THE AAO
JOURNAL
A Publication of the American Academy of Osteopathy

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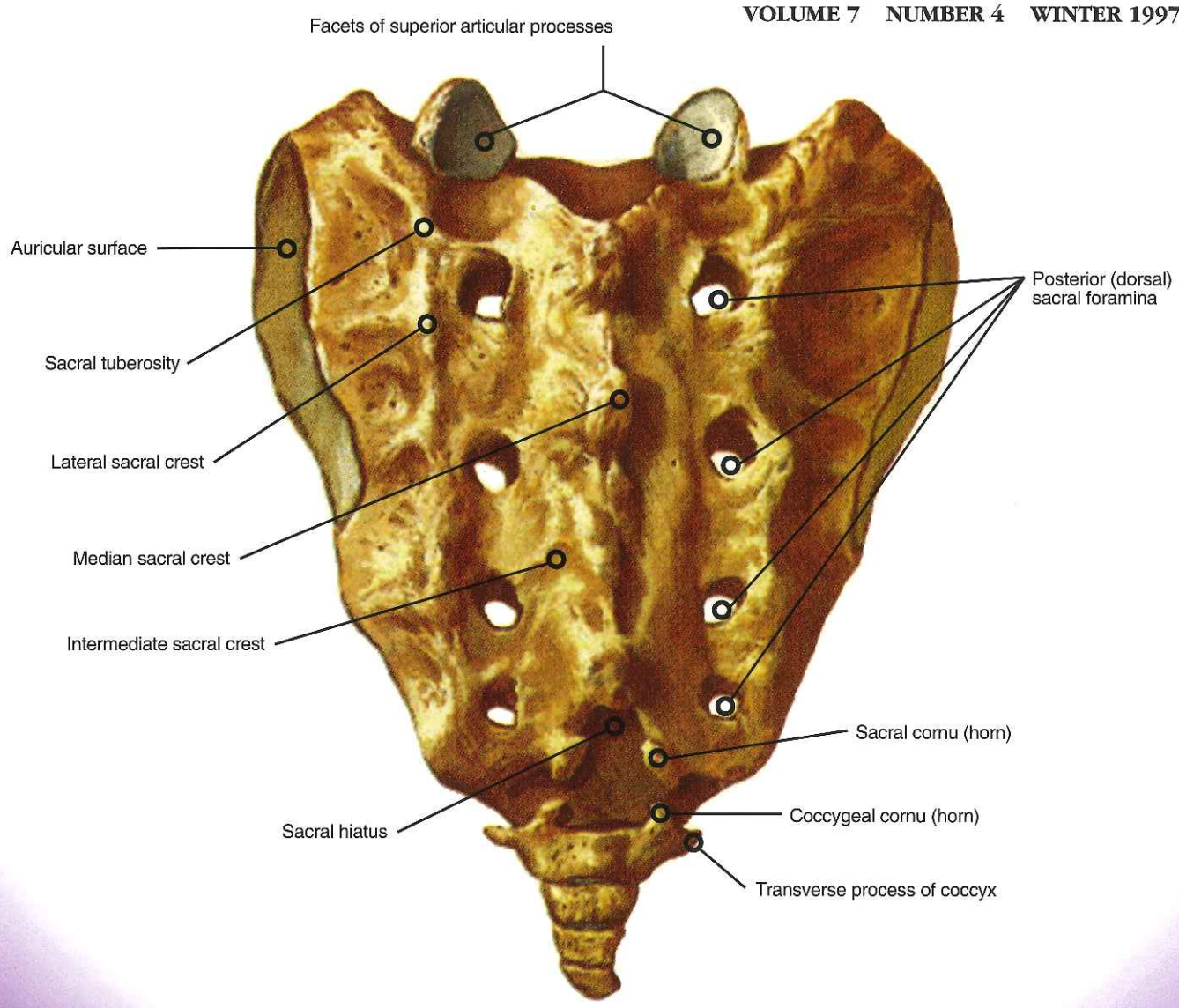

The Sacrum: a bone of contention

...see page 17

AAO's CME Calendar

American Academy of Osteopathy
3500 DePauw Boulevard, Suite 1080
Indianapolis, IN 46268-1136
Phone: (317) 879-1881 or FAX: (317)879-0563

January 1998

15-18
An Introduction to Osteopathic Manipulative Treatment
Boyd R. Buser, DO,
Program Chairperson
Turtle Bay Hilton Hotel
O'ahu, Hawaii
Hours: 23 Category 1A

February

21-22
Winter OMT Update
Melicien Tettambel, DO, FAAO
Program Chairperson
Doubletree Hotel, Downtown
Portland, OR
Hours: 18 Category 1A

21-22
Basic Percussion Vibrator
Richard Koss, DO, Program Chair
Doubletree Hotel, Downtown
Portland, OR
Hours: 15 Category 1A

March

23-25
Manual Thermal Diagnosis
John Glover, DO,
Program Chairperson
The Broadmoor Hotel
Colorado Springs, CO
Hours: 24 Category 1A

26-29
AAO Convocation
Dennis Dowling, DO,Program Chair
The Broadmoor Hotel
Colorado Springs, CO
Hours: 33 Category 1A

April

24-26
Exercise Prescription
Brad Sandler, DO, Program Chair
Denver, CO
Hours: 20 Category 1A

May

15-17
Functional Methods
William Johnston, DO, FAAO
Program Chairperson
Chicago, IL
Hours: 20 Category 1A

16-17
Advanced Percussion Vibrator
Richard Koss, DO, Program Chair
Chicago, IL
Hours: 15 Category 1A

June

12-14
Systemic Dysfunction
Michael Kuchera, DO, FAAO
Program Chairperson
PCOM
Philadelphia, PA
Hours: 20 Category 1A

August

14-16
Levitor
Michael Kuchera, DO, FAAO
Program Chairperson
St. Paul. MN
Hours: 20 Category 1A

14-16
Visceral Manipulation
John Glover, DO, Program Chair
St. Paul, MN
Hours: 24 Category 1A

Affiliated Organization's CME Calendar

December 5-7
16th Annual Winter Update
Indiana Osteopathic Association
Radisson Hotel City Centre
Indianapolis, IN
Hours: 20 Category 1A
Contact: IAOP&S
(800) 942-0501

February 6-8, 1998
The Osteopathic Approach to Respiratory Problems in Children
The Osteopathic Center For Children;
co-sponsored by AAO
San Diego, CA
Contact: Kathy Campbell
(619) 583-7611

February 6-8, 1998
The Osteopathic Approach to Respiratory Problems in Children
The Osteopathic Center For Children
San Diego, CA
Contact: Kathy Campbell
(619) 583-7611

February 22-27, 1998
Ski & CME Midwinter Conference
Colorado Society of Osteopathic Medicine
Keystone Lodge & Resort
Hours: 38 Category 1A
Contact: Patricia Ellis
(303) 322-1752

April 30 - May 3, 1998
101st Annual Convention
Indiana Osteopathic Association
Radisson Hotel
Evansville, IN
Hours: 30 Category 1A
Contact: IAOP&S
(800) 942-0501

12th International Congress of FIMM
Musculoskeletal Science in Practice
Strategies of Tomorrow
April 13-17, 1998
For Registration information,contact:
American Academy of Osteopathy
3500 DePauw Blvd., Suite 1080
Indianapolis, IN 46268-1136
Phone: (317) 879-1881

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3500 DePauw Boulevard
Suite 1080
Indianapolis, IN 46268-1136
(317) 879-1881
FAX (317) 879-0563

The AAO Journal is the official quarterly publication of the American Academy of Osteopathy, 3500 DePauw Blvd., Suite 1080, Indianapolis, Indiana, 46268-1136. Phone: 317-879-1881; FAX: (317) 879-0563; e-mail AAOSJN@aol.com; AAO Website: http://www.aao.medguide.net

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THE AAO
JOURNAL
A Publication of the American Academy of Osteopathy

The mission of the American Academy of Osteopathy is to teach, explore, advocate, and advance the study and application of the science and art of total health care management, emphasizing osteopathic principles, palpatory diagnosis and osteopathic manipulative treatment.

Editorial Section

Peer-Reviewed Section

1997 Journal Index

About the Cover: Cover illustration from Interactive Atlas of Human Anatomy by Frank H. Netter, MD; permission received for use from Novartis Pharmaceuticals Corporation.

Instructions for Authors

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

The AAO Journal welcomes contributions in the following categories:

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

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

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

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

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

Professional News
of promotions, awards, appointments and other similar professional activities.

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

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

Submission
Submit all papers to Raymond J. Hruby, DO, FAAO, Editor-in-Chief, MSU-COM, Dept. of Osteopathic Manipulative Medicine, A-439 E. Fee Hall, East Lansing, MI 48824.

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

Requirements for manuscript submission:

Manuscript
1. Type all text, references and tabular material using upper and lower case, double-spaced with one-inch margins. Number all pages consecutively.

2. Submit original plus three copies. Retain one copy for your files.

3. Check that all references, tables and figures are cited in the text and in numerical order.

4. Include a cover letter that gives the author's full name and address, telephone number, institution from which work initiated and academic title or position.

5. Manuscripts must be published with the correct name(s) of the author(s). No manuscripts will be published anonymously, or under pseudonyms or pen names.

6. For human or animal experimental investigations, include proof that the project was approved by an appropriate institutional review board, or when no such board is in place, that the manner in which informed consent was obtained from human subjects.

7. Describe the basic study design; define all statistical methods used; list measurement instruments, methods, and tools used for independent and dependent variables.

8. In the "Materials and Methods" section, identify all interventions that are used which do not comply with approved or standard usage.

Computer Disks
We encourage and welcome computer disks containing the material submitted in hard copy form. Though we prefer Macintosh 3-1/2" disks, MS-DOS formats using either 3-1/2" or 5-1/4" discs are equally acceptable.

Abstract
Provide a 150-word abstract that summarizes the main points of the paper and it's conclusions.

Illustrations
1. Be sure that illustrations submitted are clearly labeled.

2. Photos should be submitted as 5" x 7" glossy black and white prints with high contrast. On the back of each, clearly indicate the top of the photo. Use a photocopy to indicate the placement of arrows and other markers on the photos. If color is necessary, submit clearly labeled 35 mm slides with the tops marked on the frames. All illustrations will be returned to the authors of published manuscripts.

3. Include a caption for each figure.

Permissions
Obtain written permission from the publisher and author to use previously published illustrations and submit these letters with the manuscript. You also must obtain written permission from patients to use their photos if there is a possibility that they might be identified. In the case of children, permission must be obtained from a parent or guardian.

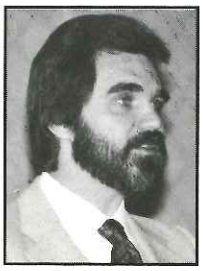
References
1. References are required for all material derived from the work of others. Cite all references in numerical order in the text. If there are references used as general source material, but from which no specific information was taken, list them in alphabetical order following the numbered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

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

Editorial Processing
All accepted articles are subject to copy editing. Authors are responsible for all statements, including changes made by the manuscript editor. No material may be reprinted from *The AAO Journal* without the written permission of the editor and the author(s).

From the Editor

by Raymond J. Hruby, DO, FAAO



The AAOJ on another level

With this issue of *The AAO Journal (The AAOJ)*, a publication of the American Academy of Osteopathy, we present our first journal issue with peer-reviewed content. Those of you who have followed *The AAOJ* know that we have had this goal in mind for some time.

Over the past year, we have been able to develop the policies and protocol that will serve to give peer-reviewed status to *The AAOJ*. With this issue, we move on to that level.

