clumsiness is not always identified because it is nonspecific and does not represent a neurological disease or physical illness. The term "nonspecific neuromotor deficit" is sometimes used to refer to a developmental delay of motor locomotion and posture that causes a functional impairment of adaptive skills, academic performance or general output.[7] Developmental dyspraxia, defined as an impairment of the ability to plan and carry out motor actions, is often cited as the primary deficit in motor clumsiness.[8,9]

Developmental dyspraxia is characterized by inaccurate judgments of sequence, timing and force, and reflects a nonspecific impairment of brain processing that does not have a clear anatomic correlate. Other cognitive, sensory and motor processes are also involved in clumsiness, including vision, kinesthesia and proprioception.[10,11]

Epidemiologic studies have demonstrated a five to 15 percent incidence of motor clumsiness in children.[5,7] Birth histories were obtained, and perinatal complications occurred more frequently in the clumsy group when compared with general birth statistics. This finding is supported by recent studies demonstrating that very low-birth-weight and extremely low-birth-weight premature infants have significant neuromotor problems at school age.

Children with developmental problems have been found to have an association with abnormal craniosacral dysfunctions.[12] Upledger found that, with examination of the cranium, he was able to determine which children were from mothers with complicated obstetrical deliveries and classified as having motor coordination problems. There was a positive relationship between an elevated total craniosacral motion restriction and motor dysfunction. Dr. Viola Frymann also noted that skeletal distortion due to traumatic birth injuries or in infancy can play a part in learning problems in children.[13]

Some neurophysiologists have proposed a sensory feedback system to explain the relationship between sensation and movement. This system of sensory feedback relies on kinesthesia, the perception of movement, to provide second-to-second information regarding the position of body parts in space. The continuous feedback produces smooth, integrated sequences of movement. The relationship between kinesthetic input and children with developmental coordination disorder remains uncertain.[10]

Evidence suggests low birth weight, prematurity, hypoxia and neonatal malnutrition are factors in developmental coordination disorder. A study by Marlow and colleagues in 2007 investigated motor and "executive" cognitive function in 241 children who were born severely prematurely (less than or equal to 25 complete weeks of gestation) and assessed at a median age of six years and four months.

Compared with 160 term classmates, 180 extremely pre-term children, without cerebral palsy and attending mainstream schools, performed less well on three simple motor tasks: posting coins, heel walking and one-leg standing. They more frequently had non–right-hand preferences (28 percent versus 10 percent) and more associated/overflow movements during motor tasks.

continued on page 15

CME QUIZ

The purpose of the quiz, found on page 11, is to provide a convenient means of self-assessment for your reading of the scientific content in "Sensory integration syndrome or developmental coordination disorder: A case report" by Wm. Thomas Crow, DO, FAAO.

Please answer each question listed. The correct answers will be published in the June 2013 issue of the *AAO Journal*.

To apply for Category 2-B CME credit, record your answers to the *AAO Journal* CME quiz application form answer sheet on page 36. The AAO will note that you submitted the form, and forward your results to the AOA Division of CME for documentation. You must score a 70 percent or higher on the quiz in order to receive CME credit.

American Osteopathic Association Continuing Medical Education

This CME Certification of Home Study Form is intended to document individual review of articles in the *American Academy of Osteopathy Journal* under the criteria described for Category 2-B CME credit.

CME CERTIFICATION OF HOME STUDY FORM

This is to certify that I, _____
Please print name

READ the following article for AOA CME credits.

Name of Article: Sensory integration syndrome or developmental coordination disorder: A case report

Author(s): Wm. Thomas Crow, DO, FAAO

Publication: The *AAO Journal*, Volume 23, No. 1 March 2013, pp. 8-10, 15.

Category 2-B credit may be granted for these articles.
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Complete the quiz to the right by circling the correct answer. Mail your completed answer sheet to the AAO. The AAO will forward your results to the AOA. You must have 70 percent accuracy in order to receive CME credits.

September 2012 *AAO Journal* CME quiz answers:

1. **D**
2. **B**
3. **B**
4. **C**

Answers to the December 2012 *AAOJ* CME quiz will appear in the March 2013 issue.

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1. According to the author, the relationship between kinesthetic input and children with developmental coordination disorder is due to the proposed sensory feedback system relying on kinesthesia to provide second-to-second information regarding the position of body parts in space, resulting in smooth, integrated sequences of movement.

A) True
B) False

2. According to the author, the relationships between skeletal distortion, birth trauma and learning problems in children is attributed to which of the following?

A) AJ Ayres
B) WT Crow
C) VM Frymann
D) JE Upledger

3. According to the author, developmental dyspraxia reflects a specific impairment of brain processing and has a clear anatomic correlate.

A) True
B) False

4. According to the author, the positive relationship between an elevated total craniosacral motion restriction and motor dysfunction is attributed to which of the following?

A) AJ Ayres
B) WT Crow
C) VM Frymann
D) JE Upledger

Osteopathic manipulative treatment for Lyme disease-induced Bell's palsy: A case study

Joshua P. Baker, DO, FAAP; Charity D. Baker, DO

Abstract

A 30-year-old female presents multiple constitutional, non-specific symptoms, is ill-appearing and meets qualifications for systemic inflammatory response syndrome, but with an unknown source of infection to confirm sepsis. Due to lack of patient compliance to determine the cause of the problem, antibiotics to cover a human bite infection or pylonephritis/urosepsis is initiated. These symptoms resolve completely over a period of days. Shortly thereafter, a complete unilateral Bell's palsy suddenly appears. She now agrees to further evaluation. Traditional medical treatment for a presumed idiopathic Bell's palsy is initiated. The patient agrees to initiate Osteopathic Manipulative Medicine (OMM). Lyme disease is diagnosed, at which point OMM is begun and appropriate medical treatment is initiated. The patient responded very well to the treatments and had a complete recovery from her Bell's palsy.

Introduction

Osteopathy in the Cranial Field has a wide range of applications. In this case study, the authors present a case of Lyme disease-induced Bell's palsy that was treated with traditional medical management in addition to the application of OMM focused on Osteopathy in the Cranial Field. The patient responded very well to all of the treatment methods with a complete recovery of her symptoms.

Presentation of Case

A 30-year-old Caucasian female presented in June 2012 on day four of an illness with significant constitutional symptoms, which involved objective fevers of up to 102 degrees Fahrenheit, chills, sweats, anorexia, nausea, global headache, malaise, fatigue, body aches, night sweats, orthostatic symptoms, lightheadedness, dizziness, heat and cold intolerance, dry mouth, feeling globally weak and decreased urination. She presented with an otherwise negative review of symptoms. She reported having been bitten on her bilateral breasts three weeks ago by her seven-month-old, exclusively breastfed daughter, which resulted in immediate bleeding after the bites, and about three weeks of bilateral breast redness, warmth, pain and swelling. The patient stated that her breast pain began to improve at the onset of the current symptoms.

Her physical exam findings are listed below, and are pertinent for tachycardia with an otherwise non-diagnostic physical exam, including a negative fundoscopic and breast exam.

Vital Signs: Body mass index– 31.7. Blood pressure– 98/68. Height– 166 centimeters. Pulse oximetry– 97 percent. Heart rate– 110 /minute. Respiratory Rate– 18/minute. Temperature– 37.4 degrees Celsius. Weight– 87.3 kilograms.

General: Active, ill-appearing , no acute distress, well-nourished, not lethargic.

Head: Atraumatic, normocephalic. No sinus tenderness, warmth, redness or facial asymmetry. Negative battle sign, racoon's eyes, hemotympanum.

Ears: Bilateral tympanic membranes clear without redness, discharge, effusion. No otorrhea. No external auditory canal inflammation.

Eyes: Extraoccular muscles intact, direct/consensual responses to light intact bilateral. No eye discharge. No red eye. No periorbital region redness, warmth, swelling, cellulitis, tenderness. No photophobia. Negative papilledema on fundoscopic exam.

Nose: Nares patent. No nasal lesions or ulcers. No nasal discharge or purulence.

Mouth: Mucus membranes moist. No oral lesions.

Throat: No tonsillar hypertrophy, erythema or exudate. No peritonsillar asymmetry or peritonsillar region swelling.

Neck: No stiff neck, jugular venous distention, torticollis, thyromegaly or thyroid nodules.

Lymphatic: No head, axillary or neck lymphadenopathy.

Cardiovascular: Regular rate/rhythm. No murmurs, clicks or thrills. No S3 or S4. Radial/ulnar pulses +2/4 bilateral. Capillary refill less than two seconds all extremities. No skin mottling.

Pulmonary: No increased work of breathing, wheezing, crackle, rales, nasal flaring, retractions, accessory muscle use, stridor or abdominal respirations.

Abdomen: Active bowel sounds, soft, not tender. Non-distended. No guarding, rebound or rigidity. No splenomegaly, hepatomegaly, masses, negative Lloyd's test.

Neurologic: Alert and oriented to person, place and time. Cranial Nerves II-XII intact, moves all extremities equally and actively. Motor strength +5/5 bilateral upper/lower extremities, patellar. Achilles, brachioradialis, biceps, triceps reflexes bilateral +2/4 .

Psychiatric: Euthymic affect normal mood, appropriate insight, appropriate judgment, speech coherent with regular rate and rhythm, long-term and short-term memory intact.

Musculoskeletal: Stable gait without antalgia, fingers and fingernails normal, toes and toenails normal, normal spinal curves, no scoliosis.

Skin: No skin rashes.

Breasts: No breast redness, induration, warmth, fluctuance, asymmetry, mass, tenderness, orange peel appearance, dimpling, skin retraction. No nipple discharge.

The initial assessment was systemic inflammatory response syndrome (SIRS) due to the presence of oliguria, tachycardia and fever. The diagnosis of sepsis could not be made in the absence of a confirmed infection.

The physician recommended chest x-ray, lumbar puncture and laboratory evaluation, which included complete blood count with manual differential, thyroid stimulating hormone, C-reactive protein, erythrocyte sedimentation rate, blood cultures, complete metabolic profile and urinalysis with culture.

The patient declined all evaluation and blood work, but did agree to the urine analysis, which demonstrated microscopic hematuria, but was otherwise negative.

The differential diagnosis at this point included mastitis, human bite infection with sepsis, meningitis, pneumonia, pyelonephritis, urosepsis and multiple other infections, as well as non-infectious causes of fever.

Intravenous fluids were also recommended to help her obvious dehydration, to which she acquiesced. After one liter of normal saline bolus, the patient subjectively reported feeling much better and was sent home.

The patient postulated that the entire illness was related to the human bite from her daughter a few weeks ago. Despite a normal breast exam, and given her refusal of diagnostic modalities to find the exact cause of her symptoms, the human bite was a plausible diagnosis and antibiotics to help cover typical human bite mouth flora were initiated. Additionally, the presence of oliguria, fever, tachycardia and microscopic hematuria would also place pyelonephritis/urosepsis high on the differential diagnosis.

Ceftriaxone 2000 milligrams (mg) intramuscularly was administered in the office. She was then sent home with high-dose Augmentin (amoxicillin/clavulanate) 875 mg to 125 mg by mouth (PO) three times daily (TID) for 14 days, with probiotic supplement once daily for 30 days.

An after-hours phone call was received on day five of the illness, in which the patient reported that all her constitutional symptoms were still present, with the addition of non-bilious, non-bloody emesis once. On day six, another follow-up phone call revealed she was feeling well and nearly back to normal.

On day nine of the illness, she presented with the inability to close her right eye tightly, the inability to brush her teeth, a funny look to the right side of her face and weakness on the right side of her face. She was otherwise feeling well and her initial constitutional symptoms were all resolved.

Her physical exam was consistent with a near complete right sided Bell's palsy.

Her diagnosis of Bell's palsy was quite obvious. She now did agree to some laboratory evaluation. We suspected the recent symptoms were related to the current palsy.

She also agreed to set up scheduled Osteopathic Manipulative Treatment (OMT) to treat the idiopathic Bell's palsy.

In addition to the Augmentin, she was started on Prednisone 50 mg PO once daily for five days and Acyclovir (Zovirax) 400 mg PO TID for 10 days according to current guidelines to treat idiopathic Bell's palsy.

Lab results on day nine (referenced ranges in parentheses):

- Urine culture from day four revealed no growth.
- Hemoglobin A1C: 5.3 (4.2-5.8)
- Complete blood count with manual differential: White blood cells: 5.2 (4.5 to 11.0). Hemoglobin: 13.3 (11.7 to 15.5). Platelets: 278 (150 to 440). Differential: 39 percent lymphocytes (18 to 44). Fifty-one percent segmented neutrophils (35 to 80). Six percent monocytes (zero to10). Four percent eosinophils (zero to three).
- Erytherocyte sedimentation rate: 52 (zero to 20)
- C-reactive protein: 1.2 mg/deciliter (zero to 0.9)

Results from lab work on day nine (reported out on day 13):

- Antinuclear antibody (ANA II multiplexed bead immunoassay): Negative

- Lyme disease serology screen (ELISA) with Lyme disease Immunoglobin M (IgM) and Immunoglobin G (IgG) antibodies via Western blot if positive: Positive screen with positive IgM Western blot and negative IgG Western blot.

On day thirteen, she was asked to return to the office for further evaluation.

Electrocardiogram: Normal sinus rhythm. No conduction delay noted. She was otherwise feeling well, but continued to have the same near complete Bell's palsy. She had finished 10 of the 14 days of Augmentin, five of the five days of Prednisone, five of the 10 days of Acyclovir. Augmentin and Acyclovir were discontinued, and she was started on Doxycycline 100 mg PO BID for 14 days.

Osteopathic manipulation was initiated and was focus on Osteopathy in the Cranial Field (OCF) to help treat her Lyme disease-induced Bell's palsy. Osteopathic Manipulative Treatment (OMT) was provided on days 14, 21, 28, 32 and 49 of her illness, respectively. OMT focused mainly on OCF, utilizing direct and indirect treatments for any cranial dysfunction identified. Full-body evaluation was also performed on these visits to correct any other somatic dysfunctions identified. The other dysfunctions were treated with a variety of treatment methods, including OCF.