Some have expressed concerns that we would lose the current flavor of the journal by becoming a peer-reviewed publication. I assure you that we have no intention of letting that happen. One of the original goals of the journal was to be a forum where osteopathic physicians could read and publish information that reflected not only the scientific nature of osteopathic medicine, but also the "art" of osteopathic practice as well.

We will continue to publish the kind of material you have become accustomed to over the time *The AAOJ* has existed. The difference is that we will now include a separate section within *The AAOJ* containing articles judged by experts to have scholarly content worthy of peer-reviewed publication. To be sure, a few things will have to be different, especially for those authors who wish to submit material for peer review. We have to be more strict about the format of the articles and insist on such things as conflict of interest disclosures and assignment of copyright for materials published in *The AAOJ*. To that extent, I urge all authors to read carefully the "Instructions for Authors" information found on the preceding page. Following these instructions will save you a lot of time and trouble.

As we move forward with the peer-reviewed *AAOJ*, we are also looking forward to providing an electronic form of the journal on the AAO's Website (**http://www.aao.medguide.net**). This will take a little more time, as there is much work involved with publishing the journal electronically. A number of medical publications have gone on-line in recent years and we look forward to doing the same with *The AAOJ*.

This will give us literally a world wide exposure of the journal, the Academy and the profession.

I want to express my thanks to a number of people who have helped make *The AAOJ* a success. This includes Diana Finley, our hard-working managing editor, the AAO staff, the editorial board, and all those who agreed to be peer reviewers for the journal. I am also grateful for the advice and guidance I have received from the AAO Board of Trustees and the Academy's publication committee. We look forward to serving our readership with this new format for the journal, and, keep watching for the electronic version! ❐

Letter to A.T. Still

Dear Doctor Still,

As I study your written works, I continue to find words that seem quite difficult to interpret. There is so much that you have written that gives me more insight into your philosophy and principles. There are also things that you have written that make me think at great length about their possible meaning.

For example, you made a number of comments about death that seem quite mysterious to me. They seem to reflect a philosophy you have about life and death that remains hidden from us when we try to understand your writings.

The book, *A. T. Still in the Living*, by Robert E. Truhlar, DO, contains some quotes about death that have puzzled me for a long time. One of the quotes is this: "Death is the completed work of development of the sum total of effort to a finished work of nature." This seems to imply that death is not the end of life, but rather a pinnacle of achievement for a human being. So many people think otherwise; that death is the end of everything. Many people have a great fear of death. I believe it was Mark Twain who said that everybody wants to go to heaven but nobody wants to die!

In that same book, there is another remark you made about death that remains quite a mystery for me. You said: "What is death but a birth from the second placenta to which life has been attached." Were you referring to something like reincarnation? Or, is this a reference to an eternal life after death as we understand it?

We may never fully understand what you meant by these comments, or how they are reflective of your overall philosophy. One thing is clear to me: you had a zest for life and a confident attitude about death that few people seem to achieve. I hope that I can think half as clearly as you have when it comes to these subjects.

Your ongoing student,
Raymond J. Hruby, DO, FAAO

Message from the President

by Ann L. Habenicht, DO, FAAO

My charge to the osteopathic profession

Since I last communicated with you, I have had the opportunity to represent you at the Kirksville College of Osteopathic Medicine's (KCOM) Founder's Day Program. This was my first sojourn to the birthplace of osteopathy. The historical displays lining the halls of KCOM, the cabin and the Still Museum are great reminders of the origins of our profession. During the program, Dr. Mike Kuchera asked four leaders in the profession to give a charge to the profession "for the new century". All four had very similar ideas. I would like to share my "charge" with you.

"The challenge to 'present a charge' is a difficult task considering the excellent program the faculty currently provides for the KCOM students. This program is steeped in osteopathic teachings and training to provide the basic science student an excellent foundation to enter the externship years. Additionally, KCOM is known for its osteopathic research, both past and ongoing. What then is the charge?

I believe that the osteopathic colleges, as a whole, prepare our basic science students with excellent osteopathic concepts, techniques, and thinking to enter the clinics. Unfortunately, the majority of our third- and fourth-year students are receiving excellent ***medical education***, but how osteopathic is this education?

As Capt. Michael Murphy stated yesterday — there is a noticeable difference between the osteopathic and allopathic approach to a patient. The majority of you were trained at a time when clinical rotations *were* under *direct* osteopathic supervision. Unfortunately, this is not true today. That which makes us different is being diluted and lost.

The majority of our colleges have sold their hospitals. Class size has increased and our schools now number 19, with the new San Francisco and Pikeville colleges. More of our externs are placed in allopathic hospitals. Granted — this is good *medical* training, but *not* that 'hands-on' osteopathic training.

It is truly sad when a recent graduate thinks that the 'osteopathic stuff is bogus' because 'nobody uses it'. This graduate never saw osteopathic principles in clinical settings because he only received allopathic rotations.

The future of osteopathy lies in our students and house staffs. We *must* give them the same quality ***osteopathic*** training *you* all received. This cannot be done solely by the current departments of osteopathic manipulative medicine. It will take additional person-power to make the change. This ultimate change will only take place if the deans and presidents of the colleges see to this change.

As a member of the Illinois delegation to the AOA House of Delegates, I see the delegates trying to mandate this change each year. The House cannot dictate to the colleges, but the colleges are ultimately responsible for our students' training.

My charge, then, is to the college administration, the dean and the president, to serve as a driving force from the birthplace of osteopathy to demand osteopathic clinical experiences in all 19 colleges. Only the dean can influence other deans, and only the president can call others to accountability for osteopathic teaching in the externships.

This accountability must also take place in our DO internships and residencies. Since residents and interns teach our students, these house staffs must also use osteopathic concepts in caring for their patients. Training acquired in residency sets the pattern for patient care in practice.

We — the osteopathic profession — have the health care delivery system for which our nation is asking. Too often patients cannot tell whether the physician treating them has a DO or an MD degree.

For the osteopathic profession to flourish in the 21st century, we ***must*** make the difference ***clear!*** The osteopathic difference will be easy to recognize if our future DOs have a truly osteopathic education."

As we all know, the federal government has told the American people that the US is training too many physicians. The government is paying hospitals to decrease the number of positions available in residency training programs. Now, more than ever, we must provide the "osteopathic difference" in our training programs before we become casualties of down-sizing. ❐

Message from the Executive Director

by Stephen J. Noone, CAE

The right to bill for E&M services and OMT

The right to bill for Evaluation and Management (E&M) services and osteopathic manipulative treatment (OMT) is one of the most visible distinctions of the osteopathic medical profession. From a medical economics perspective, it is critical to the livelihood of Academy members.

"I am writing this letter for documentation for what I am forced into remaining in practice. I have lost the battle and the war and cannot continue to fight for the principle of the right in what we are doing as osteopathic physicians. I must capitulate and bow to the immense financial pressures and resultant hardships imposed by the insurance companies. I must simply code appropriately and bill for the E&M service without using the OMT codes, though I do OMT on that date of service."

This quote is from a letter recently received from an AAO member (name withheld to respect his privacy) who expressed his high level of frustration in obtaining appropriate reimbursement for his uniquely osteopathic services. He goes on to report that the majority of insurance companies are reimbursing him only for OMT and denying the higher paying E&M service. He has given up the fight and will now only bill for the E&M, thus "giving away" the OMT service.

While I empathize with this osteopathic physician's position and respect his decision to change his internal coding practices, I believe that the change is counter productive for the profession as a whole.

The primary source of the problem is the language in the American Medical Association's *CPT Manual* which states in part: "Evaluation and Management services may be reported, if, and only if, the patient's condition requires a significant separately identifiable E/M service, above and beyond the usual preservice and postservice work associated with the procedure." This language emanates from the osteopathic profession's negotiations with the Health Care Financing Administration (HCFA) to *clarify* for Medicare carrier medical directors that E&M and OMT may be reported on the same day of service, even for established patients by using the -25 modifier attached to the E&M service. A number of insurance companies are now misusing this same clarifying language as a rationale for denying E&M and OMT on the same date of service. We must not capitulate to this practice.

The Academy continues its efforts to fulfill its contract with the American Osteopathic Association to negotiate with HCFA a permanent solution to this continuing problem. AAO Trustee/Past President Boyd Buser, serving as a physician advisor to the AOA Division of Payor Relations, has been instrumental in ongoing negotiations with HCFA for a *national* resolution to the language problem.

Since the misused language is published in the *CPT Manual*, the AOA's Coding/Reimbursement Advisory Panel has appealed to AMA's CPT Editorial Panel to revise that language to clearly indicate that it is appropriate for DOs to report evaluation and management services in conjunction with OMT on the same date. Furthermore, the AOA's proposal would clarify that a separate diagnosis is not needed when delivering OMT services to an established patient. The Academy is represented on this AOA panel by Dr. Buser in his physician advisor position and AOA Trustee/Past President Judith O'Connell who serves as the Academy's official delegate to this panel.

Meanwhile, as these national initiatives seek to rectify this injustice, AAO members must continue to advocate resolutions to coding/reimbursement problems at the state and local level. I encourage AAO members to approach the leadership of their respective state osteopathic associations to volunteer their time and talents in support of a local medical economics committee to change physician payment policy of third party payors in their states. There is significant evidence that many of these third party payors are not well-informed about the unique practice of osteopathic medicine and are willing to listen to a rational presentation of the protocols for the use of OMT in patient care. While there are many negative stories of denial of payment, there are also many positive accounts of insurance companies changing physician payment policy after learning the facts. ❐

WINTER OMT Update

(Intermediate Course)

"Application of Osteopathic Concepts in Clinical Medicine and Preparation for OMM Boards"

Program Chairperson: Melicien Tettambel, DO, FAAO

February 21-22, 1998

•Course Objective

This Academy program is designed for a physician desiring the following:

- **OMT Review:**
  Hands-on experience and troubleshooting
- Integration of OMT in treatment of various cases
- Preparation for OMT practical portions of certifying boards
- Preparation for AOBSPOMM (American Osteopathic Board of Special Proficiency in Osteopathic Manipulative Medicine)

- **Comments from past participants**

Would you attend again?

"Yes, good review for those who are out of practice"
"Excellent refresher"
"Would definitely recommend"
"Yes, good presenters"

Were the skill sessions useful?