The single most significant dysfunction noted throughout this healing process was a repeated ipsilateral temporal bone restriction of different types on the side of the Bell's palsy. On some occasions, the temporal bone was externally rotated, and on other occasions, it was internally rotated. These temporal bone dysfunctions were subjectively difficult to treat, but did respond to treatment during each session. On some occasions, it responded to direct methods, and on other occasions, it responded to indirect methods. The only consistency noted was repeated significant dysfunction of the ipsilateral temporal bone. The specific dysfunctions present, and treatments that led to improvement of those dysfunctions, were variable. There was no baseline cranial examination for which to compare prior to her developing the Bell's palsy. Incidentally, on day 49 of the illness, and the last OMT session, the ipsilateral temporal bone restrictions were absent on examination.

By day 21, her second treatment, she had near complete resolution of her Bell's palsy. By day 28, her third treatment, she had complete resolution of her Bell's palsy. At day 49, her fifth and final treatment, there were no further cranial dysfunctions noted on examination, and osteopathic manipulation was discontinued. Repeat Lyme disease testing was also performed on day 49, which demonstrated another positive screen, but now she demonstrated positive IgM and IgG antibodies consistent with treated infection.

Discussion

The purpose of this case report is not to discuss Lyme disease or idiopathic Bell's palsy, but to discuss osteopathic manipulation in the treatment of Lyme disease-induced Bell's palsy. This case resulted in an astoundingly positive outcome. It is not scientific to propose that the outcome of this case was as a result of OMT, but its positive outcome is consistent with successful resolution of cranial dysfunctions utilizing the tenets of OCF. To the author's knowledge, there is not one published case of Lyme disease-induced Bell's palsy treated with OMM.

Bell's palsy has rigorous information available for potential medical[1,2] and surgical treatment[3] options. To a lesser extent, there is published material in the fields of occupational therapy,[4] physical therapy,[5] biofeedback,[6] acupuncture,[4] dental,[7] and OMM.[8,9] There are valuable osteopathic publications available to describe specifics of typical cranial dysfunctions and treatment goals for idiopathic Bell's palsy. Similarly, Lyme disease has well established guidelines for antimicrobial treatment.[10] This case report will not delve into any of this information.

Early in the patient's disease process, she was treated with amoxicillin/clavulanate for a human bite. Fortuitously, amoxicillin alone is a second-line treatment for Lyme disease.[10] Ideally, she would have acquiesced to the requested evaluation, including cerebrospinal fluid analysis through lumbar puncture, which the authors believe would have identified the Lyme disease at an earlier time.

On initial presentation of the Bell's palsy, Prednisone, Acyclovir and diagnostic testing as aforementioned are current standards of care for the management of idiopathic Bell's palsy.[1,2]

Following the positive Lyme disease test, doxycycline is considered a first-line treatment option.[10]

The authors propose that Lyme disease-induced Bell's palsy be treated based on current medical guidelines with the addition of OMM, focusing on OCF, to utilize a multimodal approach to the care of this patient.

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Standardized scores for visuospatial and sensorimotor function performance differed from classmates by 1.6 and 1.1 standard deviations of the classmates' scores, respectively. These differences attenuated, but remained significant, after controlling for overall cognitive scores.[14]

However, in this child and other children seen with motor developmental delays, there are some common problems found at the base of the skull, which are correctable and show objective improvements in muscle testing with the use of osteopathic manipulation.

Conclusion

Research on the treatment of children with "sensory integration disorders" or "developmental coordination disorder" using osteopathic manipulative techniques would be an interesting study using standardized and validated tests, as well as hand strength grip testing, which would give us valid, objective data upon which to base the research.

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Sequelae of traumatic closed-head injury: A case report of a 71-year-old male seen forty years later

Randy G. Litman, DO, FAAO

AL is a 71-year-old Caucasian male who complains of pain in the left calf and ankle, and numbness in both feet. He walks with a cane, fears he will fall, and is concerned that his gait will become more stiff and unsteady. He has been a patient for the past six years. In that time, his gait has become progressively more unsteady, and his pain is minimally controlled.

AL has had four spinal surgeries in almost ten years. Nothing helps the numbness, and his pain is temporarily helped by rest and his weekly Osteopathic Manipulative Treatment (OMT). His past medical and surgical history include: biconcave thoraco-lumbar scoliosis with thoracic dextroscoliosis and lumbar levoscoliosis, $T_5 - L_5$ multi-level degenerative disk disease, thoraco-lumbar spinal stenosis, bilateral lower extremity peripheral neuropathy, L_5 laminectomy for left leg pain (2002), spinal fusion at $L_{4,5}$-S_1 for left leg pain (2004), $T_{5\text{-}8}$ laminectomy for spinal stenosis (2007), removal of lumbar screws for neuropathy (2009), spinal osteoarthritis, obstructive sleep apnea, circumcision for phimosis (1980), colitis (1970s), and closed-head injury with loss of consciousness (LOC) (fell approximately 35 feet in 1967).

His medications include: Lyrica 75 mg twice daily (started in 2008 for leg pain), Vitamin B-1 100 mg daily (started in 2010 for neuropathy), Vitamin B-12 1000 micrograms daily (started in 2010 for neuropathy), Vitamin B-6 25 mg daily (started in 2010 for neuropathy). He reports no drug, food or seasonal allergies or adverse reactions.

AL is married and lives in a single home with his wife and extended family. He has worked in mining and construction most of his adult life. He played high school and college basketball, and likes to attend sports events. He denies tobacco, alcohol or illicit drug use, and admits to two +/- cups of coffee per day. He is the eldest of five children, three male and two female, all with arthritis, however, none with similar debility. He has two healthy daughters. His parents lived long lives with causes of death unknown.

AL admits to the inability to walk distances (pain and unsteadiness), neck pain and stiffness, multiple joint pains (ankles, knees and low back) and one episode of a memory lapse in 2005 (work-up negative for transient ischemic attack). He admits to three traumatic accidents: a motor vehicle accident (1962), an approximately 35-foot fall from a drilling rig associated with LOC and a left temporal laceration (1967), and crush injury to five digits of left foot (1967). He denies headache, visual changes, sinus complaints, heart complaints, polydipsia, polyuria, temperature intolerance, decreased energy level, changes in bowel or bladder habits, changes in appetite, changes in hair, skin or nails, and avoidance of people, places or events. AL is current on preventive health screenings—he had a colonoscopy in 2009 and his prostate-specific antigen was last checked in 2010.

Physical Examination

AL has an obvious "listing" stance to the left, and mild truncal adiposity. He is a well groomed and well developed 71-year-old gentleman who appears his age. He is awake, alert, and oriented to time, place and person. His height is 70.25 inches, his weight is 218 pounds, his pulse is 65, his respiratory rate is 12, and his blood pressure is 124/78.

Craniocervical findings include an estimated cranial rhythmic impulse of seven, rigid cervical fascia and range of motion, rigid temporal bones (bilaterally internally rotated), rigid right fronto-sphenoid suture, and visibly deviated symphysis menti (to right of midline). A tenderpoint is located within the left lateral pterygoid muscle belly, and somatic dysfunction– occipitoatlantal FS_RR_L is noted. Fundus exam reveals bilateral vascular narrowing and a left cortical cataract. Otoscopic exam reveals a dry, pink mucosa. Oral exam reveals poorly fitting dentures with palatal erosion anteriorly.

The heart is auscultated to be regular without audible murmurs, rubs or gallops. Cavernous sounds and crackles are heard within the right upper lung fields, and left lung field sounds are auscultated to be sibilant and clear. The thoracic inlet fascia favors glide from right to left. There is a hard end feel at the left hemidiaphragm and over the spinous processes of $T_{9\text{-}11}$. There is a midline surgical cicatrix over the spinous processes of the $T_{7\text{-}10}$ vertebrae. Inhalation motion restriction is found at left ribs one and eight and the right hemidiaphragm. No motion is detected at $T_{9\text{-}11}$ when monitored during respiration.

The abdomen is palpated to be soft, no tenderness is elicited, and it is visibly round. Fascial glide of the anterior abdominal wall favors exhalation. Lumbar range of motion is diminished with bilaterally rigid extension. A resting position of 10 degrees of right side-bend is favored. A hard, surgical cicatrix extends from L_2 to the coccyx. Pelvic exam shows the seated forward flexion test, standing forward flexion test and sphinx test all to be negative. The left sacral sulcus is palpated to be more shallow than the right. The right sacral base resists counternutation during the inhalation effort.

Examination of the lower extremities finds no edema, palpable two + pulses, pink and warm bilateral toes and feet, and a two-second capillary refill time. Resting position of the left knee is 10 degrees of flexion. The left ankle resists dorsiflexion. A spasmodic area within the distal left hamstring muscle belly (medially) is noted. The proximal left fibular head is restricted when glided anteriorly.

The neurological exam found no motor deficits (upper extremities/lower extremities) + five/five strength (hip flexion/extension, shoulder shrug, biceps/triceps, hand grip and wrist extension tested). However, sensory (lower extremity) focalities were found as follows: diminished vibration at bilateral thighs, impaired proprioception of left first toe and absent touch at bilateral plantar regions of feet. Pressure sense (feet) remained intact.

Assessment

1. T_5-L_5 degenerative disk disease
2. Biconcave thoraco-lumbar scoliosis
3. Peripheral neuropathy
4. Somatic dysfunction – cranial, cervical, ribcage and lower extremities
5. Fascial restriction/tissue texture changes – cranial, cervical, thorax, abdomen, lumbar, sacrum and lower extremities

OMT Plan (expressed by order of region and modality utilized)

1. Thoracic and rib dysfunction/restriction
   - Myofascial Release to thoracic inlet[1]
   - Muscle Energy technique to relieve left first rib restriction[2]
   - Functional fascial release of restricted left eighth rib[3]
   - "Doming" of the diaphragm[4]
2. Abdominal visceral/fascial restriction
   - Functional visceral release of anterior abdominal wall[5]
3. Cranial dysfunction
   - Balanced Membranous Tension to bilateral temporal bones and related sutures. Strain-Counterstrain to left pterygoid muscle tender point
4. Cervical dysfunction/fascial restriction
   - Suboccipital release, followed by high velocity-low amplitude to the occipitoatlantal FS_RR_L
5. Pelvis
   - Functional release of sacrum (balance and hold)[6]
6. Lumbar
   - Functional release of L_{2-3} region (balance and hold)[7]
7. Extremities
   - Progressive Inhibition of Neuromusculoskeletal Structures technique[8] followed by Muscle Energy technique (reciprocal inhibition) to left hamstring muscle
   - Functional release of proximal left fibular head[9]

Discussion

The typical goals for scoliosis treatment are to gain flexibility of the spine, improve spinal balance and optimize spinal function, i.e., range of motion.[10] AL received OMT for five years with these goals in mind, and a visible decline in function continued.

Hollis H. King, DO, PhD, FAAO, in his discussion on Osteopathy in the Cranial Field, recognizes the effects trauma can have on the primary respiratory mechanism,[11] and the relationships between the diaphragms and spinal function. In their recent *Journal of the American Osteopathic Association* article, Daniel Lopez, DO, and colleagues noted the relationship between trauma and the cranial base and the neural connections to the postural control muscles.[12] Management of the case with a Respiratory-Circulatory Model[13] is both systematic and anatomically logical if the patient's falling accident in 1967 is felt to be the trigger of the cranial/diaphragmatic dysfunction (Sutherland's core link),[14] and the multi-level degenerative disk disease.

The described regimen is aimed to be both anatomically and physiologically efficient. Key indicators for success will evaluate both gait and pain control. The patient has expressed motivation to be successful, and subtle glimpses of improvement (increased tolerance to walking distances) have been seen to date.

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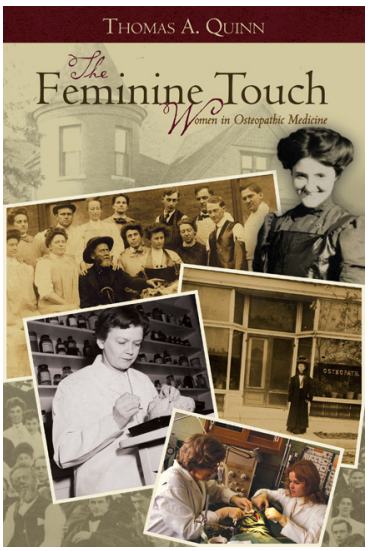

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Normalization of thoracoabdominal fascial and autononic tone: A case study for the diagnosis and treatment of atypical chest pain

Randy G. Litman, DO, FAAO

CK, a 39-year-old caucasian female, presented with acute onset of substernal "squeezing" and a sensation of dyspnea. She pointed to the sixth rib level of the left parasternal border. She noted that symptoms started one day ago, and denied alleviating or aggravating positions or activities.

CK has been a patient for three years, and is frequently seen for recurrent somatic dysfunction and fascial restrictions within the cranial vault, cervical spine, thorax, ribs and pelvis. Her past medical and surgical history include: acne rosacea, hyperlipidemia, allergic rhinitis, asthma, fibromyalgia, depression, abdominoplasty at age 34 years, tendon repair in the right ankle at age five years and two negative breast biopsies. Dyspnea and chest tightness were new symptoms for her.

Her current medications include: Zyrtec 10 milligrams (mg) or Claritin 10 mg daily (allergic rhinitis), Lipitor 10 mg daily (hyperlipidemia), Tylenol Simply Sleep nightly (as needed), Wellbutrin XL 150 mg daily (recently restarted for depression with anxiety), Albuterol metered-dose inhaler twice daily (recently started for asthma), Aerobid M twice daily (recently started for asthma) and a daily multivitamin. She reports penicillin is associated with vaginal yeast infections.

She is married, has two children and many animals, and lives in a house. She works as a substitute elementary school teacher, plays racquetball and rides horses for recreation, and is a soprano soloist at her church. She denies alcohol, tobacco and illegal drug use, however, admits to daily caffeine intake, but does not state quantity.

She has two healthy living children—a 12-year-old boy and nine-year-old girl. Her parents were divorced, and she has no siblings. Her father was 66 years old at death, due to chronic obstructive pulmonary disease and lung cancer. Her mother is 65 years old, alive, and has breast cancer, diabetes and asthma.

CK has had three pregnancies, with two deliveries and one miscarriage. She experienced menarche at age 12 years, and has regular menses every 28 days with seven days of menstrual bleeding. Her last mammogram was performed in 2007 (negative), and her last gynecologic examination was in 2010. She reports performance of monthly self-breast exams.

She denies palpitations, lightheadedness, dizziness, diaphoresis, nausea or vomiting. She denies air hunger and current wheezing, but notes difficulty taking a breath. She admits to frequent sinus congestion and rhinorrhea, occasional shortness of air (associated with exertion), an accidental fall on her right shoulder and side (approximately 10 years ago), and occasional rib and shoulder pain after racquetball. She admits to anxiety related to her father's death, and recent restart of her antidepressant medication by her family physician.

In 2008, the patient was given the *Oregon Health & Science University Fibromyalgia Clinic Questionnaire* as part of her fibromyalgia evaluation. Significant self-reported symptoms include: 1) exertional myalgia and weakness, joint swelling and arthralgia; 2) difficulty swallowing and constipation; 3) fatigue after exercise; 4) daytime sleepiness, poor sleep, tiredness upon awakening and restlessness of legs; 5) depressed mood, impaired coordination, impaired logical reasoning and questionable anxiety (feels much tension/worry at home over finances.); and 6) breathlessness and lightheadedness.

Physical Examination

CK is 68 inches tall and weighs 139 pounds. She is well developed, well nourished, well groomed and appears younger than 39 years old. She presents in acute distress. She is agitated, yet, awake, alert, and oriented to the three spheres. Blood pressure is 110/72; pulse (pre-/post-OMT) is 120 and 88 beats per minute; respiration rate is 20; and oxygen saturation (right atrial) is 100 percent.

Decreased breath sounds were heard at the right lung base on heart and lung exam. The thoracic inlet was boggy with a clockwise fascial direction of ease. Tenderness could be reproduced at the sixth left parasternal intercostal area. Inhalation motion restrictions were noted at the right hemidiaphragm and right ribs two through five. A T_5FRS_R

somatic dysfunction was noted. The abdomen was soft and flat, with elicited discomfort to deep palpation, over a boggy epigastrum. Anterior abdominal wall fascial motion was monitored during respiration and found to be absent.

Upper respiratory exam revealed injected tympanic membranes, a boggy and hyperemic nasal mucosa, enlarged nasal turbinates with clear secretions, and a cobblestone appearance to the posterior pharyngeal wall.

Cranial examination revealed a strain pattern of right sphenobasilar synchondrosis torsion with a maintained externally rotated right temporal bone position. Cranial Rhythmic Impulse is 12 cycles per minute. Cervical examination revealed flexion/extension of 45/45 degrees, presence of ropey paracervical soft tissue and somatic dysfunction– occipitoatlantal ES_RR_L. Lumbar examination demonstrated a bilaterally negative Thomas test, presence of paraspinal bogginess and somatic dysfunction– L_2FRS_R. Examination of the pelvis demonstrated a positive seated forward flexion test on the right, a negative standing forward flexion test bilaterally, a positive sphinx test on the right and a bilaterally negative Lasegue Test. The right sacral sulcus was palpably shallower than the left, and the right anterior superior iliac spine was positioned inferior to the left. A somatic dysfunction– right sacral extension was noted.

Assessment

CK is a 39-year-old caucasian female with dyspnea and localized, reproducible chest pressure. Her examination was consistent with the following differential diagnoses and physical findings:

1. Gastroesophageal Reflux Disease (GERD);
2. Asthma;
3. Somatic dysfunction– cranial, cervical, rib, thoracic, lumbar and sacral regions;
4. Diaphragmatic dysfunction– cranial, thoracic inlet, thoraco-abdominal and pelvic; and
5. Anxiety– multifactorial.

Treatment Plan

1. Myofascial Release to thoracic inlet and thoraco-abdominal diaphragm to ease lymphatics.
2. Fourth ventricle compression to release cranial diaphragm.
3. Balanced Membranous Tension to release right temporal bone and normalize torsion.
4. Balanced Ligamentous Tension with sequential Muscle Energy technique to right sacral base.
5. Functional release of thoraco-abdominal diaphragm, thoracic somatic dysfunction and ribs.
6. Lymphatic drainage of celiac plexus.
7. Fascial traction to tender area within sixth intercostal space until fascial creep sensed.
8. Functional release of L_2 somatic dysfunction followed by direct Muscle Energy technique.
9. Add Zantac 150 mg twice a day to regimen.
10. Advised to continue all other prescribed medications.
11. Breathing exercises given.
12. Dietary restrictions for acid peptic disease given.
13. Referral to gastroenterology to consider endoscopy.

Discussion

CK's physical examination found: (1) somatic dysfunction in six body regions; (2) fascial restriction within the thoraco-abdominal diaphragm and anterior abdominal wall; (3) tissue texture changes within the cervical, thoracic inlet, epigastric and lumbar areas; and (4) tenderness within two sympathetically related areas. The treatment plan was adapted from the following Greenman quotation:

> The function of the diaphragm…to assist in inhalation and exhalation…requires a functionally flexible thoracic spine, ribcage and lumbar spine. The abdominal musculature should have symmetric tone and length, and the pelvic diaphragm balanced…The respiratory-circulatory model looks at somatic dysfunction(s) and its influence on fluid movement and ease of respiration…The guiding principle…[is to] move from central to distal.[1]

A review of the patient's history and findings considered the following in the treatment plan: 1) significance of recurrent somatic dysfunction, i.e., cranial, cervical and sacral, and effects on the primary and secondary respiratory mechanism (the core link);[2] 2) the role(s) of psychosocial and perhaps medication stressors on anxiety and symptomatology, i.e., "once facilitated cord segments are established, stress of any kind (physical, mental or emotional) will initiate an outburst of sympathetic impulses to their associated viscera, even if that stress has no direct relationship…";[3] 3) The mechanical effect(s) of the abdominoplasty, childbirth and trauma on the respiratory mechanism, i.e., tone of the abdominal wall, balance of the pelvic diaphragm and motion of the sacrum; 4) the history of asthma and the new presentation of GERD may perhaps not be new, i.e., a manifestation of asthma.[4] Sontag and Harding[5] suggest shared embryologic origins between the distal esophagus and the respiratory tree.

In summary, GERD and reactive airway disease (asthma) were major contributors to the clinical presentation. Visceral dysfunction (lung and stomach) produced reactive sympathetic outflow that produced

lymphatic sequestration, increased cervical, thoracic and lumbar skeletal muscle tone, and decreased thoracic and lumbar mechanical motion. The other regions sequentially became part of the problem because of their neural, as well as structural, connections to the respiratory mechanisms affected. The treatments aimed to move fluids, reduce sympathetic tone and normalize somatic relations. Subsequent upper endoscopy revealed a diagnosis of distal esophagitis with metaplastic change (secondary to chronic gastric reflux). Gastroenterology switched CK to a proton pump inhibitor, and advised her to continue her dietary restrictions. She has been seen subsequently for recreationally induced rib somatic dysfunction, and reports her usual asthma triggers, but with the absence of chest symptoms.

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Palpating and Treating the Brain: Brain Nuclei, White Matter and Spinal Cord

May 17-19, 2013 at AZCOM in Glendale, AZ

Course Description

This is an **advanced (Level 5) class** that uses different paradigms by working extensively with the brain parenchyma, its gray and white substance. It trains practitioners to address very specific structures and physiology of the brain and spinal cord. These structures are often unaddressed primary/key lesions in somatic dysfunctions.

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- how to work with autonomic nervous system dysregulation;
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- how to release lesions in the white and gray matter of the brain and spinal cord.

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Program Chair

Bruno Chikly, MD, DO (UK) is a graduate of the medical school at Saint Antoine Hospital in France, where his internship in general medicine included training in endocrinology, surgery, neurology and psychiatry. Dr. Chikly also has the French equivalent of a Master's degree in psychology. He received a DO degree from the European School of Osteopathy in the UK, and a PhD in Osteopathy from the Royal University Libre of Brussels in Brussels, Belgium. He is the author of the book *Silent Waves The Theory and Practice of Lymph Drainage Therapy*, as well as the DVD *Dissection of the Brain and Spinal Cord.*

"I know that the normal brain lives, thinks and moves within its own specific membranous articular mechanism", Sutherland WG, *The Cranial Bowl,* Free Press, 1939.

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Breakfast, lunch and coffee breaks will be provided
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May 17-19, 2013 at AZCOM

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Evaluating teaching methods and asessment tools of high velocity low amplitude techniques for undergraduate osteopathic manipulative treatment of the spine

Millicent King Channell, DO, FAAO

Introduction

In the United the States today, there are two types of fully licensed physicians—osteopathic (DOs) and allopathic (MDs). Currently, there are more than 70,000 practicing osteopathic physicians and 19,000 osteopathic medical students.[1] This is equivalent to roughly six percent of the overall physician population and 20 percent of the medical student population. Osteopathic physicians' training in osteopathic structural exams, diagnosis and treatment is the most tangible distinction between the two groups.

However, there is evidence that the number of osteopathic physicians utilizing this training is low.[2] Physicians cite lack of confidence, time and reimbursement as the reasons for not utilizing osteopathic manipulative treatment (OMT).[2] Specifically they cite lack of continued training during their clerkship years while in medical school, as well as during their residencies. Additionally, there is a common point of contention between osteopathic physicians who utilize Osteopathic Manipulative Medicine (OMM) and those physicians (MD or DO) who do not. The contention is that there is a lack of standardization for the execution of treatments and a lack of sufficient research to show their efficacy. Although this assessment is largely inaccurate,[3,4,5] it still prevails.

The goal of this paper is threefold: 1) to review the literature and discuss the theories behind High Velocity Low Amplitude (HVLA) spinal manipulation; 2) to review and discuss the methods used to evaluate students proficiency in treating the spine with HVLA; and 3) to propose a baseline of standards for teaching these techniques and evaluating students.

Mechanics of HVLA techniques to the spine

HVLA utilizes a high-velocity thrust across a very small distance through the diarthrodial joint. These techniques move a joint that is exhibiting somatic dysfunction through its restrictive barrier such that the joint resets to appropriate physiologic motion.[6] This type of technique can be applied to both the axial and appendicular skeleton, although, for the purpose of this paper, we will focus on its application in the axial skeleton only. HVLA is usually associated with an audible "pop" or crack." This sound is thought to be caused by the formation of bubbles or "cavities" within the fluid through local reduction of pressure in the joint. This process of pressure reduction and sound production is referred to as cavitation.[7]

There are several hypotheses for the mechanism of action of HVLA techniques,[8] however in a review of literature, Evans narrowed it two: 1) release of entrapped synovial folds and 2) disruptions of periarticular or articular adhesions

Release of entrapped synovial folds

The synovial fluid has been demonstrated to have what are most likely nociceptive nerve fibers running through it that are not associated with blood vessels or any other structure. It is thought that abnormally displaced zygapophaseal joints, or somatic dysfunction of these joints, may impinge on these nerves causing pain.[9] Returning the joint to normal alignment therefore relieves these impingements.

Although there is a physiologic response of increased muscle tone when a force is exerted across a joint, the thrusting phase of a HVLA technique achieves peak force at approximately 91 +/- 20 ms. This is generally shorter than the 90-300 ms mechano-receptor mediated response of increased muscle tone, which may follow and can be verified with electromyelography.[9] The net result is aligned zygapophaseal joints without impingement of nociceptive nerve fibers, or the reflex response of increased muscle tone secondary to a thrusted force across them.

Disruptions of periarticular or articular adhesions

Lewit demonstrated that an examination of the cervical spine of patients before surgery, and again while under general anesthesia, showed restriction of motion largely unchanged despite chemical relaxation of the muscles. This suggests restriction of motion happens not only because of muscular restriction, but because of restrictions within the joints themselves.[10] The force

produced in an HVLA technique is large, relative to the size of the zygapophaseal joint; however, much of that force is believed to be absorbed by synovial fluid itself.[11,12] Conway showed less total force is required to produce cavitation when a fast rate of force is used compared to a slower rate. This is presumably safer. It has also been shown that, at very high shear rates, liquids take on qualities similar to solids, and they can fracture or crack.[14,15] This disruption of tension leads to at least a temporary (20-minute) increased range of motion of the joint.[16] Additional attempts at HVLA to these joints will not allow for cavitation, as the pressure has already been released and the gas dissolved back into solution.[16] They may also cause injury due to the increased range of motion and potential to be moved through the anatomical barrier.

In another study reviewing the biomechanical data, Evans noted that spinal manipulation techniques induce rotation around an axis that is parallel to the articular surfaces of the zygapophysial joint. This causes increased contact between one side of zygapophysial joints while gapping the other.[17] It's worth noting that Evans[7] disregards the commonly taught idea that HVLA realigns the vertebrae,[18] citing several cadaveric studies that show this to be false.[19,20] The disregard for this theory, although it may be accurate, seems premature, as cadavers and living beings would be expected to react differently under force.

Reproducibility of palpatory diagnosis

There are a number of groups interested in the accurate palpatory assessment of the spine, including osteopathic physicians; certain medical specialties (both allopathic and osteopathic), including physiatrists, anesthesiologists; sports medicine physicians; chiropractors; physical therapists and manual therapists. There are studies evaluating inter- and intra-examiner reliability. Several studies demonstrate acceptable intra-examiner reliability[25] regarding location of spinal levels and isolation of somatic dysfunction. However, inter-examiner reliability has depended on what is being assessed. Osteopathic physicians are trained to evaluate somatic dysfunction using TART—a four-part descriptor consisting of tissue texture changes, asymmetry, restriction of motion and tenderness. Palpatory research is similar in that regard as well.

Objectives may include simple spinal level location, tenderness at that spinal level or a named intersegmental somatic dysfunction. None of the studies assessed specifically for tissue texture changes. Multiple systematic reviews have been performed assessing the reliability of static palpation of the spine.[28,21,22,23] They consistently note pain provocation as the most reliable. However, it has been suggested that this may not be so much an assessment of the reliability of the examiners, as it is an assessment of the ability of the examined subjects to consistently recall the same site of pain from palpation to palpation.[21] Assuming the examiners are applying reasonably similar forces to similar tissues from subject to subject, and then asking the subjects for a response, what is actually being tested is the consistency of the examiners' palpation procedures, as well as the consistency of the subjects' ability to recall the same site of pain.