"Yes, excellent demonstration with lectures"
"Yes, we learned from each other's different styles"

- **CME Hours**
  2 Days - 18 Category 1-A

•Appropriate Dress
Loose fitting sports attire

•Advance Registration Deadline
January 21, 1998

•Refreshment Breaks/Lunch
Breakfast, Breaks and Lunch will be provided

•Hotel Reservations
DoubleTree Hotel (Downtown Portland)
310 S.W. Lincoln
Portland, OR 97201
For reservations call direct (503) 221-0450
$ 99.00 single/double

Saturday, February 21, 1998

8:00 am	Cranial Osteopathy
8:45 am	Counterstrain
9:30 am	Myofascial Release
10:15 am	Break
10:30 am	Muscle Energy
11:15 am	HVLA
12:00 nn	Lunch
12:30 pm	OMM Board Review
1:30 pm	Lab: HVLA (whole body)
3:00 pm	Lab: Muscle Energy
4:30 pm	Refreshment Break
5:00 pm	Lab: Cranial & Myofascial
6:30 pm	Lab: Counterstrain
7:30 pm	Adjourn

Sunday, February 22, 1998

7:00 am	OMM Coding Update Panel
8:00 am	My favorite techniques
9:30 am	OBGyn/Pediatric techniques
10:45 am	Break
11:00 am	OMT in the hospital patient
12:15 pm	Lunch
1:00 pm	The Key Lesion
3:00 pm	OMM Board Review
4:00 pm	Adjourn

Winter OMT Faculty

Melicien Tettambel, DO, FAAO,
Program Chairperson
Alice Shanaver, DO, CSPOMM
Harriett Shaw, DO, CSPOMM

American Academy of Osteopathy

3500 DePauw Boulevard, Suite 1080
Indianapolis, Indiana 46268-1136
Phone: (317) 879-1881
Fax: (317) 879-0563

Winter OMT Update Registration
February 21-22, 1998
DoubleTree Hotel, Portland, OR

Name for Badge (please print clearly) _____

Street Address for Confirmation _____

City _____ State _____ Zip _____

Daytime Phone _____

AOA Number _____

College and Year Graduated _____

❒ **I require a vegetarian meal**

SEMINAR FEE:

Prior to Jan. 21, 1998:

AAO Member	$475
Intern/Resident	$250
AAO Non-Member	$525

After Jan. 21, 1998:

AAO Member	$575
Intern/Resident	$350
AAO Non-Member	$625

We Accept MasterCard or VISA

Card Member's Name _____

Card Number _____

Expiration Date _____

Signature _____

REFUND POLICY:

The American Academy of Osteopathy reserves the right to cancel this educational program if insufficient physicians preregister. Sufficient registrations must be received 30 days prior to the opening of the course. If you are considering registering for this course less than 30 days prior to the opening, contact the Academy office before making travel plans. In the event of course cancellation by the Academy due to lack of registration, all money will be refunded.

Cancellation from participants received in writing for other reasons up to 30 days prior to the course opening are subject to withholding of a 15 percent administrative fee. All other cancellations will receive no refund but may transfer 80 percent of the tuition to another AAO educational program held within the next 12 months.

From: The Principles of Osteopathic Technique

by A. S. Hollis, DO; 1914

The basic principles of osteopathic practice

In presenting the following discussion of certain fundamentals of osteopathic practice we shall attempt to make clear and definite a few main thoughts that lie at the very foundation of our Science. Unfortunately, osteopathy has frequently been judged by its opponents on the grounds of several misrepresented fundamentals and the claims of the Science have been disregarded, because some of those fundamentals were often apparently at variance with known anatomical facts. In every new Science a difficulty, such as this one, is found, and it is only when the basic ideas are stated with extreme accuracy and exactness that any claim to scientific precision can be made for them. We shall attempt herein to state our ideas with as much clearness as possible, so that whether or not our readers agree with the contentions put forward they cannot but grasp the thoughts and follow the lines of reasoning.

The Lesion

The first conception that we wish to determine clearly is the "lesion". What is the lesion? How widely are we justified in applying that term from the osteopathic viewpoint? Do the commonly accepted ideas of the lesion clash with the Anatomy of the spine as we know it? In answer to these and similar questions we would say that an osteopathic lesion is a condition which is found in the spine associated with disease and serving as a causative factor of it. It is an abnormal condition of the ligamentous and other articular structures of such a nature that the movements between the vertebrae become perverted.

This definition is designed to emphasize the essential nature of the condition which is under discussion, and this is that some *perversion of movement* is the *manifesting factor* in a lesion. This perversion may be in the nature of an excessive amount of movement, though this is rare, or it may be in the nature of a deficient amount, and this is very commonly the case. Such a condition, namely a deficient amount of movement between the vertebrae, is called rigidity. Hence, rigidity is the essential feature of most osteopathic lesions. Now rigidity between articular surfaces means that the ligaments and the synovial membranes, etc., of the articulation in question have become thickened and perverted in their nature to the extent that they limit the normal movement. Hence, the essential pathology of an osteopathic lesion is to be looked for mainly in the articular structures themselves, though also we may look for it in the ligaments that elsewhere bind the vertebrae together, such as the common and the supraspinous ligaments. We need to do scarcely more than merely mention the fact after what has been already said, that any "bony" lesion will be manifested by limitation *of movement within the range of the normal movement of the vertebrae affected*. We mention this to combat the thought of the "dislocated" vertebra, that is to say, the thought of a vertebra wrenched beyond its normal range of movement; for as soon as such a "lesion" is found it is "analogous" to a dislocated ankle and should be treated in a manner similar to such a condition.

A question naturally arises as to the causative factors underlying the production of lesions, and on careful analysis we find that we may accurately speak of two main types. These →

we might name:" (a) primary, (b) secondary. By a primary lesion, we mean, either one that is developed spontaneously owing to a certain architectural weakness that seems inherently to cling to man's spine, and this is due largely, in all probability, to his upright position; or one that can be traced to some trauma. A secondary lesion refers to a contracture of the musculoligamentous structures of the back, owing to a toxic congestion that occurs concurrently with acute troubles in the body. In a somewhat different sense, the term "secondary" is often applied to lesions that occur in the neck and back as a result of and to compensate for lesions lower down. Lesions of such a nature – and they are common – will themselves remain corrected only if their primary lesions be thoroughly worked upon and adjusted. This is a strong argument for working from below upwards when giving a treatment, which indeed should always be done. By working this way, these "secondary" lesions will often adjust themselves to a great extent. The main point we would emphasize here is that an osteopathic lesion will be manifested by a lessened degree of movement in the majority of cases; these will always be some perversion of movement and generally also some tenderness will be found on attempted motion.

Adjustment

A thought that demands a word of explanation at this point is: granted that such be the case, what does the Science of Osteopathy suggest as a curative procedure? The answer is, that osteopathic practice aims to re-normalize abnormal tissues. We may use to our advantage in this connection the expression "adjustment", as being a fitting term to express what osteopathy aims to accomplish. What is meant by this is that a certain normal standard is regarded as existent for every individual spine, and that if there are found present variations from that standard it is the work of the osteopathic physician to normalize those structures and, thus, to give free play to Nature and the Nature's processes. It is well to remember that osteopathy was founded on the premise that Nature is striving for each one of her children to be well. Health is normal and if not present, there is but one reason, namely that somehow Nature's attempted efforts are being thwarted or are not being afforded free play.

The striking feature of osteopathic practice is of course the manipulative procedures employed, but if we associate the term "adjustment" with osteopathy, we must see that any methods which will harmonize with Nature's efforts to produce normal conditions are strictly to be included under the heading of the osteopathic principle. We must aim not only to adjust the individual parts of the organism in order that harmony may result within and without, but also we must adjust the organism to its environment.

In correcting abnormalities in the organism the attempt is made to drive away congestion, to dissipate and absorb excess tissue that may have proliferated around the articulations of the vertebrae, to stretch and otherwise normalize the capsules surrounding the articulations of the vertebrae, and to reestablish generally a normal condition of the vertebral tissues.

In other words, to the extent that we "adjust" the tissues of the vertebral column to the normal, are we employing the essential feature of osteopathic practice? Many times in using manipulation, a "pop" is heard between the articular surfaces. This is due to the separation of those surfaces and is not of supreme importance in itself. In fact, the more strictly normal an articulation is, the more readily and frequently, it can be "popped". In other words, if a pop can not readily be obtained between almost all the vertebrae, there are generally but two explanations possible. One is that the line of force used was not properly applied, and the other is that the tissues were so congested and the ligaments etc., so thickened that the force applied was insufficient to cause a separation of the articular surfaces. At this point, we would simply mention the fact that too frequent popping of vertebral articulations (and especially of those in the neck) undoubtedly causes irritation and is itself productive of considerable harm. Also, in some people there is present so lax a condition of the connecting tissues that the vertebrae pop at the slightest provocation. Many osteopathic movements do not produce a "pop", and in these cases, the force is applied directly in the line of the plane of the articulation and the principle employed is analogous to that employed in breaking up adhesions in one of the larger joints of the body.

The exact mechanism whereby the osteopathic lesion produces its effects upon the nervous system is hard to determine precisely. Concerning two facts, we may probably feel fully assured, and they are: (a) that any trouble that may result from or be associated with osteopathic lesions, is produced by some vascular changes occurring around nerve cells; these cells being either in the cord itself or in the sympathetic ganglia; (b) that direct pressure upon the nerve trunk or upon the blood vessels in the intervertebral foramina is a negligible factor in the production of disease. We are not in this latter connection denying the possibility that the vessels may become contracted in size in the intervertebral foramina; they may conceivably do so, but if they do, that condition is produced by an irritation of their vasomotor cells, and not by direct pressure. ❐

Motor-vehicle accident trauma

by Peter M. File, DO, CSPOMM
Portland, ME

Candidate's Name:

CR

Chief Complaint:

Mid-back, neck, and shoulder pain.

History of Chief Complaint:

This 31-year-old female, a previous patient in this office for low back pain, returns with complaints of mid-back, shoulder, and neck pain resulting from a motor vehicle accident 4 days prior to her visit. She was the belted-back seat passenger in a motor vehicle that was struck from the side by a police cruiser traveling 60 mph through an intersection. She was thrown forward on impact, striking her head on the front seat, then recoiling into the back seat. She does not believe she struck her head on the recoil. She denies any pain immediately after the accident, but within hours began to "stiffen up" in the mid and low back regions. The stiffness spread into her upper back, shoulders and neck. Two days after the accident, the low back pain and stiffness resolved, but the pain in her neck, shoulders and mid-back remained.

Medical Care

She saw no physicians after the accident. She did see a neuromuscular therapist for one treatment, which seemed to be slightly helpful. She was then referred to this office for further evaluation and treatment.

Past Medical History

The patient was treated for an episode of low back pain three months prior to the accident. She responded well to treatment. The remainder of her medical history is essentially normal.

Social History:

The patient is single. She denies smoking, caffeine, or significant alcohol consumption. There is no additional stress noted. She is very active, exercising regularly, and works as the director of a fitness center for a major corporation.

Allergies/Medications

There are no allergies or sensitivities. No medications are being utilized.

Physical Examination:

This pleasant, cooperative female presents with slight guarding of her shoulder and neck regions.

Neurological:

She was alert and oriented to person, place, and time. There was no apparent memory loss. Muscles strength and sensations to light touch and pain appeared grossly intact in the upper and lower extremities. Gait is normal.

Structural:

There is fullness noted in the right para-spinal muscles in the mid-thoracic region. Standing flexion revealed myofascial pull from the thoracic region down into the lumbar region. The key somatic dysfunctions appeared to be at the T6-8 SlRr, as well as at the TlESrRr area on the right. Cervical range of motion appears restricted in left rotation. There is tightness in the left scalene muscles. There are compensatory somatic dysfunctions in the cervical region.

Initial Assessment:

Mid-back, shoulder, and neck pain due to somatic dysfunctions secondary to the motor vehicle accident.

Treatment Plan:

Osteopathic manipulation, gentle stretching exercises. A short course of neuro-muscular therapy and moist heat.

Course of Treatment:

After weekly treatment sessions over a three-week period of time, the patient was still having discomfort and only short-term relief of pain, despite the fact that she was stretching regularly and trying to increase her activity levels gradually.

On the fourth visit, I explored deeper in the fascia in the abdominal region for other possible restrictions which might be hindering her →

progress. Significant restrictions were found in the kidney regions bilaterally, restricting the free movement of the kidneys in relation to the normal abdominal movements. The kidney areas were treated with myofascial release in addition to other somatic dysfunctions in the upper back, shoulder, and, neck regions. Her follow-up visit a week later showed significant improvement in her overall mobility in her shoulders and neck, as well as into her low back and hips. Her energy level had also increased. Reevaluation of the kidney region showed improved kidney motion. This area was treated again. Follow-up two weeks later showed return of full motion in the shoulder region and resolution of her pain. She was seen one additional time a month later to make certain that the sensitivity had resolved, which was the case. She was back to full function with no pain or restricted motion. She was then discharged from care.