Locating correct spinal levels is important to multiple provider groups and landmarks are often a significant role player in accurate identification. Teoh notes that training anesthesiologists to do epidurals requires precise placement of thoracic epidurals. The T7 ± 1 spinous process level was identified correctly 78 percent of the time when utilizing the C7 landmark, and 42 percent of the time with the scapular landmark ($P = 5.84 \times 10^{-8}$). Physician errors were more common caudally (i.e., T8 or T9 identified). The C7 landmark was more accurate among those with a body mass index (BMI)<25 ($P = 6.51 \times 10^{-5}$). In those with a BMI ≥25, both landmarking methods were frequently inaccurate ($P = 0.312$).[27]

However, other literature cites that correct isolation of the C7 spinous process also requires a specific approach. In one study,[24] a control group was examined with the conventional procedure of using the most prominent spinous process as a marker for C7, compared with the experimental group in which passive flexion-extension of the patients identified the lowest freely moving spinous process as C6 and the following stationary cervical spinous process as C7. The C7 spinous process was correctly identified in 77.1 percent of patients in the flexion-extension group, compared with 37.5 percent in the control group (P<0.001). The accuracy of the flexion-extension method was significantly higher than the conventional method regardless of the patient's age, gender, and BMI. Particularly, this difference in accuracy was seen not only in patients with a BMI <25 kg/m(2), but also in those with a BMI ≥25 kg/m(2) (BMI <25 kg/m(2), P=0.006 versus BMI ≥25 kg/m(2), P=0.008). Snider found improved identification of L1-L4 spinous processes using multiple bony landmarks, including the sacral base, L5, Tuffier's line, T12, and the 12th ribs. Obesity significantly decreased accuracy (P = .0003) at L3 (50 percent versus 73 percent) and L4 (44 percent versus 72 percent).[26]

In all sections of the spine, correctly identifying spinal levels varies depending on whether any landmarks are used,[25,26,27] level of training of the participant (student, expert/physician) and size of the patient. However, systematic reviews consistently note that soft tissue paraspinal palpatory diagnostic tests have not been shown

to be reliable[28,22,23] and that better quality studies are needed for spinal palpatory diagnostic procedures.

Current undergraduate teaching standards of HVLA

As of 2011, there are currently 26 colleges of osteopathic medicine in the United States, offering instruction at 34 locations in 25 states. Total student enrollment is 19,427 nationally.[29] The Educational Council on Osteopathic Principles (ECOP) is a committee of the American Academy of Colleges of Osteopathic Medicine (AACOM), consisting of OMM Department Chairs or their representatives from every college. Part of its mission is to present recommendations for the improvement of curriculum in the teaching of osteopathic principles and practices on behalf of osteopathic medical education to the Board of Deans, and to further develop consensus in the teaching of osteopathic principles and practices among the schools. ECOP has set forth a minimum standard of techniques[30] to be included in the curriculum of osteopathic schools, which includes: Counterstrain, Muscle Energy, Myofascial Release, High Velocity Low Amplitude thrust, soft tissue, lymphatic technique and Osteopathy in the Cranial Field. It lists indications, contraindications and principles of diagnosis. ECOP also specifies some regions in the body to which HVLA may be applied and references manuals of treatments. It does not specify the number of lecture/lab hours per topic, the number of procedures a student must perform, in which position (patient supine, prone, seated or standing) they need to be done or in what environment it must be taught (i.e., adjustable tables, observed execution by table trainer, etc.). These are left to individual schools.

Undergraduate curriculums teach HVLA for at least two sections of the axial skeleton during the first- and second-year curriculum (at least one school is known not to teach HVLA of the cervical spine). The standard model is for students to be paired with classmates at a table (static or adjustable) for manipulation. Students may observe a demonstration at the center of the lab, which is often projected onto video screens for easier viewing. They may either have a directed lab, in which they are executing the techniques at the same time as the demonstrator, or they may be asked to execute the task after one full observation. In either case, they may or may not be directly observed at the time of execution. They may or may not be given formative feedback. Time constraints do not usually allow for more than one to two attempts per technique per student.

Recently, ECOP members presented a position paper at the annual meeting of the AACOM regarding trainer to student ratios. They recommended at least a one to eight ratio of trainers to students to allow for recurrent, but intermittent, feedback to students regarding the execution of techniques.[31] This number is based on a systematic review of standards in a variety of healthcare environments in which kinetic skills are taught. Such skills are seen in dentistry, surgery, anesthesia and chiropractic. The trainer to student ratios range from one to one through one to 12. Most ratios were one to four through one to eight. Smaller ratios were recommended for teaching cervical HVLA, cranial techniques and trigger-point injections.[31]

The level of experience among table trainers varies significantly. They may be second- or third-year medical students (who may or may not have demonstrated proficiency in OMM previously), residents (most often Family Medicine or NMM/OMM) and physicians (both board certified in NMM/OMM and non-board certified). Individual schools either create their own manuals or utilize one of a half dozen published osteopathic manuals.

Students are partnered with other classmates and practice techniques on one another. Their partner may or may not have somatic dysfunctions related to the designated region of teaching. Students may be partnered with the same person throughout the school year or change weekly. The body size differentials between partners may be large. As stated previously, some schools have adjustable tables while others do not. Therefore, the need for repositioning may be significant, but the environment (i.e., the table) may not allow for appropriate adjustments.

Current undergraduate assessment standards of HVLA

Students may be assessed through written, practical and, less commonly, oral exams. For the scope of this paper, we will focus on the practical exam. Most schools have midterm and final practical exams each semester of the first two years. However, HVLA of the spine may or may not be tested each of the four times. Students are usually tested using one another as patients for examination purposes. Although some schools utilize standardized patients for practical exams, the author knows of no school that allows for HVLA to be performed on standardized patients at any time.

Objective Structured Clinical Examination (OSCE)[32,33,34,35] for student assessment is well established, with an extensive body of research documenting it is a valid means to assess clinical skills that are fundamental to the practice of medicine.[36] The OSCE consists of a circuit of stations that test a range of skills and learning to assess undergraduate medical students. A well-constructed OSCE provides important information about candidate performance and the quality of training. Although many osteopathic colleges incorporate OSCEs into their curricular assessments,[37] it is unclear how many, if any,

incorporate OMM into these assessments. However, as previously stated for safety and appropriateness, it would not be expected to allow HVLA to be performed on an standardized patient. It has been shown by Boulet, et al, that OMM can be validly assessed using the OSCE format and without NMM/OMM faculty. That model, however, excluded HVLA as well.

The diagnosis portion of practical exams usually consists of physician trainers verifying the diagnosis of the student examinee as found on their partner. Scores may be given based on simply finding the levels of dysfunction or may require an exact diagnosis, with points given for each aspect that is accurate (i.e., flexion/extensions, side-bending, rotation, level of dysfunction).

Some schools have required third-year clerkships in OMM, but most do not. This is, in part, secondary to OMM preceptor shortages. Additionally, because of safety and ethical issues, HVLA is not tested and is explicitly excluded on the one national practical exam, the COMLEX-PE.

Models of Teaching and Learning Motor Skills

Learning is the act or process of acquiring knowledge or skills. With regards to motor skill learning, there are several models utilized that affect learners' performance:[39] observational practice, focus of attention, feedback and self-controlled practice.

Observational practice, particularly when combined with physical practice, can make important contributions to learning.[40] Neuroimaging experiments have shown common neural structures being activated in both observation and action.[41] Observational practice, however, may afford the learner opportunities to observe subtleties of tasks that would otherwise be lost if they were asked to execute a task simultaneously to it being taught or from a static manual.[42] This is best used when participants alternate between physical and observational practice in pairs. Even when given half the trials of execution of someone not in a pair, those who worked in dyads performed as well. In this way, teaching in pairs is time and cost effective.[43] Additionally, there is some evidence that medical trainees who worked in pairs tend to report greater enjoyment.[44]

Critiques on motor skill learning often focus on how the movements of certain body parts should be coordinated with others in space and time. An example would be executing a supine HVLA thrust to T6-8 rotated right, side bent left: The physician stands to the left of the supine patient. The physician places their thenar eminence under the transverse process of the right T7. Multiple studies, particularly in the field of sports, have shown that directing the learner's attention to their own movements and body parts (i.e., internal focus) is relatively ineffective.[45,46,47,48] Instead, the performer should be directed to the effects of their movements (i.e., an external focus). Small changes in the wording of instruction toward, for example, what the patient position looks like when correctly situated, would lead to more accurate and effective long-term learning. Focus of attention externally leads to the use of unconscious and automated processes. Additionally, electromyogram studies have shown decreased activity of performers' muscles when utilizing an external focus. This indicates a physical efficiency of motion as well.

The rate at which feedback is given, and its focus, have also been found to have significant effects on long-term learning. Multiple studies have shown that intermittent feedback is more effective than constant feedback. A study evaluating students given constant feedback after performing chiropractic tasks found students to have reduced errors during practice, but lower long-term retention rates.[49] Sidaway studied 40 healthy subjects (20 males and 20 females) with a mean age of 21.8 years (standard deviation = 4.9 years) who were given either manual feedback (physically repositioned-GD) or verbal feedback (knowledge of results-KR) to learn to distribute their weight on their feet at a 70 to 30 ratio. This feedback was given at either every attempt or every third attempt. Following acquisition, retention tests were performed 10 minutes, one day and one week later, during which time no feedback or guidance was given. Analysis of this interaction revealed that the most accurate performance was exhibited by the KR group (33 percent), while the GD group (100 percent) consistently exhibited the poorest learning.[50] Additional studies show that when given negative feedback on trials, performers performed worse in their long-term retention compared with those given feedback on their best performances.[51,52,53] It is important to note that, in the performance of the complex task of performing spinal HVLA, Scaringe, et al, found no significant difference in results of qualitative feedback versus quantitative feedback.

Technology integration

In terms of learning aids, technology in teaching manipulation lags behind other disciplines. Simulators are commonly used to teach all levels of learners in the fields of cardiology, surgery and gynecology.[55,56,57,58,59] At the simplest level, the use of video demonstrations that the learner has control over (i.e., to replay slowly or at will) has been shown to significantly enhance movement performance.[60] A few studies have utilized force pads and manikins, separately and combined, to teach spinal manipulation.[61,62,63,64] Scaringe used a force transducer consisting of a piezoelectric film embedded in a one-inch thick rubber to measure the force exerted by students.

The study did not specify if this was used in isolation, with a manikin or with a live patient. Triano quantified student performance and force using a Leader 900 Z-series manipulation table (Leader International, Port Orchard, WA) modified with an AMTI force plate to independently evaluate the biomechanical characteristics of loads acting through the patient's body. In these studies, students using the simulators had significantly less variability in the execution of force and were just as proficient as the control group.

Young, et al, created a life-size manikin of the human head with a flexible plastic neck, called the Thrust in Motion Cervical Manikin (TMC). The authors gave no significant detail as to its construction, or how they set the manikin to simulate somatic dysfunction. However, in blind scoring of students trained only on the TMC versus the traditional teaching model of using fellow students, students were equally proficient. These studies show that students can avoid the potential risk of strains, sprains and limited access that occurs with the model of practicing solely on fellow students. Moreover, it suggests a model that might be utilized by schools and certifying bodies to determine proficiency.

Discussion

There are several practices that should be considered for revision. Review of the literature has shown that there is not acceptable evidence of inter-examiner reliability in static palpation of the spine, irrespective of their level of training.[28] Tenderness to palpation has been shown to be the most reproducible aspect of palpation, and that may not be completely reflect practitioner skill, but rather patient recollection of pain. In other areas of inter-rater reliability, practitioners may correctly assess the physical location of dysfunctions found, but misname the level.[21] Additionally, patients with BMI>25 has been shown, even in the best of circumstances, to significantly decrease accuracy of palpation.[22,23,24] This is problematic considering that 68 percent of Americans are overweight or obese.

Collectively, this information refutes the validity of many diagnostic portions of the practical exams taking place at osteopathic colleges by which graduates are evaluated. Just as schools have both individually and collectively created manuals and videos of techniques, an objective model should be created for assessing palpatory skills. In many other areas of medicine, simulation models have been created to allow students to be systematically trained to find particular physical findings and demonstrate task proficiency.[55,56,57,58,59] Studies from the chiropractic community suggest it is possible to have models in which students can be trained to use simulators with and without the presence of trainers. This way, students could potentially have significantly increased opportunity to practice thrusts and receive quantitative feedback. Manikins of varying sizes may also simulate different body sizes. This would be objective, reproducible and appropriate given the average size of the American patient.

The osteopathic profession is rapidly growing. ECOP's recent recommendation for trainer to student ratios for OMM labs may help schools negotiate increased funding for faculty and table trainers. In several of the studies referenced here, adjustable tables were the norm[61,62,63,64] to aid students in learning. Schools without such equipment may be impeding the learning of HVLA techniques by many of their students. Adjustable tables are imperative given the dynamics of practitioner body weight relative to that of the patient in order to exert correct vectors and amounts of force.

There is no minimum standard for who can teach in student labs (i.e., students teaching students, residents, attending physicians). The nuances of HVLA, particularly to the spine, are such that they require not only close supervision, but opportunities to practice. The current standard in osteopathic colleges guarantees neither. There must be a base standard for teachers in labs, particularly if students are permitted to not just be tutors, but primary teachers. It is recommended that students not be permitted to be primary lab trainers of HVLA unless they have demonstrated proficiency to an appropriate physician trainer and participated in the curriculum described below.

Just as advanced cardiovascular life support (ACLS) trainers must go through additional certification to teach courses, there should be a curriculum of basic education methods that all educators in OMM, and particularly HVLA, should undergo. This should include not only medical knowledge, such as the safety and efficacy of cervical HVLA, which is controversial, but modules on how to teach (external versus internal focus; intermittent versus constant feedback). Additionally, video recordings of students at some point prior to their summative assessments would also be useful.

In assessment, students may or may not be asked to demonstrate their skill in HVLA at one or more spinal levels over the course of their training. Students who are required to demonstrate a complete execution of HVLA to the spine are verified through the audible "pop" and/or re-examination by the physician examiner. The higher they go in their training, the less likely they are to have OMM incorporated or be assessed in it. If OMM is included in their clerkships, HVLA may be categorically excluded from assessments, as it is in the COMLEX-PE. The last assessment of their skill level in HVLA may have been in their second, or even first, year of medical school. Here

again is where a simulation model would be useful. This is to ensure student confidence, not only regarding their palpatory findings, but also about its applications. Students should be required to demonstrate HVLA at the time of initial exposure in front of a lab trainer (formative), as well as in an exam setting (summative) during their first two years, but there must also be subsequent evaluations annually.