Discussion:

This case points out the manner in which restrictions in the connective tissue around organs of the body can have a significant effect on the maintenance or reoccurrence of somatic dysfunctions elsewhere. In this particular case, once the restrictions were released in the kidney region, the shoulder problems resolved very quickly. This young woman was a very active individual and should have responded very quickly to her initial treatment. It was puzzling to the patient and myself when her response was sluggish. It was amazing to both of us once the kidneys were released to see how quickly the rest of the restrictions resolved and her homeostatic mechanism brought her back to health.❑

The Kirksville Crunch

by Harold Magoun, Jr., DO, FAAO
KCOM 1950

Several of the early osteopathic colleges are associated with specific osteopathic techniques. The Philadelphia College is noted for the Spencer Shoulder Techniques, the Chicago College is noted for Fryette's knee-in-the-back thoracic technique, and the Kirksville College is noted for it's namesake, the "Kirksville Crunch". This is a mid-thoracic direct action technique accomplished with the patient supine and their hands clasped behind their neck. This has all too often been done as a "shotgun" maneuver, but when properly done it is a very specific and very effective technique. It is a popular technique, but often not well done, and I have heard it taught improperly on a number of occasions. I think the issue needs to be clarified. The "Kirksville Crunch" is applicable to both extension-rotation-sidebending and flexion sidebending-rotation restrictions, with a slightly different direction of force as will be explained later. It works well from about 4-5 T to 9-10 T. The operator stands on the side of the convexity of a diagnosed lesion. The patient is supine with his or her hands clasped behind the neck, as low as possible on the neck to minimize leverage on the neck. The operator's caudad hand marks the lesioned segment. The operator then slides his cephalad hand behind the patient's head, staying in the midline until his hand is in the mid-scapular area. The patient's head is supported in the bend of the operator's elbow, and the patient's upper body is supported by the operator's hand. The patient's upper trunk is then side-bent and rotated toward the operator, which reverses the side-bending rotation. The operator's clenched hand is then placed as a fulcrum at the level of the spinous process of the lesioned segment, which due to the inclination of the spinous process will stabilize the normal segment below for the correction. If the lesioned spinous process is closer to the segment below, the lesion is in extension; but, if closer to the segment above, it is in flexion. The vast majority are in extension. The operator then places his lateral chest wall on the patient's forearms on the proximal portion of the ulna and radius, not on the elbows. The patient's forearms are then pressed towards the table to take the slack out of the tissues, the patient then is gently flexed and extended over the fulcrum feeling the spine move like the track of a catapiller tractor until the tension is right at the fulcrum. If the lesion is in extension, a force just below the fulcrum will flex the spine, and if the lesion is in flexion a force just above the fulcrum will extend the spine to bring about a correction. The correction can be very easily applied specifically to one segment this way, with a gentle thrust, instead of the typical "shotgun" approach. This is a great osteopathic technique when properly done.❑

Review of the *Collective Papers of Irvin M. Korr, Volume II*

by Jerry L. Dickey, DO, FAAO
Fort Worth, Texas

Since being asked to write this review of the *Collective Papers of Irvin M. Korr Volume II*, I have had great fun in reading and, in many cases, rereading these papers. I have revisited in my mind, my many numerous associations with Dr. Korr. I started reading Dr. Korr's papers while I was still an undergraduate and, I must admit that I was an awe-struck student when I found myself one of Dr. Korr's students. My feelings have progressed to those of a colleague and fellow faculty member, a friend, and finally those of an immediate superior. I felt very familiar reading Dr. Korr's words again.

I must compliment the editor Hollis H. King, DO, PhD, for dipping backward and pulling three papers that were included in Volume I. He has, thus, been able to start this exposition of Dr. Korr's thinking with all four articles in the series "The Spinal Cord as Organizer of Disease Processes". This marks the first time that all four of these papers have been included in the same printing, and as such represent the last hard-bench research that Dr. Korr was involved with.

If you want hard science, go back and read Volume I, for it represents the fruitful years of Dr. Korr's fascinating works dealing with the osteopathic philosophy. Volume II picks up with the functional implications of the hard scientific research and how this earlier work points in a direction of evolving healthcare.

The editor has done a beautiful job of organizing the torrent of philosophical perspectives that Dr. Korr has written since 1980. The section headings are concise and definitely help to organize Dr. Korr's philosophical and practical applications of this new way of thinking.

I would highly recommend section 7, which deals with the lighter side of Kim Korr. For those of us who were his former students, I am sure many of us still assume that Dr. Korr was devoid of humor or any scrap of humanity. For those who were not aware, Dr. Korr has always had an imp on a cobweb leash. In this section he lets the imp off the leash. Let this section forever dispel those misconceptions.

To truly appreciate this work one must remember that Dr. Korr came into the osteopathic profession, not to praise it but to bury it. Within a short period of time he became convinced, as a scientist, that we had something vitally important to add to the arena of medical knowledge. As a person with the courage of his convictions, Dr. Korr has worked tirelessly for over half a century to convince the osteopathic profession of the rightness of its ideas and the worthiness of its unique contributions to medicine. At times, he has been a voice crying in the wilderness, but he does so quite eloquently. The papers in this volume talk to the research and basic science communities both inside and outside of our teaching institutions. He talks persuasively to the members of this profession to recognize the incredible gift that they have been given as members of the osteopathic profession. Dr. Korr has worked tirelessly to ever remind us that the privilege of being members of the osteopathic profession carries a strong responsibility to demonstrate our uniqueness in everything that we do.

Dr. Korr has worked tirelessly for over half a century to convince the osteopathic profession of the rightness of its ideas and the worthiness of its unique contributions to medicine.

I view this volume as a celebration of a life and a mind that has been dedicated to scientific truth and doing what is right. What more could Irvin M. Korr, PhD, have done or said to convince the osteopathic profession of the incredible value of our unique convictions and contributions to the healing arts. ❑

{Editor's Note: To purchase a copy of the Collective Papers of Irvin M. Korr, Volume II, *call the American Academy of Osteopathy at (317) 879-1881}*

Book Reviews continue →

Review of *Foundations for Osteopathic Medicine*

by Sherman Gorbis, DO, FAAO, Associate Professor, MSUCOM

Letter to the Editor

Dear Dr. Hruby:

Thank you very much for giving me the opportunity to review *Foundations for Osteopathic Medicine*. I found myself spending more time on certain chapters than others. However, as our department begins to do more research and more faculty development, I can see myself returning to *Foundations* more and more. This assignment became a labor of love.

We really should ensure that our students do have this text and that our entire faculty be encouraged to use it whenever appropriate.

Once again, thank you for entrusting this assignment to me. I hope it meets with your approval.

Sincerely,
Sherman Gorbis, DO, FAAO

In the late 1980s, Howard M. Levine, DO, FACFP, then chairperson of the American Osteopathic Association (AOA) Bureau of Research, issued a challenge that a textbook be developed for use of all osteopathic students and physicians. He felt that our students should learn to "think osteopathically" and should know when and how to use osteopathic principles and practice (OPP) and osteopathic manipulative treatment (OMT) in all clinical situations when appropriate. Within earshot of Dr. Levine's words, was Robert C. Ward, DO, FAAO. Dr. Ward became the Executive Editor of *Foundations for Osteopathic Medicine (Foundations)*.

The text is divided into the following sections:

I. Osteopathic Philosophy
II. History
III. Basic Sciences
IV. Behavioral Sciences
V. Clinical Problem Solving
VI. Family Practice & Primary Care
VII. Clinical Specialties
VIII. Palpatory Diagnosis & Manipulative Treatment
IX. Health Restoration
X. Applications of Basic and Clinical Research for Osteopathic Theory & Practice

Sections I and II very nicely relate osteopathic philosophy and history. The principles of osteopathic philosophy include:

1. The body is a unit; the person is a unit of body, mind, and spirit.
2. The body is capable of self-regulation, self-healing, and health maintenance.
3. Structure and function are reciprocally interrelated.
4. Rational treatment is based upon a basic understanding of the principles of body unity, self-regulation, and the interrelationship of structure and function.

These principles are a common thread woven throughout the *Foundations* textbook. Section III provides a comprehensive description of principles of anatomy, physiology, and pharmacology, as well as regulatory mechanisms such as the autonomic nervous system, the neuroendocrine-immune system, and the neurophysiologic system. If osteopathic medical students have the opportunity to read these first three sections early in their first term, they would learn the building blocks upon which the principles of osteopathic philosophy are based. They would also understand the normal structure that the use of appropriate OMT hopes to attain, thereby allowing normal function to occur.

If osteopathic medical students have the opportunity to read these first three sections early in their first term, they would learn the building blocks upon which the principles of osteopathic philosophy are based.

Section IV, Osteopathic Considerations in the Behavioral Sciences, clearly brings home the point that there is a patient involved in patient-care and the doctor-patient relationship. As physicians, we deal with more than just patients who have diseases. This section very nicely describes variables that patients can address so that they may begin to take some responsibility for their health improvement. Inquiring about various aspects of a patient's life, and really caring about patients, are ideas that are mentioned many times throughout the text. Not coincidentally, these are areas that patients feel add to the distinctiveness of osteopathic physicians. ❑

Visceral Manipulation Manual Thermal Diagnosis

March 23-25, 1998

The Broadmoor, Colorado Springs, CO

Description of Course

Manual thermal diagnosis, first level, second level, third level, link brain with organs, emission-reception, review general and local listening.

In this course, we will introduce manual thermal diagnosis, which allows us to find where there are dysfunctions in the musculoskeletal system, cranial system, and the viscera, using infrared thermal projections. This method is very quick and very precise, and also provides us with information on the chain of a lesion pattern. We cover the thermal projections of all of the anatomical structures introduced in earlier courses. We also begin to explore the patterns of somatization and cephalization that are occurring in the patient's organism, tracing the lesion through the central nervous system. Labs work on learning to recognize when we are receiving (diagnosis) in these areas, and learn to not take on the problems of the patients, and subsequently not drain our own vitality in the process.

Specific applications include finding hormonal imbalances, finding precise locations of problems in an abdomen, acute pelvic pain, acute thoracic pain, congestion, hepatic dysfunction, pancreas and kidney dysfunction's coronary restrictions, sinusitis versus cranial restrictions, suture restrictions, specific joint restrictions, gastritis, gastroesophageal reflux, ulcers, and acute appendicitis.

Who May Attend:

Educational objectives for AAO are to provide programs aimed to improve understanding of philosophy and diagnostic and manipulative skills of AAO members, DOs who are not AAO members, individuals who possess credentials required for unlimited licensure as physicians and for those in program leading to such license.

Faculty:
Ken Lossing, DO
Daniel Bensky, DO

CME Credits:
24 Hours – Category 1-A

Program Chairperson:
John Glover, DO

Visceral Manipulation March 23-25, 1998

Name for Badge (please print clearly)

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City State Zip

Daytime Phone Number_____

AOA Number _____

College and Year Graduated_____

❒ **I require a vegetarian meal.**

We Accept MasterCard or VISA (circle one)

Card Member's Name

Card Number

Expiration Date

Signature

Advance Registration Deadline: February 23, 1998

SEMINAR FEE:

Prior to February 23, 1998

AAO Member	**$595**
Intern/Resident	**$300**
AAO Non-Member	**$695**

After February 23, 1998

AAO Member	**$645**
Intern/Resident	**$350**
AAO Non-Member	**$745**

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P.O. Box 1439
Colorado Springs, CO 80901-7711
(719) 634-7711

Room Rates:

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$116.00 (Main Tower)

Classic
$137.00 (South Tower-City View)

Superior
$158.00 (South Tower-Mountain View/ West building with balcony)

Premier
$179.00 (West Tower, extra-sized with Mountain or Lake View)

Refund Policy:

The American Academy of Osteopathy reserves the right to cancel this educational program if insufficient physicians pre-register. Sufficient registrations must be received 30 days prior to the opening of the course. If you are considering registering for this course less than 30 days prior to the opening, contact the Academy office before making travel plans. In the event of course cancellation by the Academy due to lack of registration, all money will be refunded.

Cancellation from participants received in writing for other reasons up to 30 days prior to the course opening are subject to withholding of a 15 percent administrative fee. All other cancellations will receive no refund but may transfer 80 percent of the tuition to another AAO educational program held within the next 12 months.

For more information, contact:

American Academy of Osteopathy
3500 DePauw Blvd., suite 1080
Indianapolis, IN 46268-1136
Phone: (317) 879-1881
FAX: (317) 879-0563

Basic Percussion Vibrator Course
February 21-22 1998

Course Location: Eastmoreland Hospital; Transportation will be provided from hotel.

CME Hours: 15 Category 1-A

Faculty

Richard W. Koss, DO, Fort Worth, Texas
Rajiv Yadava, DO, St. Louis, MO

PROGRAM

Saturday, February 21, 1998

8:00 a.m *Introduction & History of Vibration/Percussion*
Lab Session: *Diagnosis - Subtle Motion; Assess the Delicate Motion*
Use of Correct Hand On Front of Body
Discussion of Motor:

Parts of:	*Technique:*
Care	*Frequency*
Grease	*Pressure, Angle*
Clean	*Vibration/Resonance*
	Thought - Intention

Lab Session: To Tables
Learn Technqiue of Percussion on One Point of Knee: Attention - Intention; -- Vibration; -- Direct Release Shock - Release

12:00 noon Lunch

1:00 p.m.
Fascia Bioelectricity, Trauma
Rhythmic Balance Interchange
Delivery of the Baby -- Trauma to Knee, Shoulders, Head.
To Tables: Knee, Ankle, Foot, Trochanters, Pelvis

5:00 pm Adjourn

Sunday, February 22, 1998

8:00 am Review - Common Faults in Use of Hammer
To Tables: Pelvis, Spine, Lumbar, Thoracic, No Higher Than C7, Diaphragm
Clavicles
Arm/Hand

12:00 noon Lunch
Regenerative "Piston" Breath Paper
Deltoid Recess
Parietals
C-Spine: C2-3
Sternum

4:00pm Adjourn

Who May Attend

Educational objectives for AAO are to provide programs aimed to improve understanding of philosophy and diagnostic and manipulative skills of AAO members, DOs who are not AAO members, individuals who possess credentials required for unlimited licensure as physicians and for those in programs leading to such license.

Basic Percussion Vibrator Course
February 21-22, 1998

_____
Name for Badge (please print clearly)

_____
Street Address for Confirmation

_____
City State Zip

_____
Daytime Phone Number

_____ _____
AOA Number College and Year Graduated

❒ **I wish to purchase a percussion vibrator in Portland.**

❒ **I require a vegetarian meal.**

SEMINAR FEE (no discounts)
AAO Members $415.00
AAO Non-Members $515.00

AAO ACCEPTS MASTERCARD AND VISA

Card Member's Name _____

Card Number _____

Expiration Date _____

Signature _____

Refund Policy

The American Academy of Osteopathy reserves the right to cancel this educational program if insufficient physicians pre-register. Sufficient registrations must be received 30 days prior to the opening of the course. If you are considering registering for this course less than 30 days prior to the opening, contact the Academy office before making travel plans. In the event of course cancellation by the Academy due to lack of registration, all money will be refunded.

Cancellation from participants received in writing for other reasons up to 30 days prior to the course opening are subject to withholding of a 15 percent administrative fee. All other cancellations will receive no refund but may transfer 80 percent of the tuition to another AAO educational program held within the next 12 months.

Hotel Reservations for the Doubletree Downtown Portland
310 S.W. Lincoln, Portland, OR 97201
National toll-free reservations line(800) 222-TREE
Direct to Portland hotel (503) 221-0450
Room Rate: $99.00 single/double

The sacrum; A bone of contention

by Kenneth E. Nelson, DO, FAAO

About the Author

Kenneth E. Nelson, DO, FAAO, is a 1970 graduate of CCOM. He joined the faculty there in 1971. Dr. Nelson is board certified by the AAFP, ACOFP, and AOBSPOMM receiving his FAAO in the Academy in 1994. Dr. Nelson currently holds academic appointments in the Department of Family Medicine, Biochemistry and Center for Osteopathic Research and Educational Development at CCOM.

The contents of this article will be used as the basis of the panel discussion at the 1998 AAO Convocation's Evening with the FAAOs. Read it, form your own opinions, then with your personal prejudices in hand come and join the debate.

Introduction

The sacrum is strategically located at the junction between the bipedal stance of the lower extremities and the vertical weight bearing force of the vertebral column. From its position, wedged between the ilia, it transmits force from above bilaterally into the lower extremities, and accommodates for the torsional forces placed upon it during locomotion. This complex relationship is not easily understood. The mechanics of dysfunction of the sacrum with adjacent structures is a frequently debated subject.

Dr. Still implored us to: "Acquaint yourselves with all structures by a deep and continued study of anatomy, because on this foundation you must stand or fall."[1] The osteopathic profession has followed this instruction and, on anatomy, we are in agreement. It is our interpretation of function as it relates to structure where we appear to disagree. Yet, if the anatomy is sound, and it is, how can we arrive at such seemingly different descriptions of function?

Sacral function and dysfunction have been studied and debated for years. If we make the assumption that the authors who have worked diligently to describe sacral mechanics did so astutely, the problem must then lie in our terminology. Fred Mitchell Sr. noted this problem as follows: "While there is a great difference of opinion of the sacroiliac and iliosacral movement, in my opinion one of the barriers has been the lack of a common vocabulary..."[2] In the forty years since that statement was made much has been accomplished toward the creation of a common vocabulary. Although we now speak employing the same words, regarding sacral somatic dysfunction, there are several terms which appear to over-lap one another. This facilitates confusion.

Possibly our descriptions of function (and consequently dysfunction) are not as diverse as they initially appear to be. In order to determine this, it is appropriate that we look back at the works upon which our contemporary conclusions are based. In the following paper, I have done that, and indeed have come to the conclusion that no diversity, other than minor differences of perspective, exists.

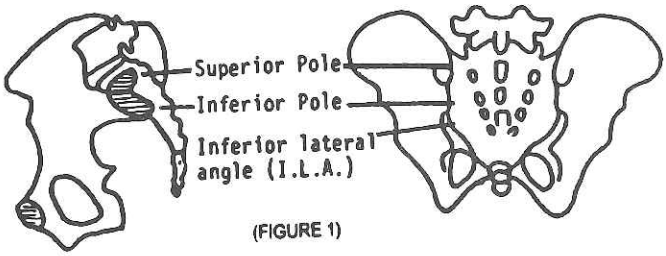
> Acquaint yourselves with all structures by a deep and continued study of anatomy, because on this foundation you must stand or fall.
>
> *Andrew Taylor Still*

Anatomy, our common ground

A thorough discussion of lumbo-sacro-pelvic anatomy is certainly beyond the scope of this paper. It has been described in many texts and is readily available for the reader who wishes to review it in depth. There are certain aspects of the area, however, that necessitate mention for purpose of the discussion to follow.

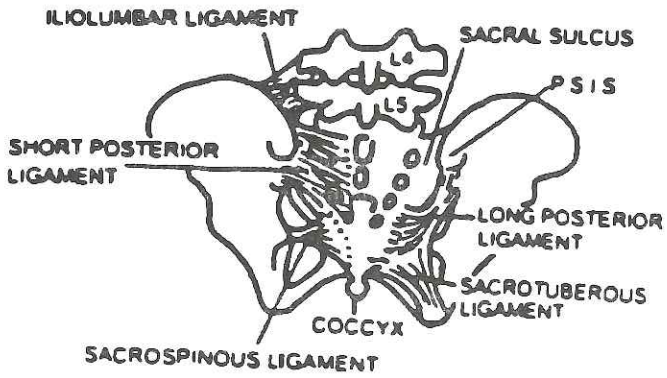
The sacrum, a triangular bone, is situated in an in- →

verted position with its base superior to its apex. Typically it consists of five fused vertebral segments, although congenital variations are not uncommon. The superior surface of the first sacral segment articulates in typical vertebral fashion with the inferior surface of the lowest lumbar vertebra through an intervertebral disc and two zygapophyseal joints. The fused first, second, and third segments, laterally, form the sacral component of the sacroiliac joint. This is a crescent shaped articulation which, in the weight-bearing position, is situated with its convex edge directed anteriorly and inferiorly. For our purposes we consider the sacroiliac articulation to be functionally divided into a superior pole, and an inferior pole (**Fig. 1**).



(FIGURE 1)

The iliac surface of the articulation is roughly a mirror image of the sacral counterpart. The sacrum which may be considered to be both wedged and suspended between the ilia is held in place by strong sacroiliac ligaments. What is homologous to the transverse processes of the fifth sacral segment forms lateral prominences just caudal to the sacroiliac articulations. These prominences are referred to as the inferior lateral angles. They serve as points of partial attachment for the sacrotuberous and sacrospinous ligaments, which retard the tendency for sacral (anatomic) flexion during weight bearing (Fig. 2).



(FIGURE 2)

Illustrations by author

With this brief review of anatomy in mind let us turn our attention to a discussion of function and dysfunction. Such a discussion must occur within the context of the type of therapeutic technique to be employed.

Identifying and describing somatic dysfunction

Today there are a plethora of technical approaches for the remediation of somatic dysfunction. In order to employ a technique, the somatic dysfunction to be treated should be defined in terms of the specific technical approach. Although there is no doubt in my mind that an articular approach will impact fascial dysfunction, or that addressing the primary respiratory mechanism will effect articular dysfunction, I believe that it is most appropriate to diagnose somatic dysfunction, apply therapeutic intervention, and reassess for therapeutic efficacy consistently within the same model. This is not to say that a good osteopathic clinician should not routinely employ combined technique. Rather, that a decision should be made as to whether the dysfunction being addressed is best treated as primarily fascial, muscular, articular, neuro-reflex, or alteration within the primary respiratory mechanism. Having made that decision (diagnosis), the most appropriate technique modality (fascial release, muscle energy, articulatory, counterstain, cranial etc.) should then be employed. Within these multiple models for identifying somatic dysfunction there are as many different descriptions of sacral dysfunction. To compare and contrast all of them is a far greater task than appropriate for this paper. I will therefore limit my attention to the area of direct technique, particularly the muscle energy and articulatory (high velocity, low amplitude) models. Both of these models approach sacral dysfunction in terms of dysfunction at an articular level. Yet between these two, there appears to be significant lack of consensus. A review of the literature upon which these models are based will prove helpful in resolving this problem.

To accomplish this I have employed the following criteria:

1) Articular somatic dysfunction is most appropriately diagnosed in terms of restriction of normal articular motion.[3]

2) Terminology employed when naming articular somatic dysfunction must be clearly defined and consistently employed.

3) The definition of the mechanics of articular motion is best, whenever possible, delineated using reproducible technical methods rather than simple observation.