Proposal for teaching HVLA of the spine at the undergraduate level

In teaching HVLA, there are four aspects that the author proposes need to be addressed in order to create a more adept population of students: standardization of the training environment, standardized training of trainers, increased use of simulation technology and standardization of testing.

Standardized training environment

ECOP represents the leaders in OMM education at the undergraduate level. Their stance on student to teacher ratios and tiers of teachers should be heeded. With respect to teaching HVLA, this proposal recommends a one to four ratio of faculty to students, specifically for HVLA. This is based on the importance of supervision of a technique, which, in the hands of a novice, may be more prone to injury, particularly in the cervical spine. It is recommended that all schools utilize adjustable tables for all students. Many schools have already met this criterion, but several have not. With large variability in the size of both students and patients, it becomes critical to allow for adjustments of positioning to suit individual circumstance.

The studies previously referenced consistently show that the best model for long-term retention of kinetic tasks and spinal manipulation include the following: the opportunity to observe a technique being performed prior to practice, the opportunity to practice that technique several times under supervision, and receive both qualitative and quantitative intermittent feedback. Along with the above student to faculty ratio, the use of simulators and video feedback must become the norm. Many schools already have entire labs dedicated to medical simulators. At osteopathic schools, the standard must include simulators for spinal manipulation, including HVLA. This will aid in student confidence, and the limited availability of teaching faculty and practice opportunities.

Standardized training of trainers

It is a thorny task to convince experts in the field that the skill of teaching is different than the skill of treating. Moreover, when people are proficient in a task, it is difficult to persuade them that the way they were taught is perhaps not universally the best way to create the largest number of proficient students.

Most physicians do not have formal training in being educators. Despite many osteopathic schools having combined programs with Masters in Public Health, Masters in Business Administration and Law degrees,[66] only the University of New England and A.T. Still University offer combined programs with a Master of Science in Medical Education Leadership and a Doctor of Health Education, respectively. Additionally, the Costin Institute at Midwestern University in Chicago, and AACOM's faculty development CME program entitled Training Osteopathic Primary Care Educators,[67] are designed to expose osteopathic educators to educational theory. However, each of these programs is generalized to all medical educators, at both the undergraduate and postgraduate levels, and they are also directed at all specialties of medicine.

Recommended here is a focused CME program specifically directed at osteopathic educators who are teaching OMM at the undergraduate level. There should be a baseline of educational theory and practice for our schools. Specifically for spinal HVLA, the evidence supports moving toward a model of positive, intermittent feedback with an external focus in coaching. Many faculty are overwhelmed and uninformed regarding medical education pedagogy, learning through trial and error, and reinventing the wheel every time the faculty change. Although what it listed here is being described in the context of teaching HVLA, it could largely be applied to other techniques.

Proposed trainer curriculum (10 total hours)

Teaching methods (7 hours)

- Models of teaching and learning motor skills (1)
- Evidence-based diagnosis of the spine (1)
- Safety and efficacy of HVLA (focus on cervical spine) (1)
- Effective coaching/teaching for manual techniques (2)
- Utilizing innovation and technology in the OMM lab (2)

Assessment and evaluation methods (3 hours)

- Validating assessment tools (1)
- Utilizing subjective and objective assessment tools in OMM (2)

Given the limited resources of time and financial support for physician training after residency, the author proposes this as a relatively short CME program that could be provided in both webinar and live formats. Webinars would allow access to the largest base of physician teachers, and may or may not require lab supplementation at a later time. A live forum at several national conventions, specifically the American Academy of Osteopathy,® the

American College of Osteopathic Family Physicians and the American Osteopathic Association would also be desirable, as these are highly visible meetings. These conventions would yield the largest exposure to physicians who are most likely to be teaching OMM at the undergraduate level. This program would be required of at least one current attending physician at every OMM department nationally. It is also recommended that every NMM/OMM resident be required to participate once as part of their residency. Although every residency is not associated with a school, these residents are more likely to be involved in teaching medical students, either in the lab or on clinical clerkships, compared to other specialties. These efforts would increase the number of physicians who are trained at each institution and all four years of osteopathic medical education.

Increased use of simulation technology

Although performed in the first and/or second year of most osteopathic medical schools, there is no mandate for students to be tested on HVLA of the spine at any point in their training. No manikin can completely substitute for the nuances of treating a live patient. It is suggested that schools not abandon the use of training and testing students on one another, but augment that evaluation with the use of simulators that can give the objective feedback so sorely lacking in our current assessments. It is recommended that students be tested at least annually on HVLA of all three levels of the spine. In the chiropractic literature, the appropriate amount of force was developed by statistical analysis of faculty performing the techniques. Consideration should be given to developing standards for thrust, both locally and nationally.

Standardization of testing

At the national testing level, the exclusion of HVLA is obviously secondary to safety issues for the standardized patients who are engaged for this exam. There is also the very important issue of a reproducible experience for each tested candidate. Currently, the COMLEX-PE does not test specific procedures, such as phlebotomy, ACLS, laceration repair etc. Therefore, it would not be advisable to disrupt the continuity of the test to specifically examine the execution of this particular technique given the obstacles previously listed. However, it is expected that, at some point, the National Board of Osteopathic Medical Examiners will test these procedures and, at that time, they too would be asked to include HVLA and the use of simulators to evaluate students.

Conclusion

There are a number of aspects of teaching HVLA techniques that the osteopathic profession is executing well. These include the use of manuals, some aspects of technology, such as access to video demonstrations, working in pairs and observation of techniques by an expert. All are consistent with current literature regarding motor skill learning, and should be encouraged at the formative stages of task acquisition.

As a profession, we must stay current with educational theory and teaching aids. That includes standardization on multiple levels including: the OMM lab environment, the table trainers, the utilization of technology, as well as the standardization of testing. By doing these things, we will stay current with educational standards, and hopefully increase the pipeline of confident, proficient practitioners of OMM.

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Normalization of Muscle Function

June 14-16, 2013 at UMDNJSOM in Stratford, NJ

Course Description

The most beautiful symphony played…the most graceful ballet performed… the greatest athletic feat… these all have in common one simple thing: Muscles firing in synchronous and fluid motion with harmony, power and beauty. Yet any musician, ballerina or athlete will tell you that an injury severely hampers their performance. An instrument as amazing as the human body deserves an approach to diagnosis and treatment that recognizes its complexity and inherent healing capacity.

This Level 2 course is high yield, with a focus on common muscle dysfunctions and dysfunctionally related problems. It will explore the relationship between chief complaint and specific pain referral patterns, mechanism of injury and symptoms. The participant will perform specific neurologic, orthopedic and palpatory examination techniques to determine the neuromuscular dysfunction. These examination techniques will lead to a comprehensive and elegant treatment.

The treatment approaches that will be covered include osteopathic manipulative treatment (counterstrain, myofascial release and muscle energy techniques), spray and stretch, medical acupuncture and injections. It will also explore the exercise prescription utilizing stretching, strengthening and neuromuscular rebalancing. Participants' newly expanded diagnostic and treatment skills will allow for immediate success in treating patients upon return to practice. The result will be improved patient outcomes and a more enriching practice experience. Physicians and physicians-in-training, especially those involved in primary care, should be interested in attending this course.

CME

20 hours of AOA Category 1-A credit is anticipated.

Program Chair

Jay B. Danto, DO, is a 1994 graduate of Michigan State University College of Osteopathic Medicine. He is board certified in Neuromusculoskeletal Medicine/ Osteopathic Manipulative Medicine and Family Practice, and serves as an associate professor at Kirksville College of Osteopathic Medicine. Dr. Danto has obtained a Certificate of Special Proficiency in Osteopathy in the Cranial Field and training from the Helm's-UCLA Medical Acupuncture Training Program. He is the author of many articles on osteopathic philosophy and education, including the textbook *Normalization of Muscle Function* and a book for patients called *Healing & Anti-Aging for Your Back & Neck Pain*.

Course Times

Friday and Saturday: **8:00 am - 5:30 pm** (breakfast and lunch provided)
Sunday: **8:00 am - 12:30 pm** (breakfast provided)

_____ I require a vegetarian option
_____ I require a gluten-free option

Course Location

University of Medicine & Dentistry of New Jersey
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June 14-16, 2013

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Osteopathic manipulative treatment of pes anserine bursitis using the triple technique: A case report

Richard Chmielewski, MS, DO, FACEP; Nicole Pena, OMS IV; Gina Capalbo, OMS IV

Abstract

Knee pain is a common complaint among patients presenting to their primary care physician. Not only is the knee joint the largest joint in the body, it also provides structural support to the entire body. Being that it is such a large, superficial joint, the knee is susceptible to various injuries and somatic dysfunctions. The authors present the case of a 61-year-old male complaining of pain in the anteromedial knee and subsequently diagnosed with pes anserine bursitis. The patient was treated with traditional medical therapy without significant, persistent symptom relief. The approach of the authors in this case was to treat the patient with the Triple Technique for the knee—a series of Muscle Energy, Counterstrain and Balanced Ligamentous Tension techniques for treating the knee joint. The Triple Technique has been used by the authors for a variety of knee somatic dysfunctions, but is suggested by this case for the treatment of pes anserine bursitis.

Introduction

The prevalence of knee pain and symptomatic knee osteoarthritis has significantly increased in recent years. Nguyen, et al,[1] has found that the frequency of knee pain has increased about 65 percent in men and women in the 20 years after 1974. In an investigation by Wood, et al,[2] they found that 36 percent of the patients in a 745-adult study with the primary complaint of knee pain presented with at least one nonarticular condition. Included in the nonarticular conditions was pes anserine bursitis. Anserine bursitis is a common disease in type 2 diabetics and females who present with refractory anteromedial knee pain. Type 2 diabetic patients have been shown by Cohen, et al,[3] and Unlu, et al,[4] to have a high prevalence of pes anserine bursitis. In their studies, 24 to 34 percent of individuals with type 2 diabetes who report knee pain have anserine bursitis. Helfenstein and Kuromoto[5] report the increased prevalence in the female population may be due to a higher incidence of valgus angulation of the knee. The change in angulation places more stress on the pes anserine bursa, the most frequently inflamed bursa of the knee.

The pathophysiology of anserine bursitis is influenced by the mechanics of its anatomical structure. Pes anserine is the conjoined tendon of the sartorius, gracilis and semitendinosus muscles inserting on the proximal medial aspect of the tibial metaphysis. These muscles act primarily as flexors of the knee and secondarily will assist in the internal rotation of the tibia. Therefore, they protect the knee from excessive valgus and rotational forces. Located inferior to the attachment of the three tendons is the pes anserine bursa. Bursae are synovial tissue-lined structures that allow tissues to glide over each other. The pes anserine bursa functions to reduce frictional forces located between the three tendons previously mentioned and the tibial metaphysis. However, repetitive valgus and rotational forces exerted stress the bursa. This stress may cause the synovial cells lining the bursa to secrete more fluid, thereby causing pain and bursitis or inflammation of the bursa.[6,7]

In a clinical setting, pes anserine bursitis should be considered whenever the patient has point tenderness along the medial aspect of the knee, complains of anterior knee pain or has pain with ascending and descending stairs. On physical exam, the pes anserine bursa can be palpated distal to the tibial tubercle and three to four centimeters medially. If tenderness is elicited, or indicators of inflammation are seen in this location, anserine bursitis should be considered in the differential. Furthermore, the patient should be assessed for hamstring hypertonicity because of its strong association with pes anserine bursitis. In addition, Forbes, et al,[8] illustrated the importance of X-ray and MRI studies in ruling out other medical conditions. Plain radiographs and magnetic resonance imaging (MRI) will assist in ruling out a proximal tibial stress fracture. Furthermore, the X-ray can diagnose pathology that can contribute to a tight hamstring and anserine bursitis, such as osteochondroma, osteochondritis dissecans and medial compartment arthritis. Other concurrent pathologies can be ruled out with and MRI, including Baker and meniscal cysts, bone cysts and fluid in the semimenbranosus bursa.

Current treatment regimens for pes anserine bursitis are focused around physical therapy, rest or restriction of physical activity, local anesthetic or corticosteroid injections into the bursa, and rarely surgical intervention.[6] Physical therapy is focused primarily around isometric stretching of the hamstrings, quadriceps, hip adductors and gastrocnemius muscles. Surgical decompression may be indicated in individuals who are immunocompromised with

a local infection and not responding to standard antibiotic therapy. While these treatments have been effective, many people still have knee pain. This case report would like to recommend another treatment for pes anserine bursitis: The Triple Technique—a series of osteopathic manipulative techniques used to treat somatic dysfunctions of the knee. This technique is non-invasive and may offer significant reduction in pain and symptoms.

Case Presentation

Report of Case

The patient in the present case is a 61-year-old white male. He is a self-employed contractor who complained of pain in the left anteromedial knee. The patient remembered having injured that knee about two years prior while walking around and climbing stairs. He eventually recovered without treatment, but would have an occasional recurrence of diffuse pain in the left knee. The patient had been seen about eight months prior by another physician for pain in the medial left knee. An MRI was done at that time to rule out a meniscal tear. The MRI was negative for "internal derangement." The week prior to his initial visit to our clinic, a flare up in pain occurred without his recollection of any specific trauma or strain. The patient presented ambulating with a slight limp and unassisted by crutches or a brace.

The patient's past medical history is significant for dermatitis and recurrent dislocation of the left shoulder. Past surgeries include excision of a porocarcinoma (an eccrine gland carcinoma) at the nape of his neck. Medications include Aldara cream (five percent) as needed for dermatitis and an Epi-Pen kit for an emergencies only. He is allergic to bees and has no known drug allergies. He is married and has two adult offspring. He denies tobacco use, admits to occasional alcohol use and denies any history of illicit drug abuse. As for the review of systems, the patient reported pain in the left knee, especially anteromedially. He denied the knee swelling, locking or "giving out."