1) Diagnosis by motion restriction

Somatic dysfunction may be diagnosed by assessing positional asymmetry, restriction of motion, and tissue texture change.[4] There are sufficient variations within normal anatomy to invalidate the use of positional diagnosis alone.[5] This is particularly true in the lumbo-sacro-pelvic region. Congenital variation from the norm has its highest incidence in the lumbosacral region. Colachis[6] demonstrated differences of as much as 10 degrees in the angle of inclination (the angle formed between the longitudinal axis of the sacral alar articulation and the horizontal plane) between the left and right articular surfaces in the same sacrum. Such variations are enough to create significant differences in the positional relationships of "normal" anatomic structures from individual to individual. Fryette summarized this best as follows: "There is probably no single factor which attracts the attention of osteopathic physicians so quickly as asymmetry. However, asymmetry is not always indicative of pathology."[7]

Tissue texture change is a valuable indicator of the presence of somatic dysfunction. Localized tissue texture change may, however, be present due to inflammation from local pathology other than somatic dysfunction, or reflexly from a distant site as in the case of a viscerosomatic reflex. In both these cases, no articular dysfunction need be present.

Articular function allows movement to occur and articular dysfunction consists of restriction of normal motion mechanics.[4] Manual technique, directed at treatment of articular dysfunction, is directed at the reestablishment of normal (unrestricted) articular mechanics.[8] It follows that, articular somatic dysfunction is most appropriately diagnosed by evaluating available articular motion. Assessment of positional asymmetry and tissue texture change are not to be disregarded. Both offer valuable diagnostic information and are often easier to obtain. But neither definitively identifies the dynamics of dysfunctional articular mechanics.

2) Naming sacral articular dysfunction

Significant sacral articular somatic dysfunction may occur between the sacrum and L5 and between the sacrum and the left and/or right ilium. When describing dysfunctional sacral motion mechanics, it is not only important to identify the dysfunctional motion pattern, it is imperative to state (or at least clearly recognize) the reference point, relative to which, sacral motion is occurring. Motion may well occur, but unless a fixed point of reference is identified, the motion can not be specifically described, let alone measured. To say that the sacrum is "anterior", "posterior", or in "torsion" is to say nothing unless we identify what the sacrum is "anterior..." to. Fortunately, these reference points have been identified. Unfortunately, this is not always remembered. It is also important that we are consistent in our system of nomenclature. Again, rules for this have been delineated.[9,10,11,12] Vertebral dysfunction is named for the dysfunctional segment relative to the segment immediately caudad. As such, dysfunction between the sacrum and L5 should be named for L5 relative to the sacrum. Appendicular dysfunction is typically named for the distal component relative to the proximal component. Since the ilia are paired bones and could be considered the most proximal bones of the lower extremities, it could be argued that dysfunction between the sacrum and ilium be named for the ilium relative to the sacrum. In fact, this was the norm in the early part of the twentieth century.[4] This circumstance is not as simple as mechanics between the sacrum and L5. The pelvic bones also articulate with one another at the pubic symphysis resulting in potential ilio-ilial dysfunctional patterns. Therefore in order to avoid confusion, dysfunction between the sacrum and ilium should be named for the sacrum relative to the ilium. Ilial dysfunction patterns are best defined in terms of one ilium relative to the other and, typically, have dysfunctional involvement of the symphysis pubis.[13] This is best addressed by identifying and naming the symphyseal dysfunction.

This brings us to a significant point of confusion, the terms ilio-sacral and sacroiliac. This problem has been considered since the beginnings of osteopathy.[14] However, because the relationship between the sacrum and ilium consists of a single articulation, if the sacrum is considered to be moving and the ilium the reference point, or if the ilium is considered to be moving and the sacrum is the reference point, the articular mechanics are the same.[15] The confusion appears to be one of primary versus secondary dysfunction.[16] If the dysfunction is specifically of the sacroiliac articulation (primary dysfunction) whether the problem arose through movement of the sacrum upon the ilium (sacroiliac)[17] or through movement of the ilium upon the sacrum (ilio-sacral)[13] is purely of historical interest. If, however, the dysfunction is secondary, due to additional dysfunctional mechanics maintaining the sacrum between the ilia (sacroiliac) or maintaining the ilium upon the sacrum (ilio-sacral), then those responsible mechanics, whatever they might be, should be specifically diagnosed and treated. If this is done, the sacroiliac (or iliosacral) problem should resolve with little or no direct treatment. The body's potential for self-healing should account for this. Under these circumstances, the diagnoses of sacroiliac or iliosacral dysfunction are of less consequence than the diagnosis of the primary dysfunction be it symphysis pubis dysfunction or psoas major myositis. Again, this issue may be simplified by naming primary articular dysfunction between the sacrum and ilium in terms of the sacrum relative to the ilium.

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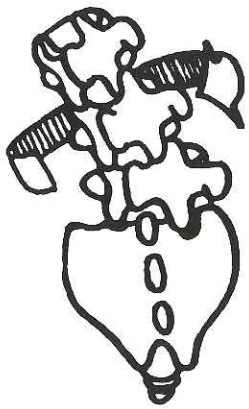
3) Defining articular mechanics

This discussion will be limited to physiologic mechanics of the lumbosacral and sacroiliac articulations, with the recognition that dysfunctions resulting from significant exogenous force need not demonstrate motion restriction consistent with physiologic motion.[18,19,20] Fryette stated that "anatomically the sacrum is part of the pelvis but physiologically it is part of the lumbar spine."[21] Fryette proposed the physiologic motion of the spine after studying cadaveric specimens and living individuals. He later developed a spinal model mounted in soft rubber to demonstrate spinal mechanics which he patented and employed as a teaching aide. In his description of vertebral mechanics, he stressed the importance of involvement the vertebral zygapophyseal joints upon the movement of the individual vertebral segments. He described the specific motion patterns Type I (neutral) and Type II (non-neutral). He also described the sequence in which the components of these complex vertebral physiologic motions occurred.[22]

These points may well be common knowledge to most readers, but I will review them because they are extremely relevant. The articular relationship between the sacrum and L5 consists of two posterior zygapophyseal articulations and an intervertebral disc and, as such, the criteria exist to allow Type I (neutral) and Type II (non-neutral) vertebral mechanics.[21]

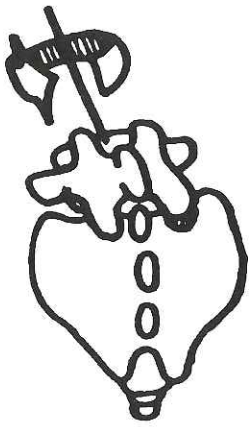


Neutral – Group curve sidebent left with rotation right

Type I group mechanics, three or more segments. If sidebending is introduced, group rotation occurs in the opposite direction (toward the produced convexity).

(FIGURE 3)

Type I (**Fig. 3**) mechanics occur when the zygapophyseal joints are not engaged. Type I mechanics, often referred to as group or neutral mechanics, require involvement of a minimum of at least three consecutive vertebral segments. As a group, when sidebending is introduced, rotation *of the entire group* relative to the anatomic position, occurs toward the produced convexity. The most superior and inferior segments rotate the least, while maximum rotation occurs at the middle segment (apex) of the group curve. Fryette stated that the sequence in which this occurred was sidebending followed by rotation.



Non-neutral L5 flexed, rotated left, sidebent left

Type II dysfunction of the vertebral unit. If flexion or extension is sufficiently present to localize forces between the two segments, when sidebending is introduced, rotation of the superior segment occurs in the same direction (toward the produced concavity).

(FIGURE 4)

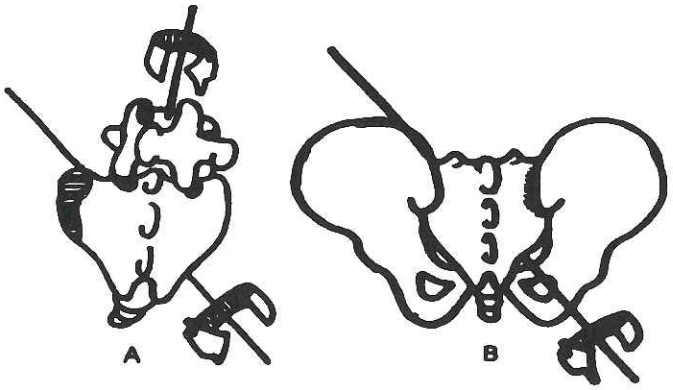
Type II (**Fig. 4**), non-neutral mechanics occur between two adjacent vertebral segments. When extension or flexion is present such that the zygapophyseal joints become involved, and sidebending is introduced, in order for sidebending to occur it must be preceded by rotation. The rotation occurs toward the direction in which the sidebending forces will produce the concavity. This sequence occurs as extension or flexion, (introduction of sidebending forces) rotation followed by sidebending.

The sacrum participates in Type I (neutral) mechanics as the lowest segment of the lumbar group. Under appropriate circumstances L5 moves upon the sacrum in compliance with Type II (non-neutral) mechanics. Under these circumstances as Dr. Fryette pointed out, the sacrum behaves physiologically as part of the lumbar spine. It must be emphatically stated here that the coupled sidebending rotation mechanics of the sacrum are *not* Fryette Type I mechanics. Because, the sacroiliac articulations are not typical vertebral articulations.

The sacrum, which is "anatomically part of the pelvis," can become dysfunctional with the ilia. Sacral mechanics relative to the ilia have been studied extensively employing multiple methods.[4,6,23,24,25,26,27] All have demonstrated that sacral flexion/extension occurs. Figerio,[24] employing orthogonal simultaneous radiography demonstrated that complex movements occur between the sacrum and the ilia and between the two ilia. These movements were not specifically described. Strachan,[4] employing a cadaveric model, succeeded in demonstrating flexion/extension and complex coupled relationships between sidebending and rotation. Strachan's prepared cadaveric specimen consisted of the lumbar spine, sacrum, and pelvis. It was employed to demonstrate the motions of the sacrum and one ilium relative to the other ilium, a portion of which (excluding the sacroiliac and public symphyseal articulations) had been immobilized in concrete. Forces were introduced from above and the motions of the sacrum and free ilium were recorded. Forces introduced included,

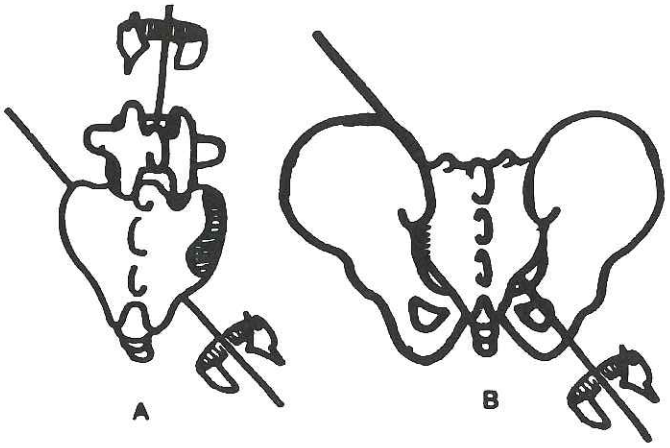
flexion/extension, compression/distraction, rotation left/right, and sidebending left/right. Of interest to this discussion are the following points. Rotation of the lumbar spine produced sacral rotation in the same direction, but to a lesser degree, coupled with sidebending of the sacrum to the opposite direction. In addition, "there was a slight tendency for the sacrum to assume some extension as these motions occurred." When sidebending was introduced the sacrum sidebent in the same direction as the lumbar spine. This was accompanied by a slight degree of rotation which was inconsistent in direction. Compression of the lumbar spine produced definite sacral flexion. Flexion of the lumbar spine was followed by sacral flexion and extension of the lumbar spine was followed by sacral extension.