The physical exam revealed intact range of motion in the left knee. Tenderness to palpation was noted only at a diffuse area just medial to the anterior tibial tubercle and just inferior to the joint line of the knee. There was no effusion, no excessive warmth to palpation, no erythema, no palpable click or crepitus on movement and no locking of the joint. Anterior draw test was negative. Lachmann's test and McMurray test were negative. Neurological exam revealed no deficits. Imaging Studies included an X-ray of the affected knee, which was reported as essentially negative. After completing the history and physical, we determined the diagnosis to be anserine bursitis of the left knee.

We proceeded with the standard treatment. The patient initially received an injection of Celestone Soluspan, 12 mg mixed with one percent xylocaine (without epinephrine), in and around the left anserine bursa and tendons of the adductor muscles. He was also advised to do hamstring stretches and quadriceps exercises at least twice daily. The steroid/anesthetic injection helped temporarily. On re-exam a few weeks later, he reported discomfort, especially on mild hyperextension of the left knee joint, a clicking within the knee joint and diffuse stiffness. An MRI was done of the left knee, which was reported as negative. There was no tenderness at the injection site of the anserine bursa.

The next step in treatment of the patient's knee included a combination of osteopathic manipulative techniques we call the "Triple Technique." This technique is used to treat various somatic dysfunctions of the knee, as it is well tolerated by patients and serves to restore balance of nutrients and waste productions into and out of the knee joint. The surrounding synovial fluid supplies the arterial, venous and lymphatic circulation to the cruciate ligaments. Sequentially straining and relaxing the cruciate ligaments assists in the influx of nutrients and outflow of waste products from the joint.

The Triple Technique is based on applying three well-accepted osteopathic manipulative treatment modalities: Muscle Energy (ME), Counterstrain (CS), and Balanced Ligamentous Tension (BLT).

Description of the Technique

Part 1

Muscle Energy was first developed by Fred Mitchell, Sr., DO, FAAO, and is postulated to activate the Golgi tendon reflex in order to improve mobility by decreasing tonicity of hypertonic musculature and restoring physiologic limits of the joint.[9] Applying ME medially and laterally across the knee joint will affect the medial and lateral collateral ligaments, the joint capsule, and the medial and lateral myofascial components (e.g., adductor muscles, the iliotibial band, etc.) With the patient in the supine position and leg extended, the physician holds the lateral ankle with one hand and just above the joint line on the medial knee with the other hand (Figure 1). The patient is instructed to push the ankle against the physician's hand laterally while the physician applies a medial force. This is an isometric technique. After three to five seconds, the patient relaxes the leg completely. The physician takes up any slack in the joint, repositions into the barrier and repeats three to five times, as with other ME techniques. Then the physician changes hand position to affect the opposite side. One hand is placed on the medial aspect of the ankle and the other on the lateral aspect of the knee just

above the joint line (Figure 2). The physician instructs the patient to push the foot and ankle inward against his/her hand for three to five seconds while the physician applies a counterforce as before. The patient then relaxes the leg for a few seconds, the physician takes up the slack in the joint by repositioning to the new barrier and the process is repeated 3-5 more times.

Part 2

Counterstrain was developed by Lawrence H. Jones, DO, FAAO, as a means of relieving joint pain by placing it into a position of maximal relaxation. Hypershortening a tight muscle and mildly straining its antagonist allows the muscle spindles to reset, physiologically reducing the firing of mechanoreceptors that stimulate muscle contraction. Applying CS anteriorly and posteriorly across the knee joint will affect the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL), as well as their associated tender points. A tender point is a dime-sized area with palpable tissue texture changes. Tender points are often tense, fibrotic and tender to the touch. They are used to diagnose and treat. The patient is positioned so that the tender point is no longer tender. This position is held for 90 seconds.[9]

In the Triple Technique for the knee, we modify the Anterior Draw Test into a CS technique. The patient lies supine with the affected knee flexed to 90 degrees with the foot on the table. The physician sits on the foot to stabilize it and interlocks the fingers behind the knee (Figure 3). The physician applies a gentle force anteriorly to stretch the ACL, thereby hypershortening the PCL. The position is held for 90 seconds then slowly released. For treatment of the ACL, the patient remains supine with the leg extended, and a comfortable but firm support (e.g., hard foam pad) is placed under the distal thigh just proximal to the joint line on the affected side. The physician locates the flat surface of the tibia and places his/her thenar eminence there (Figure 4). The physician applies a force directly down toward the table in the plane of the joint line, getting feedback from the patient to determine the amount of pressure needed for the patient to feel a stretch but not pain. This position is held for 90 seconds and then slowly released.

Part 3

Balanced Ligamentous Tension or Ligamentous Articular Strain techniques were developed by Dr. Andrew Taylor Still as "general osteopathic techniques" and later published by Dr. William G. Sutherland in the 1949 *Year Book of the Academy of Applied Osteopathy*. These are indirect techniques affecting the connective tissues of the body. Utilizing disengagement, exaggeration and balance with approximately one to three pounds of pressure, BLT is known for improving blood and lymphatic flow by balancing affected tissues.[9] The last part of the Triple Technique for the knee joint is a technique to balance the tension in the muscle and fascial components of the entire leg, up to the hip and low back. The patient remains in the supine position. The physician uses both hands to lift and support the leg and ankle joint. The physician rotates the leg into internal and external rotation while monitoring for the end point in each direction (Figure 5). Upon palpating the midpoint between the points of tension, the midpoint position is held and gentle distraction is added (about 10 to 15 pounds of pressure). The position is held until the physician appreciates a change in the tissue tension and a release, or passive stretching or laxity. Traction on the leg is interrupted and the technique is then repeated two to three more times, each time rotating and feeling the midpoint position as before (which often may change), and the patient's leg is gently returned to the table.

The patient in this case was seen every few days for a total of three sessions of the Triple Technique to the affected knee. He reported marked improvement almost immediately, with lessening of the anteromedial tenderness, as well as pain and stiffness of the joint after each session. On physical exam there was continued, steady improvement in mobility, weight bearing and normalization of his gait. The patient was seen a couple more times for follow up and Osteopathic Manipulative Treatment as his condition resolved. Over the ensuing three years, from 2009 to the present, he has been seen for other unrelated health concerns and his knee pain has not recurred.

Discussion

Pes anserine bursitis is an important differential diagnosis in individuals with knee pain, especially when there is point tenderness localized in the anteromedial aspect of the knee. Alvarez-Nemegyei and Canoso[10] report that diabetes mellitus is a known predisposing factor leading to this condition. In addition, knee osteoarthritis, tight hamstrings and obesity are considered risk factors. Finally, long-distance runners have a high prevalence of anserine bursitis. Rennie and Saifunddin[6] state that the mainstays of treatment of anserine bursitis are physiotherapy. This includes ice initially, followed by heat, restrictive activity and later muscle-conditioning exercises and non-steroidal anti-inflammatory drugs (NSAIDs). However, glucocorticoid injections are the only treatment regimen to be shown effective in clinical trials.[10] In a study by Larsson and Baum,[11] steroids significantly improved symptoms when compared to lidocaine alone. In fact, 71 percent of patients injected with steroids showed significant improvement after follow up in two to 61 months.

Nevertheless, there remain symptomatic individuals after traditional therapy has been applied. In this case

study, the Triple Technique was performed on a patient who classically presented with pes anserine bursitis, but conventional therapies failed to improve his symptoms. Not only did the patient report marked reduction and resolution of localized tenderness, pain and stiffness, but objectively, on physical exam there was improvement in mobility, weight bearing and normalization of his gait after the Triple Technique was performed. This present case report suggests that the Triple Technique may be used as an adjunctive remedy in the treatment regimen of anserine bursitis.

We have also used the Triple Technique to treat chronic bilateral knee pain and osteoarthritis. As an example of one specific case, a patient was diagnosed with "bone on bone arthritis" by an orthopedic surgeon. The patient could barely finish one round of golf a week and would still be in pain for days afterwards. After the Triple Technique was utilized, he was able to resume his passion and play 18 holes of golf for five consecutive days in a single week. Furthermore, he cancelled a scheduled total knee replacement surgery, because of the marked improvement in his condition. The Triple Technique has also been used with success on many other patients when conventional therapies, such as cortisone injections, arthroscopy with meniscectomy, NSAIDs, physical therapy and massage therapy failed to relieve symptoms. Since being treated with the Triple Technique, many patients have been able to resume physical activities that were once too painful and have achieved objective improvement in gait and range of motion. Most importantly, patients frequently state an improvement in their quality of life.

There has been no documented research as to the effectiveness of the Triple Technique in controlled, randomized studies against other treatment regimens for anserine bursitis or other somatic dysfunctions of the knee. We believe that clinical trials of the Triple Technique will support its efficacy and usefulness as an adjunct in the treatment of somatic dysfunctions of the knee.

Contraindications

Although the three treatment modalities used in the Triple Technique are non-invasive, there may be some patient populations in which the technique should not be used. In the presence of a septic joint, fracture or torn ligament in the knee area, the Triple Technique would be contraindicated because of the potential to cause more harm. Specifically, ME techniques should be discouraged in patients with low vitality (e.g., acute congestive heart failure, recent myocardial infarction, etc.), as they could cause complications as a result of adding active muscle exertion. Finally, all osteopathic techniques should only be performed with the consent of a knowledgeable and capable patient.[12]

Appendix

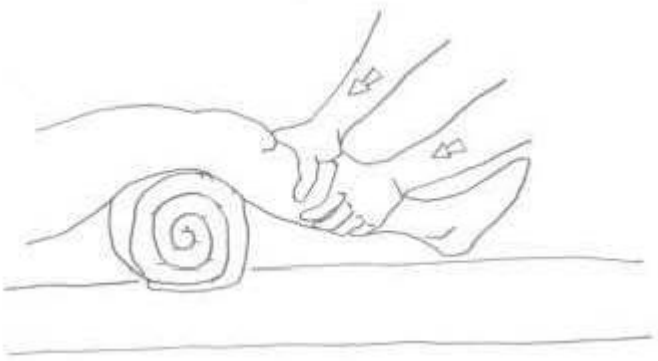

Figure 1. *Muscle Energy technique for the lateral collateral ligament.*

Figure 2. *Muscle Energy technique for the medial collateral ligament.*

Figure 3. *Counterstrain technique for the PCL.*

Figure 4. *Counterstrain technique for the ACL.*

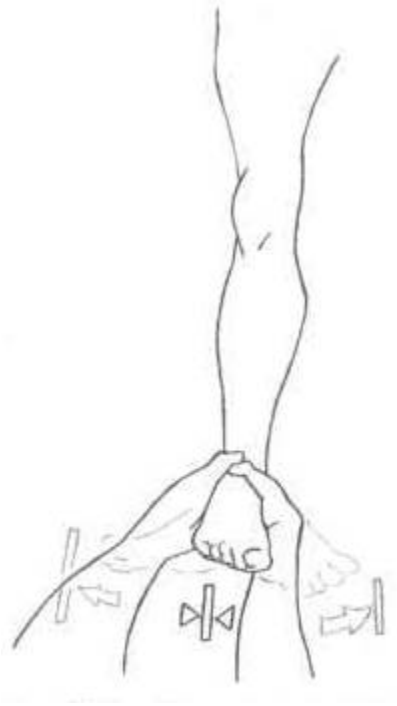

Figure 5. *Balanced Ligamentous Tension technique for the leg, hip and low back.*

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Case-Based Osteopathic Sports Medicine

September 29, 2013, in Las Vegas, NV (Pre-OMED)

Course Description

This one-day, pre-American Osteopathic Association Convention (OMED) course will be an interactive discussion and demonstration of manipulative techniques for common sports injuries of the extremities. Time will be divided between case presentation, demonstration of orthopedic testing, palpatory assessment, and manipulative treatment for extremity injuries. Both indirect and direct osteopathic manipulative treatment (OMT) modalities will be demonstrated. Discussion on rehabilitation goals, return to play and injections are welcome.

Course Objectives

The participant will be able to:

- Learn how to find and treat the axial component in extremity issues.
- Diagnose and treat shoulder impingement syndromes and rotator cuff pathology.
- Learn lymphatic techniques for the upper and lower extremities.
- Diagnose and treat trochanter bursitis, iliotibial band friction syndrome and fibula somatic dysfunction.
- Apply manipulative techniques to the wrist and foot.

Program Chair

Kurt P. Heinking, DO, FAAO, is a 1994 graduate of Chicago College of Osteopathic Medicine, where he currently serves as Chair of the Department of Osteopathic Manipulative Medicine. He is board certified in Osteopathic Manipulative Medicine, Family Medicine and Sports Medicine, and has a private musculoskeletal medicine practice in Willowbrook, IL.

CME

8 hours of AOA Category 1-A credit are anticipated.

Course Times

Sunday: 8:00 am - 5:30 pm
Includes (2) 15-minute breaks and a (1) hour-long lunch.

Coffee will be provided, but participants are responsible for their own meals.

Course Location

Mandalay Bay Hotel
3950 S. Las Vegas Blvd.
Las Vegas, NV 89119

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September 29, 2013 in Las Vegas, NV

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Gait disturbance in the elderly: Contribution of an osteopathic treatment

Yannick Huard, DO (Fr.), ScM

Abstract

Objectives: The prevalence of falling becomes higher with the age of the individual, affecting one in three people 65 years and above, and one in two people 80 years and above. The gradual move toward dependency in falling elderly leads to a feeling of abandonment associated with the loss of autonomy. Experts agree on the need for a multidisciplinary management of this public health problem, and focus on the detection of the fragility of falling elderly. Osteopathy, particularly addressing gait, could be part of this preventive approach.

Methods: A randomized controlled trial was conducted on healthy but sedentary elderly individuals (19 women and 14 men ages 64 to 72) to assess the impact of osteopathic treatment on preventive care. This included stability of posture and quality of walk. The analysis focused on the comparison of two groups: A "faller" group, including subjects who experienced a falling episode in the last three months (treatment group), and a "non-faller" group, including subjects who did not fall during the last year (control group).

Results: The stabilometric comparative analysis of posture in patients older than 64 years showed that fallers focused their bipodal support on a smaller area, but spent more energy stabilizing. In addition, the analysis confirmed that this relative stability is highly dependent on vision. The clinical comparative analysis of posture on this population showed that balance, according to the "functional reach test" and" unipodal support test" is strongly altered in fallers. The clinical comparative analysis of the quality of gait in subjects more than 64 years of age revealed, for the timed "up and go test" (also called "get up and go"), fallers were more hesitant and less by swift alteration of the regularity of their stride. Finally, the comparative analysis of the data for fallers, before and after treatment, showed a favorable impact of the osteopathic treatment.

Conclusion: From results obtained in a population of 33 subjects, an absolute rule cannot be declared. However, it is interesting to note that fallers of this population tend to control their posture with their eyes, and remain vulnerable if no support is offered to them. A thorough analysis of the impact of osteopathic treatment on the body, including the muscles and joints of the musculoskeletal system, would undoubtedly be of interest in the study of patients likely to fall.

Introduction

Posture can be summarized by maintaining active segments of the human body in space. The postural system is complex in nature and represents a multimodality system.[1] The support of a vertical posture requires integrated coordination. In scientific literature, walking is considered an automatic and coordinated activity.[2,3,4] Again, this is a more complex phenomenon than it appears, but we can say that it is a combination of dynamic and maintenance movements.[5,6] Posture and gait require the integrity of large systems: the vestibular tracts, the cerebellar tracts, the motor nervous system tracts and the proprioceptive system.

Aging is not a disease or dysfunction, but must be understood as a gradual loss of functional capacity.[7,8,9] The health status of the elderly depends primarily on the integrity of the nervous, cardiovascular, respiratory and muscular systems. Taking into consideration only healthy elderly, the risk of falling is the result of a decrease in the reaction rate and the capacity to adapt to the environment.[10,11,12,13,14] Thus, it is essential to integrate the evaluation of predictive factors into the care of health elderly. The main objective of this study is to determine whether osteopathic treatment can help prevent the risk of falling.

Keywords: posture, falling, elderly, stabilometry, Osteopathy

Methods

The population consists of 33 patients recruited from the Clinic of Ecole Supérieure d'Ostéopathie (ESO-Paris), divided into two groups:

15 fallers –the fall is defined as being down at least once in the last three months, beyond the individual's control and apart from an organic cause (neurological, cardiovascular, etc).

18 non-fallers – A non-faller is defined as having no falls in the last year.

The study was carried out according to the following protocol:

Faller Group:
T0 – a series of measurements on a stabilometric platform plus clinical evaluation and osteopathic treatment

T1 – a series of measurements on a stabilometric platform plus clinical evaluation.

Non-faller group:

T0 – a series of measurements on a stabilometric platform plus clinical evaluation plus rest (corresponding to treatment time)

T1 – a series of measurements on a stabilometric platform plus clinical evaluation.

The judgment criteria were stabilometric platform measures and clinical tests. The platform used was always the same (FEETEST 01 platform with POSTUREWIN software) under the same visual and acoustic environmental conditions. The terms of measurement corresponded to current recommendations (i.e., only one series of measurements on a calibrated platform is validated).

The stabilometric parameters used in this study were: 1) X-medium (mm) – symmetry of postural tone; 2) Y-medium (mm) – antero-posterior orientation; 3) Surface YO (mm2) – stability with opened eyes; 4) Surface YF (mm2) – stability with closed eyes; 5) Romberg Quotient (SU) – impact of vision; and 6)LFS (UC) – energy expenditure.

The Clinical tests used were: 1) The timed "get up and go" test – evaluates a sequence measured in seconds. The patient rises from a chair, walks three meters in one direction, then three meters back, walks around the chair and sits down. 2) The "functional reach test" – evaluates a movement in centimeters. The patient stands with one arm horizontal and advances the hand as far as possible while maintaining balance (any movement of the feet invalidates the test). 3) The "unipodal support test" – evaluates the maintenance of balance in seconds. The patient stands on one foot and keeps its balance without assistance as long as possible (if the balance persists, the test is stopped after 30 seconds).

Results

Table 1 refers to the anthropometric data. Statistical analysis of the results led to the conclusion that there was no significant difference between the two groups.

Tables 2, 3 and 4 show the stabilometric data. Statistical analysis of these results led to the conclusion that there was no significant difference between the two groups at T0. It also resulted in the conclusion that there was a significant difference between the two groups at T1 for the X-medium, Y-medium, QR and LFS data. Additionally, there was a significant difference in the faller group between T0 and T1 for the X-medium, Y-medium, QR and LFS data.

Tables 5, 6 and 7 show the clinical data. Statistical analysis of the results led to the conclusion that there is a significant difference between the two groups at T0 for the timed get up and go test and the unipodal support test data. It also resulted in the conclusion that there is a significant

Table 1. *Anthropometric data*

	Fallers, n=15	Non-fallers, n=18	*P*
Age (year)	68.3 ± 2.7	67.7 ± 2.5	0.74
Mass (kg)	57 ± 6.4	54 ± 7.8	0.48
Size (m)	1.57 ± 0.05	1.63 ± 0.07	0.23
BMI* (kg/m^2)	23.1 ± 2	20.3 ± 1.5	0.25

**Body Mass Index*
Values expressed as mean ± standard deviation
P corresponds to the degree of significance with a threshold of 0.05

Table 2. *Stabilometric measures at T0*

T0	Fallers, n=15	Non-fallers, n=18	*P*
X-medium (mm)	11.96 ± 1.44	5.07 ± 1.4	0.85
Y-medium (mm)	-25.02 ± 10.76	-32.5 ± 13	0.48
Surface YO (mm^2)	592.8 ± 351.5	720.3 ± 428.7	0.46
Surface YF (mm^2)	1144 ± 563.3	848.6 ± 502.7	0.65
QR (SU)	249.3 ± 132.4	150.1 ± 177.3	0.27
LFS (UC)	1.73 ± 0.4	1.51 ± 0.5	0.38

Table 3. *Stabilometric measures at T1*

T1	Fallers, n=15	Non-fallers, n=18	*P*
X-medium (mm)	5.56 ± 1.74	5.79 ± 0,7	0.00^S
Y-medium (mm)	-16.59 ± 6.26	-29.13 ± 10,73	0.05^S
Surface YO (mm^2)	762.2 ± 394	710 ± 411.6	0.88
Surface YF (mm^2)	1008.9 ± 359	867.3 ± 501.2	0.21
QR (SU)	169.8 ± 103.5	165.1 ± 181.2	0.04^S
LFS (UC)	1.11 ± 0.1	1.67 ± 0.5	0.00^S

S corresponds to a significant difference

Table 4. *Comparison of stabilometric data between T0 and T1*

T0/T1	*P* Fallers, n=15	*P* Non-fallers, n=18
X-medium (mm)	0.00^S	0.09
Y-medium (mm)	0.02^S	0.33
Surface YO (mm^2)	0.21	1.00
Surface YF (mm^2)	0.58	0.90
QR (SU)	0.00^S	0.49
LFS (UC)	0.00^S	0.27

Table 5. *Clinical tests results at T0*

T0	Fallers, n=15	Non-fallers, n=18	*P*
Get Up & Go (S)	24.3 ± 11.4	15 ± 5.4	0.00^S
Funct. Reach T. (cm)	12.6 ± 6.5	25.1 ± 4.9	0.26
Unipodal Support (S)	7.3 ± 3.3	25.1 ± 1.6	0.01^S

Table 6. *Clinical tests results at T1*

T1	Fallers, n=15	Non-fallers, n=18	*P*
Get Up & Go (S)	17.3 ± 3.4	16.2 ± 5	0.14
Funct. Reach T. (cm)	19 ± 3	26.9 ± 6.9	0.00^S
Unipodal Support (S)	13.1 ± 3.8	28.4 ± 1.9	0.01^S

Table 7. Comparison of clinical tests data between T0 and T1

T0/T1	*P* Fallers, n=15	*P* Non-fallers, n=18
Get Up & Go (S)	0.25	0.37
Funct. Reach T. (cm)	0.01^{S}	0.47
Station unipodale (S)	0.00^{S}	0.71

difference between the two groups at T1 for the functional reach test and the unipodal support test data. Additionally, there is a significant difference in the faller group between T0 and T1 for the functional reach test and the unipodal support test data.

Discussion

Regarding the clinical interpretation of this trial, there is difficulty in recruiting healthy but sedentary elderly. Nevertheless, the population of 33 patients was homogeneously distributed among the two groups. Thus, the anthropometric data are comparable.

The case history of each faller provides no homogeneous explanatory model. The patients could have dropped forward, backward or to one side. They could have dropped several times. Each more or less admitted to a lack of physical activity.

The osteopathic clinical examination gives some leads: All fallers have lumbar dysfunctions (lack of mobility), all fallers have an asymmetry of muscle tone in the lower limbs, and all fallers have painful symptoms.

Regarding the interpretation of the statistical analysis of the platform data, the X-medium criterion differentiates the two groups between T0 and T1. Every patient in the trial did not suffer from postural deficiency syndrome. The non-fallers retained a slight natural asymmetry. The fallers avoided any variation when it hurts.

The Y-medium criterion differentiates the two groups between T0 and T1. Every patient in the trial did not suffer from postural deficiency syndrome. The non-fallers maintained a backward support.

The fallers move their support forward after treatment.

The Surface YO and Surface YF criteria don't differentiate the two groups. Every patient in the trial did not suffer from postural deficiency syndrome. The fallers would control their balance surface less and limit their mobility less once treated.

The QR criterion differentiates the two groups between T0 and T1. Vision is paramount for balance. The non-fallers don't move on this criterion. The fallers gain balance with their eyes closed after treatment.

The LFS criterion differentiates the two groups, and the values remain above normal. The patients cover a longer route to keep their balance. The non-fallers have less need to control their balance. The fallers spend less energy after treatment.

Finally, regarding the interpretation of the statistical analysis of the clinical tests data, the timed get up and go test doesn't differentiate the two groups between T0 and T1. The elderly have slower movement in response to a specific task. The non-fallers do not change on this criterion. The fallers would stabilize their gait, but no significant difference with the non-fallers confirms that.

The functional reach test differentiates the two groups between T0 and T1. Individuals control their posture heterogeneously. The non-fallers do not change on this criterion. The fallers change their posture strategy with greater flexibility.

The unipodal support test differentiates the two groups between T0 and T1. The patients clearly have a different stability. The non-fallers remain comfortable in the position. The fallers become steadier after treatment.

The limits of this trial lie in the fact that the size of the recruited population does not allow any amplification of the results. Moreover, the results of the stabilometric measures cannot differentiate the two groups at T0 on all parameters. Lastly, the results of the clinical tests are not homogeneous at T1.

Conclusion

Regarding the objective of this trial, we can conclude that osteopathic treatment has a positive impact on some risk factors for falling in the elderly. The stabilometric values move favorably after treatment, the flexibility of the fallers is optimized, the unipodal stability of the fallers is strengthened and the quality of the faller's gait tends to improve.

This trial offers some interesting questions on the impact of osteopathic treatment on the body: What is the degree of influence on lumbar mobility for fallers? What is the degree of impact on the mobility of the lower limbs of fallers? How can Osteopathy be integrated into multidisciplinary care dedicated to the risk of falling?

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Prolotherapy Weekend

October 10-12, 2013, at UNECOM in Biddeford, ME

Course Outline

Thursday, October 10, 5:00 pm - 10:00 pm: Physicians who have not taken a prior course in prolotherapy are required to attend this session. It will include an introduction to prolotherapy, wound healing, degenerative postural cascade, coding and billing.

Friday and Saturday, October 11-12, 8:00 am - 5:30 pm: Participants will be divided into two groups—beginners and advanced. These two groups will alternate between lectures in anatomy and injection technique, and time in the anatomy lab performing injections under supervision and reviewing prosections.

Principles of Prolotherapy by Cantieri MS, Pasquarello GJ and Ravin TH, will serve as the course syllabus. Please see http://principlesofprolotherapy.com/index.html for details.

Prerequisites

Functional anatomy: (1) Level I course or equivalent.

Participants must indicate upon registration whether they are a beginner or advanced prolotherapy student. If you are unsure, please contact Sherrie Warner at the AAO.

CME

20 hours of AOA Category 1-A credit is anticipated

Travel Arrangements

Call Tina Callahan of Globally Yours Travel at (800) 274-5975.

A rental car is recommended since the campus is located about 15-20 minutes from most hotels and restaurants.

Course Directors

Mark S. Cantieri, DO, FAAO, is a 1981 graduate of Des Moines University College of Osteopathic Medicine, and is board certified in NMM/OMM. He has served on various hospital staffs as a consultant in OMM—treating newborns, post-operative patients and patients in intensive care units. He currently operates a private practice, Corrective Care, PC, in Mishawaka, IN, which specializes in the treatment of chronic musculoskeletal pain. Dr. Cantieri is a Past President and former Secretary-Tresurer of the AAO.

George J. Pasquarello, DO, FAAO, graduated from UNECOM in 1993. Board-certified in NMM/OMM, he has served as a Residency Program Director and Associate Professor of OMM at UNECOM. He has also worked as a clinical specialist at Maine Spine & Rehabilitation and University Healthcare. He is currently in private practice at East Greenwich Spine & Sport in East Greenwich, RI. Dr. Pasquarello is a Past President of the AAO.

Course Location

University of New England College of Osteopathic Medicine
11 Hills Beach Road
Biddeford, ME 04005
(207) 283-0171

Registration Form

Prolotherapy Weekend
October 10-12, 2013

Name: _____ AOA#: _____

Nickname for Badge: _____

Street Address: _____

_____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

E-mail: _____

By releasing your fax/e-mail, you have given the AAO permission to send marketing information regarding courses to your fax or e-mail.

Billing Address (if different than above): _____

_____

Registration Rates

☐ $1,500 - I already own a copy of *Principles of Prolotherapy*

☐ $1,810 - Please order me a copy of *Principles of Prolotherapy*

I am a ☐ **Beginner** ☐ **Advanced** prolotherapy student.

Please notify us of any special dietary restrictions.

The AAO accepts check, Visa, Mastercard or Discover payments in U.S. dollars

Credit Card #: _____

Cardholder's Name: _____

Expiration Date: _____ 3-digit CVV# _____

I hereby authorize the American Academy of Osteopathy® to charge the above credit card for the full course registration amount.