An additional model for sacral mechanics has been proposed by Fred Mitchell, Sr.[28] Like Fryette, Mitchell Sr. described lumbo-sacro-pelvic mechanics based upon observation. He stated that the complex movement of sacral sidebending and rotation can be considered to occur as rotation of the sacrum upon an oblique axis.[2] The oblique sacral axis, first described by Magoun Sr.,[29] is currently said to pass from the superior pole of the sacroiliac articulation on one side to the inferior pole of the opposite sacroiliac articulation. Also, like Fryette, Mitchell Sr. described neutral and non-neutral mechanics between the lumbar spine and the sacrum. He stated that the side of the oblique axis upon which the sacrum rotates is determined by lumbar sidebending. The direction in which sacral rotation occurs is determined by the absence (neutral) or presence (non-neutral) of significant flexion or extension of the lumbosacral junction. Forward torsion (**Fig. 5**)



(FIGURE 5)

Forward torsion, left rotation on the left oblique axis
Neutral,
A) If weight bearing is such that the left oblique axis is engaged in the absence of flexion or extension, the sacrum rotates left so that the right superior pole of the sacrum moves forward relative to L5.
B) Under these same circumstances, relative to the ilia, the sacrum moves forward at the right superior pole and backward at the left inferior pole.



(FIGURE 6)

Backward torsion, right rotation on the left oblique axis
Non-neutral,
A) If weight bearing is such that the left oblique axis is engaged and significant flexion or extension is present, the sacrum rotates right so that the right superior pole of the sacrum moves backward relative to L5.
B) Under these same circumstances, relative to the ilia, the sacrum moves backward at the right superior pole and forward at the left inferior pole.

of the sacrum and backward torsion (**Fig. 6**) are distinctly descriptions of sacral motions in response to forces transmitted through the lumbar spine. They are descriptions of the physiologic relationship between the lumbar spine, sacrum, and ilia.

A word should be said here about "axes" of sacral motion. Axes of motion have been descriptively employed by the majority of authors, to such an extent that their existence appears to be unquestionably accepted. Yet, reviewing the research on the subject of sacral flexion/extension reveals great inconsistency in the probable axis location. Colachis[6] demonstrated that the axis for flexion/extension was located 5 to 10 cm below (anterior-inferior) the sacral promontory and that this point varied not only among individuals tested, but also in the same individual for different movements. He concluded that such variability seems to indicate that most likely angular and parallel movements take place rather than rotatory movements. Weisl[27] drew similar conclusions also stating the axis of rotation (flexion/extension) generally lies 5 to 10 cm vertically below the sacral promontory but that the site of the axis was variable in a majority of subjects indicating that the position of the axis is not stationary and that sacral motion is not rotatory. Kotke[25] and Pitkin[26] dem-

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onstrated the axis for flexion/extension to be located at the level of S2 posterior to the sacroiliac joint, the location of the superior transverse axis agreed upon by most osteopathic authors as the "respiratory axis" of the sacrum. Strachan[30] concluded that "from the standpoint of joint surfaces all the movements (of the sacrum between the ilia) are gliding movements." Fryette[31] states; "another fact which must be kept in mind is that this sacroiliac axis is not a fixed axis but a gliding moving axis." He places this axis at the level of the second sacral segment but he stresses the point that he believes it to be hypothetical.[21]

From the above we must conclude that although axes of sacral motion are conceptually useful, the body of available data does not support their existence. Thus, the oblique axis of sacral motion first described by Magoun is a descriptive convenience rather than a reality. A point which was recognized from very early on. Fred Mitchell Sr.[2] describes sacral torsion on the oblique axis as "the type of motion the sacrum assumes in its effort to do rotation and lateral flexion." If we acknowledge sacral motion about axes to be convenient descriptors of complex movements of the bony components of a given articulation we can look at the relationship of the axial skeleton to the pelvis through the sacrum as a series of articular accommodative shifts. This is certainly what Schwab[32] referred to as "torsional compensation" to "unilateral unequal (lower) extremity." And, what Mitchell Sr.[28] was describing in the cycle of walking.

Articular Somatic Dysfunction

We have reviewed the anatomy and the articular mechanics of the lumbo-sacro-pelvic region. Let us now consider the terminology employed to describe somatic dysfunction in this context. Primary articular dysfunction can occur between L5 and the sacrum and between the sacrum and either of the ilia. Such dysfunction is described in the following ways.

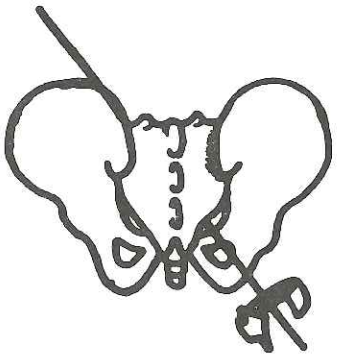
Lumbosacral dysfunction:

As mentioned above L5 and the sacrum meet the criteria for typical vertebral segments. They articulate with one another through an intervertebral disc and two zygapophyseal joints. Under neutral circumstances vertebral mechanics are a manifestation of forces transmitted through the vertebral bodies and intervertebral discs. The sacrum behaves as the most caudal segment of the involved group of vertebrae (**Fig. 3**). When sidebending forces are introduced, sidebending occurs followed by rotation of the entire group in the direction of the produced convexity. This results in L5 being sidebent in one direction and rotated in the opposite direction relative to the sacrum. These are the mechanics of the lower half of a Fryette type I group curve.

Type II Fryette mechanics occur under non-neutral circumstances (**Fig.4**). When flexion or extension forces are sufficiently present to cause the zygapophyseal joints to influence vertebral motion the motion occurs specifically between the two adjacent vertebrae where the flexion or extension is present, in this case L5 upon S1. Therefore, if significant flexion or extension occurs between L5 and S1 when sidebending forces are applied L5 will rotate upon S1 in the direction that the sidebending will occur. Once rotation occurs sidebending follows. This results in L5 either flexed or extended upon S1 with rotation and sidebending occurring in the same direction, termed "extension rotation sidebending of the lumbar," by Dr. Fryette.[33]

Sacroiliac Dysfunction:

Relative to the ilia, when dysfunctional, the sacrum rotates and sidebends in opposite directions.[30,34,35,36,37,38] This pattern results in sacral motion that has been described as rotation upon the oblique axis.[2,39,40] Therefore, sacral rotation to the left with side bending to the right may be thought of as rotation of the sacrum to the left upon the left oblique axis (**Fig. 7**). This produces a mechanical pattern in which



Sacral sidebending right, rotation left
This may be described as rotation left on a left oblique axis, anterior sacrum right or posterior sacrum left.

(FIGURE 7)

the sacrum at the inferior pole of the sacroiliac articulation on the left has moved posterior relative to the left ilium, and at the superior pole of the sacroiliac articulation on the right the sacrum has moved anterior relative to the right ilium.[41,42] In this pattern, if the motion of the left sacroiliac is restricted and the right sacroiliac is unrestricted the sacrum is said to be posterior on the left relative to the left ilium. With the same mechanical pattern, if the motion of the right sacroiliac is restricted and the left sacroiliac is unrestricted, the sacrum is said to be anterior on the right relative to the right ilium.[4,34,35] Considering the same axis of sacral rotation, the left oblique axis, it could be possible for the scrum to rotate right upon the left, oblique axis. However, these mechanics have not been formally described within the system used to diagnose and treat anterior and posterior sacroiliac dysfunctions.

Sacral Torsions:

Torsions between the lumbar spine and sacrum are described as occurring under neutral and non-neutral circumstances. In both cases, lumbar sidebending determines the mechanical pattern that follows. Lumbar sidebending produces tension in the superior pole of the homolateral sacroiliac articulation. This establishes conditions in which the sacrum can rotate about an oblique axis. Thus lumbar sidebending to the left results in sacral motion about the left oblique axis.

Under neutral circumstances (absence of significant flexion or extension) the sacrum will drop forward on the side opposite the lumbar sidebending originally called torsional flexion[43] (**Fig. 5**). If this occurs about the left oblique axis the sacrum will rotate left upon the left oblique axis. The sacrum will be relatively posterior to the ilium at the inferior pole of the left sacroiliac articulation and relatively anterior to the ilium at the superior pole of the right sacroiliac articulation. The fifth lumbar vertebra will be sidebent left and rotated right relative to the sacrum.

Flexion or extension of the torso upon the pelvis predisposes the lumbosacral junction to non-neutral torsional mechanics originally called torsional extension[43] (**Fig. 6**). If while flexed or extended, sidebending of the lumbar spine is introduced, the sacrum will rotate upon the appropriate oblique axis. But, the rotation occurs in the opposite direction as that which would occur under neutral circumstances. That is, if in the presence of flexion or extension the lumbar spine is sidebent to the left the sacrum will rotate right upon the left oblique axis. The sacrum will be relatively posterior to the ilium at the superior pole of the right sacroiliac articulation and relatively anterior to the ilium at the inferior pole of the left sacroiliac articulation. The fifth lumbar vertebra will be flexed or extended, sidebent left, and rotated left relative to the sacrum.

Conclusion

The subject of sacral somatic dysfunction has been studied since the very beginnings of osteopathic medicine. Sacral mechanics, as have been described by various authors have been compared and may be summarized as follows:

1) A sacral forward torsion (neutral) as described by Mitchell Sr. is the same lumbosacral mechanics as type I (neutral) lumbosacral group mechanics described by Fryette (**Figs. 3, 5B**).

2) A sacral forward torsion, as described by Mitchell Sr., is the same sacroiliac mechanics as anterior sacrum and posterior sacrum as described by Strachan. Recognizing that the sacral torsion model does not lateralize to the side of the dysfunctional sacroiliac articulation the way the anterior sacrum - posterior sacrum model does (**Figs. 5A, 7**).

3) A sacral backward torsion (non-neutral) as described by Mitchell Sr. is the same lumbosacral mechanics as L5/S1 Type II (non-neutral) mechanics described by Fryette (**Figs. 4, 6B**).

4) A sacral backward torsion describes a relationship between the sacrum and ilia (**Fig. 6A**). Although these mechanics have not been specifically described elsewhere, it is of interest that Dr. Martin C. Beilke reportedly stated that he believed that there were "two types of posterior scrum." But, he did not describe the mechanics of the second type of posterior sacrum. He did, however, describe three stages of accommodation to inequity of leg length.[44] In the first stage, he described an anterior sacrum on the side of the short-leg. In the third stage, the sacrum reversed mechanics resulting in an anterior sacrum on the long-leg side. Fryette[33] took issue with this description stating that "third degree short-leg" was a misnomer for extension rotation sidebending (Type II, non-neutral) mechanics. It is possible that Dr. Beilke's second type of "posterior sacrum" and a sacral backward torsion termed "torsional extension" by Mitchell Sr. are the same thing, Fryette Type II mechanics of L5 on S1 with resultant pelvic accommodation.

From the above, we must conclude that the same lumbosacro pelvic mechanics can be described in different fashions. That Fryette mechanics may be used to describe specific articular mechanics between the lumbar spine and sacrum. The terms anterior and posterior sacrum are employed to describe specific articular somatic dysfunction between the sacrum and ilia. The term forward torsion, meanwhile, describes a more global pattern of lumbosacro pelvic mechanics and by itself does not indicate specific articular dysfunction. The term backward torsion, virtually identical to non-neutral Fryette mechanics between L5 and the sacrum, goes on to include sacroiliac accommodation to these L5-S1, Type II mechanics.

Additional conclusions that can be drawn include:

1) Articular somatic dysfunction is most appropriately diagnosed by assessing available articular motion. This may be augmented by findings of tissue texture change and boney landmark position.

2) Sacroiliac coupled sidebending rotation is not Type I mechanics since the sacroiliac articulation is not, according to Fryette's criteria, a typical vertebral articulation.