Signature: _____

Click here to view the **AAO's Cancellation and Refund Policy**

Please submit registration form and payment via mail to the American Academy of Osteopathy,® 3500 DePauw Blvd., Suite 1080, Indianapolis, IN 46268 or by fax to (317) 879-0563. Or register online at www.academyofosteopathy.org

Stabilometric platform as a diagnosis support for pain? Example of chronic low back pain

Yannick Huard, DO (Fr.), ScM; W. Bertucci, PhD

Introduction

Posture relates the story of an individual. It is closely linked to morphology, integration of gestures by mimetism, various professionnal and sports activities, as well as one's psycho-emotional history. Thus, postural tendencies result in the balance of tonic effects of the muscles, which determine the basic attitude of each person.[1,2,3]

Within the framework of pain supported by the human body, morphostatic asymmetries are mentioned,[4] either because they are the cause of painful pathology (stress induced), or because they are the consequence of the imbalance generated by the pain.

The low back remains a frequent location of pain concerning a varied population. In France in 2009,[5] the prevalence of a low back pain, whatever its term, is more than 50 percent of the population. Causes can be the repetition of movements, low physical mobility, driving, tobacco addiction, etc. These varied causes are the reason we would like to evaluate this kind of pain. The objective of our experimentation is to verify if a correlation exists between the significance of postural asymmetry and the significance of low back pain.

Keywords: posture; low back pain; stabilometry

Methods

Hundred of experimental subjects took part in this investigation. The population was recruited from within the private clinic of the Ecole Superieure d'Osteopathie (ESO) at Paris-Marne la Vallée (France), and was divided into two groups. Half the subjects presented with chronic low back pain for at least six months, whatever its term (Group A), and the other half did not present with any painful symptoms (Group B). The criteria of non-inclusion were: cranial trauma of less than one year or with after-effects, cerebellar syndrome or neuropathy involving an imbalance of statics, acquired rheumatic pathology and pregnancy or post-partum.[6]

During this study, a series of measurements on the stabilometric platform were taken[7,8,9,10] (platform FEETEST 01 Technoconcept® using Posturewin software). The statistical analysis was carried out using four principal criteria (X-medium for symmetry of muscle tone, surface for body stability, length according to surface for expenditure of energy, and speed variance according to Y-medium for viscoelasticity of lower limbs posterior muscles[11]). The significance of the results obtained were studied for each variable. The results were then compared with those of AFP85 standards[12] (the French Association of Posturology examined cohorts of patients according to standard situations and defined the AFP85 standards for adults and children). Moreover, the subjects from Group A were questioned on the intensity of their low back pain using the Visual Analog Scale (VAS).[13]

Results and Discussion

Seeing the results, the study of significance proved to be mainly negative, even if there is a tendency ($p<0.39$) to distinguish the two groups. However, this tendency can be due to chance (Type 1 error). It should be considered, however, that for the LFS criterion, an effect was noted ($p=0.0005$).The statistical analysis showed that, for all the criteria, there was a VAS effect ($p<0.05$). Posture tends to change according to pain acuteness.

Reading this analysis precisely, it appears that:

- The two groups were comparable in gender and age criteria, which allows for a good analysis;
- Among the selected stabilometric criteria (X-medium, surface, LFS and VFY), only LFS is a highly significant criterion to differentiate the lumbar-pain subjects from the no-pain subjects;

Table 1. *Summary of the stabilometric results*

Parameters	Percent of Group A Subjects into AFP85 Standards	Percent of Group B Subjects into AFP85 Standards	Variance Analysis
X-medium (mm)	74	92	p=0.3206
Surface (mm^2)	78	88	p=0.1671
LFS (UC)	62	96	p=0.0005
VFY (UC)	64	80	p=0.3897

LFS: length according to surface and VFY: speed variance according to Y-medium

- Overall, the subjects suffering from low back pain have a different posture than the no-pain subjects. As if they wanted to avoid any painful deviation, more centered on the transverse criterion, requiring less movement and tending to move anteriorly with less tension of the posterior muscles of the legs;
- Lastly, the acuteness of pain influences the results of the selected criteria.

Conclusions

In conclusion, the stabilometric platform enables us to distinguish between a lumbar-pain subject and a no-pain subject, because the one suffering from low back pain has a non-standard posture. However, the criteria of judgment must be sharpened, and it is necessary to extend this study to a larger and more varied population in order to increase the statistical power. The evaluation of posture remains a very complex field, which requires a protocol of repeated measurements and a detailed selection of the subjects integrating the same group.

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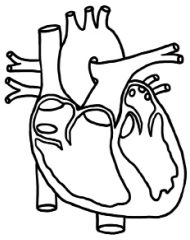
Osteopathic Approaches to the Heart and Vascular System

December 6-8, 2013 at AZCOM in Glendale, AZ

Course Description



This class will explore the heart and vascular system aspects of neuroregulation, viscoelasticity and compliance, micro perfusion, mechanical tension, function and dysfunction.

Participants will palpate, diagnose and treat the heart muscle, valves, connective tissue structures, cardiac coronaries and lymphatics, coronary conducting system, cardiac plexus and brainstem, as well as sensory and emotional connections.

It will cover the venous system with the superior and inferior vena cava, portal vein, lumbar plexus and sigmoid/rectal plexus.

It will also address the major visceral arteries of the thorax, head and neck, and upper extremities (aorta, pulmonary vessels, subclavian, common carotid, facial artery, carpal tunnel area, thyroid vessels, internal carotid and breast vessels).

Participants will start cross-correlating osteopathic diagnosis and treatment with oriental medicine by palpating the meridians pre and post treatment, and using the "healing sounds."

If time permits, the vessels of the abdomen will begin to be covered.

CME

24 hours of **AOA** Category 1-A credit are anticipated.

Program Chair

Kenneth J. Lossing, DO, is a 1994 graduate of Kirksville College of Osteopathic Medicine. Dr. Lossing completed an internship and residency program at the Ohio University College of Osteopathic Medicine. He studied under the French Osteopath, Jean-Pierre Barral, DO, and has become an internationally known speaker on visceral manipulation. Dr. Lossing is a member of the AAO Board of Trustees.

Course Times

Friday, Saturday and Sunday: 8:00 am - 5:30 pm
Includes (2) 15-minute breaks and a (1) hour-long lunch.

Breakfast, lunch and coffee breaks will be provided
_____ I require a vegetarian option
_____ I require a gluten-free option

Course Location

Arizona College of Osteopathic Medicine
19555 North 59th Avenue, Glendale, AZ 85308
(623) 572-3215

Travel Arrangements

Call Tina Callahan of Globally Yours Travel at 1-800-274-5975. Locals hotels include the Country Inn & Suites in Phoenix (1-800-230-4134) and the Quality Inn & Suites in Glendale (1-800-230-4134).

Registration Form

Osteopathic Approaches to the Heart and Vascular System
December 6-8, 2013 at AZCOM

Name: _____ AOA#: _____

Nickname for Badge: _____

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Registration Rates

	On or before October 8	After October 8
AAO Member	$ 960.00	$ 1060.00
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Please submit registration form and payment via mail to the American Academy of Osteopathy,® 3500 DePauw Blvd., Suite 1080, Indianapolis, IN 46268 or by fax to (317) 879-0563. Or register online at www.academyofosteopathy.org

AAOJ Submission Checklist

For more information on the elements in this checklist, see "*AAOJ* Instructions for Contributors" at www.academyofosteopathy.org

Manuscript Submission

- ☐ Submission e-mailed to *AAOJ*'s Scientific Editor at editoraaoj@gmail.com or mailed on CD-ROM to the *AAOJ*'s Managing Editor, American Academy of Osteopathy, 3500 DePauw Boulevard, Suite 1080, Indianapolis, IN 46268
- ☐ Manuscript formatted in Microsoft Word for Windows (.doc), text document format (.txt) or rich text format (.rtf)

Manuscript Components

- ☐ Cover letter addressed to the *AAOJ*'s Scientific Editor, Murray R. Berkowitz , DO, MA, MS, MPH, with any special requests (e.g., rapid review) noted and justified
- ☐ Title page, including the authors' full names and financial or other affiliations, as well as disclosure of the financial support related to original research described in the manuscript
- ☐ "Abstract" (see "Abstract" section in "*AAOJ* Instructions for Contributors" for additional information)
- ☐ "Methods" section
  - the name of the public registry in which the trial is listed, if applicable
  - ethical standards, therapeutic agents or devices, and statistical methods defined
- ☐ Four multiple-choice questions for the continuing medical education quiz and brief discussions of the correct answers
- ☐ Editorial conventions adhered to
  - units of measure given with all laboratory values
  - on first mention, all abbreviations other than measurements placed in parentheses after the full names of the terms, as in "American Academy of Osteopathy (AAO)"
- ☐ Numbered references, tables and figures cited sequentially in the text
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  - references include direct, open-access URLs to posted, full-text versions of the documents
  - photocopies provided for referenced documents not accessible through URLs
- ☐ "Acknowledgments" section with a concise, comprehensive list of the contributions made by individuals who do not merit authorship credit and permission from each individual to be named in print
- ☐ For manuscripts based on survey data, a copy of the original validated survey and cover letter

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- ☐ For photographs in which patients are featured, signed and dated "Patient-Model Release" forms submitted
- ☐ For named sources of unpublished data and individuals listed in the "Acknowledgments" section, permission to publish their names in the *AAOJ* obtained.
- ☐ For authors serving in the U.S. military, the armed forces' approval of the manuscript and institutional or military disclaimers submitted

Financial Disclosure and Conflict of Interest

Authors are required to disclose all financial and non-financial relationships related to the submission's subject matter. All disclosures should be included in the manuscript's title page. See the "Title page" section of "*AAOJ* Instructions to Contributors" for examples of relationships and affiliations that must be disclosed. Those authors who have no financial or other relationships to disclose must indicate that on the manuscript's title page (e.g., "Dr Jones has no conflict of interest or financial disclosure relevant to the topic of the submitted manuscript").

Component Societies and Affiliated Organizations Calendar of Upcoming Events

April 19-21, 2013
An Osteopathic Paradigm of Muscle Function
Course Director: Judith L. Lewis, DO
Associate Director: Adrienne M. Kania, DO
Rosehill Community Center, Mulkiteo, WA
CME: 24 Category 1-A AOA credits anticipated
Phone: (317) 581-0411 Fax: (317) 580-9299
E-mail: **info@cranialacademy.org**
Web site: **www.cranialacademy.org**

April 19-22, 2013
Biodynamics of Osteopathy: Phase I
Instructor: Donald V. Hankinson, DO
UNECOM, Biddeford, ME
CME: 22 Category 1-A AOA credits anticipated
Phone: (207) 781-7900 Fax: (207) 781-2900
E-mail: **ohmjh@aol.com**
Web site: **http://osteopathichealthcareofmaine.com**

April 19-23, 2013
Muscle Energy: Part I
Course Chairperson: Carl W. Steele, DO, MS, PT
MSUCOM, East Lansing, MI
CME: 35 Category 1-A AOA credits anticipated
Phone: (517) 353-9714 Fax: (517) 432-9873
E-mail: **cme@com.msu.edu**
Web site: **www.com.msu.edu/cme/courses.html**

May 1-4, 2013
Pennsylvania Osteopathic Medical Association
105th Annual Clinical Assembly & Scientific Seminar
Valley Forge Convention Center, King of Prussia, PA
CME: 40 AOA credits anticipated
(34 Category 1-A and 6 Category 1-B)
Phone: (717) 939-9318 Fax: (717) 939-7255
E-mail: **poma@poma.org** Web site: **www.poma.org**

May 2, 2013
Indiana Osteopathic Association Pre-Convention OMT Workshop: The Principles of High Velocity Treatment and Application to the Upper Half of the Body
Sheraton Hotel at Keystone Crossing, Indianapolis, IN
CME: 8 Category 1-A AOA credits anticipated
Phone: (317) 926-3009 Fax: (317) 926-3984
E-mail: **info@inosteo.org** Web site: **www.inosteo.org**

May 3-5, 2013
Indiana Osteopathic Association 116th Annual Convention
Sheraton Hotel at Keystone Crossing, Indianapolis, IN
CME: 25 Category 1-A AOA credits anticipated
Phone: (317) 926-3009 Fax: (317) 926-3984
E-mail: **info@inosteo.org** Web site: **www.inosteo.org**

May 3-5, 2013
Introduction to Osteopathic Medicine and Evaluation & Treatment: Pelvis
UNECOM, Biddeford, ME
CME: 20 Category 1-A AOA credits anticipated
Phone: (207) 602-2589 E-mail: **cme@une.edu**
Web site: **www.une.edu/com/cme/manualmedicine.cfm**

May 9-12, 2013
American Osteopathic Association of Prolotherapy Regenerative Medicine—Regenerative Medicine for Healing & Pain Treatment: Prolo, PRP, Stem Cell & Neural Therapies
Marriott Country Club Plaza, Kansas City, MO
CME: 25 Category 1-A AOA credits anticipated
Phone: (302) 530-2489 Fax: (302) 376-8081
E-mail: **lindapavina@verizon.net**
Web site: **www.acopms.com**

June 14-17, 2013
An Exploration of the Foundations & Principles of The Biodynamic Model of Osteopathy in the Cranial Field
Course Directors: Evan S. Rubin, DO; Eric R. Cohen, DO
Indian Head Resort, Lincoln, NH
CME: 24 Category 1-A AOA credits anticipated
Phone: (813) 765-5005 Fax: (813) 649-0760
E-mail: **mjllong@verizon.net**
Web site: **www.biobasicsnh.com**

June 15-19, 2013
Introductory Course: Osteopathy in the Cranial Field
Course Director: Zinaida Pelkey, DO
Associate Director: Wendy S. Neal, DO
Marriott Hotel, La Jolla, CA
CME: 40 Category 1-A AOA credits anticipated
Phone: (317) 581-0411 Fax: (317) 580-9299
E-mail: **info@cranialacademy.org**
Web site: **www.cranialacademy.org**

June 20-23, 2013
Annual Conference: Coming to Our Senses—An Osteopathic Approach to Cranial Nerve Disorders
Course Director: Maria T. Gentile, DO
Associate Director: Dennis A. Burke, DO
Marriott Hotel, La Jolla, CA
CME: 20.75 Category 1-A AOA credits anticipated
Phone: (317) 581-0411 Fax: (317) 580-9299
E-mail: **info@cranialacademy.org**
Web site: **www.cranialacademy.org**