3) Axes of sacral motion must be recognized as descriptive conveniences rather than kinesiologic reality. Research into sacral motion has clearly demonstrated that sacral motion upon fixed axes of rotation does not occur.

4) The terms "sacroiliac" and "iliosacral", when ap- →

plied to primary articular dysfunction between the sacrum and ilium are redundant. Selecting a single term to describe dysfunction of this articulation is proposed to reduce confusion.

The purpose of this paper has been to point out similarities between the various models of sacral mechanics. Not to imply that one model is superior to another, but, rather to allow the clinician utilizing one model to understand in terms of that particular model what is being said by another clinician utilizing a different model. Eventually, the osteopathic profession will recognize areas of overlapping terminology. We may then settle upon a single system of terminology which eliminates duplications, or we may choose to maintain parallel systems in order to take advantage of subtle differences they possess. Ultimately what is most important is that we are able to understand one another. If we can communicate clearly among ourselves and with the remainder of the scientific health care community, a single system of terminology will eventually evolve. *(However chauvinism for my alma mater forces me to point out that Fryette '03, Hoskins '17, Schwab '21, Beilke '28, and Strachan '30 were all graduated from and taught at CCOM).*

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Inpatient osteopathic manipulative treatment; Impact on length of stay

by Mark S. Cantieri, DO, FAAO
South Bend, IN

About the Author

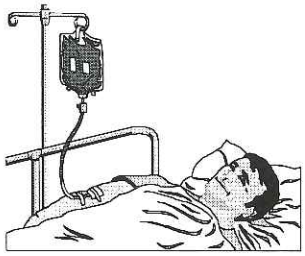
A 1981 graduate of UOMHS, Mark S. Cantieri, DO, FAAO, is currently in private practice in South Bend, IN. Dr. Cantieri is the Director, Department of OMM, Medical Education, Michiana Community Hospital in South Bend. He became a fellow of the AAO at the 1997 Convocation in Colorado Springs. He currently serves on the AAO Board of Trustees and several of its committees.

Purpose/Background: Osteopathic manipulative treatment (OMT) for the hospitalized patient is a long standing practice. There are various claims regarding the efficacy and cost effectiveness of the utilization of OMT. While there is general recognition of the efficacy of OMT in the treatment of musculoskeletal pain, there is much less support for it as a technique to complement the care of the hospitalized patient.

Methods: The investigator surveyed all hospitals (133) approved by the American Osteopathic Association to gather information regarding the utilization of OMT for the 1994 calendar year. A professional statistician then analyzed the data contributed by 18 of 36 responding hospitals.

Results: Data analysis focused on identifying those cases where, for a particular diagnostic related group (DRG), at least ten patients received OMT. Data analysis then identified an association between the utilization of OMT and a decreased length of stay (LOS) greater than one day. Those cases/DRGs with decreased LOS greater than one day included: psychosis; peripheral vascular disorder to age 70; septicemia age 18+; noncancerous disorder of the pancreas; stomach, esophagus and/or duodenum procedures; intestinal obstruction up to age 70; transient ischemic attack; circulatory disorder with acute myocardial infarction discharged alive, with cardiovascular complications; circulatory disorder without acute myocardial infarction, with cardiac catheterization, with complex diagnosis; operative vascular procedure, with major reconstruction with age 70; and other digestive system diagnosis, age 18 to 70.

Conclusion: The results of this survey indicate that utilizing OMT in the treatment regimen for the hospitalized patient may produce positive results in cases other than musculoskeletal pain. Carrying out prospective double-blind studies will help to further evaluate the impact of OMT in the hospitalized patient population. This study, in itself, raises several questions. Does severity of illness affect consultation patterns? Does OMT impact parameters other than LOS, for example, patient satisfaction and/or the overall cost and utilization of hospital resources? This paper helps to provide direction towards these ends.



Purpose/Background

Since the advent of 'osteopathy' in the late 1800s, osteopathic manipulative treatment (OMT) has been utilized as a therapeutic modality to relieve musculoskeletal pain, and to cure illness. Throughout osteopathic medicine's history, questions concerning the efficacy of OMT have produced considerable controversy. Dr. A.T. Still, the founder of osteopathic medicine, emphasized that function followed form—and *vice versa*, maintaining that systemic dysfunction would manifest physical symptoms—and *vice versa*. Still utilized OMT for disease of the chest, blood, liver, bowels, kidneys, and other organ systems.[1] Osteopathic physicians in the early part of the 20th century regularly reported the beneficial effects of OMT on patients suffering from typhoid fever, influenza, infantile paralysis, scarlet fever, diphtheria, and other common maladies.[2]

Today, many in the medical profession regard OMT as a modality strictly for the treatment of musculoskeletal pains. At a recent conference sponsored by the Josiah M. Macy Foundation, Jordan J. Cohen, MD, president of the Association of American Medical Colleges, stated: *"There's no quarrel over the utility of the manipulative method, the OMT*

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as you call it, for disorders and injuries of the muscular skeletal system. But when it comes to issues of applying manipulative therapy and diagnostic maneuvers to treat other systemic diseases, that is when we enter a realm of skepticism on the part of the allopathic world. And this is because the evidence has not been accumulated to substantiate the assertion that the approaches to non-neuromuscular conditions have utility."[3]

So while the osteopathic profession must continue to pursue research that supports the efficacy of OMT in musculoskeletal disorders, it must also conduct research to determine its efficacy in non-neuromuscular conditions. Research to determine the efficacy of OMT will serve both the interests of our patients as well as to strengthen the livelihood of the osteopathic profession. As Norman Gevits, PhD, faculty member at the University of Illinois College of Medicine states: "If osteopathic physicians cannot demonstrate that they are distinctive in terms of their philosophy, in the content of what they teach, or in their practice, then they have no compelling reason to continue as members of an independent profession."[4]

Research to determine the efficacy of OMT will serve both the interests of our patients as well as to strengthen the livelihood of the osteopathic profession

Method

With the support of the American Academy of Osteopathy, all hospitals approved by the American Osteopathic Association (133) were surveyed to gather information regarding the utilization of OMT in their institution for the 1994 calendar year. The survey instrument **(See appendix #1)** based on a study completed at St. Mary Community Hospital—formerly Michiana Community Hospital, in South Bend, Indiana—requested information for all DRGs pertaining to: the average length of stay (LOS) for each DRG; the number of patients not receiving OMT and their LOS for each DRG; and, the number of patients receiving OMT and their LOS for each DRG. Of the 133 hospitals surveyed, 36 provided responses, and eighteen of those 36 provided usable data. The other 18 hospitals indicated that they either did not have any cases utilizing OMT, or that they could not generate the data from the medical records department. The remaining hospitals did not respond to either of two different mailings.

Representative from several of the responding hospitals phoned the investigator with questions regarding the study. It appeared, in retrospect, that the number of return replies might have been improved if mailings had been sent to both the Quality Assurance and Utilization Review Committees and to the Director of Medical Records at each hospital. Since many of the callers/respondents worked in the medical records department, and since several Medical Directors stated that they did not have this data, a second mailing to the Quality Assurance and Utilization Review Committee may have improved the response rate.

Results

A professional statistician analyzed the data, utilizing SPSS for MS Windows Release 6.1.

Data analysis included a review of all DRGs utilizing OMT within the treatment regimen. The responding hospitals utilized OMT in 305 different DRGs. The total number of cases within a particular DRG classification ranged from 2581 to 1. The total number of cases utilizing OMT within a particular DRG classification varied from 130 to 1.

The hospitals reported a total of 67 DRGs where at least 10 or more patients received OMT. **(Refer to Table #1.)** Those DRGs with reduced LOS greater than or equal to one day included: psychosis; medical peripheral vascular disorder up to age 70; septicemia 18 years and older; disorders of the pancreas, non-cancerous; stomach, esophagus, or duodenal procedures; intestinal obstruction up to age 70; transient ischemic attack, circulatory disorder with acute myocardial infarction that was discharged alive with cardiovascular complications; and circulatory disorder without acute myocardial infarction with cardiac catheterization with complex medical diagnosis.

In interpreting **Table #1**, it should be noted that within each DRG, the most significant outliers (i.e. those patients with an abnormally long LOS), relative to the average LOS were, in fact, those patients who received OMT. This pattern persisted among all cases/DRGs. A review of all cases revealed that the group receiving OMT had 5 percent of its cases with a LOS "greater than or equal to 30 days", with five cases in particular with a LOS "greater than 100 days". In the non-OMT group, less than 1 percent fell into the category "greater than or equal to 30 days". The data seems to indicate that the more ill, or extreme patient cases in this data base routinely received OMT.

For patients in the top 67 DRGs, a T-test analysis compared the "LOS with OMT" to the "LOS without OMT". The mean LOS for patients

receiving OMT was 7.25 days. The LOS for patients not receiving OMT was 5.65 days. A p value of less than 0.001 indicates a significant difference in LOS between the groups. A comparison of each group to the overall LOS for all patients produced no significant difference in LOS across the study population.

Conclusion

Further research is needed to evaluate the impact of inpatient OMT. This study illustrates that a sufficient number of cases utilizing OMT can be found in order to perform follow-up studies—either single institution or multi-center research. In order for follow-up research to be most effective, the investigation/study should be headed by an osteopathic manipulative specialist. An osteopathic manipulative specialist in this capacity would insure a greater degree of standardization of treatment.

For several DRGs, a marked disparity existed between the number of patients that did and those that did not receive OMT. For instance, out of 1320 cases of heart failure (DRG 127), only 116 patients received OMT. Given the possibility that survey responses came from those institutions that routinely employ OMT, the statistics concerning OMT utilization across the osteopathic profession may be far worse than this paper indicates. The overall low incidence of OMT utilization in the hospital setting is particularly disturbing in light of the desire of osteopathic teaching institutions to maintain a distinctive osteopathic identity.

To further aid researchers in an effort to conduct follow-up studies, osteopathic institutions must make structural examination mandatory for all incoming patients. According to AOA Accreditation Standards, all patients entering an osteopathic institution should receive a structural examination. However, a 1992 study

APPENDIX #1
Length of Stay Report by DRG
For Patients with and without OMT
Michiana Community Hospital
June, 1995

DRG	AVG LOS	LOS W/OMT	LOS WO/OMT	# W/OMT	#W/O OMT
14	9.5	7	7.7	2	10
20	12.79	12	8	1	2
68	3.9	2	0	1	0
70	2.89	2	2	1	2
79	11.9	8	8	1	4
81	7.7	6	8	1	1
85	7.25	4	6	1	2
88	6.87	6.7	7.25	6	4
89	6.08	2	7.8	1	9
90	4.49	4	0	1	0
91	5.28	3.5	3	2	1
94	8	7	6.2	1	4
98	3.19	2	0	1	0
101	4.6	4	0	1	0
113	12.11	9	8.4	1	7
122	4.37	10	6	2	13
124	3.33	4	4.2	1	5
125	3.33	2	4.2	1	11
127	6.57	6.3	10.7	3	11
130	6.23	7	9	1	1
135	6.37	10	7	1	2
141	2.91	8	7.5	1	2
143	2.84	4	2	1	1
154	20.22	11	8.5	1	2
174	4.05	6	5.03	1	28
178	7.36	7	6.5	1	2
180	5.62	3	9.3	1	3
182	2.98	7	5.15	2	19
197	5	4	5.83	1	6
204	6.43	4	0	1	0
209	6.87	6.58	6	5	30
243	4.09	3.66	4.5	3	9
247	2.73	1	0	1	0
296	4.39	4	4.4	2	5
308	10	11	11	1	1
322	4.75	4.75	3	3	1
324	1.82	1	2.3	1	3
331	5.5	6	8.7	1	4
336	4.97	4.5	3.8	2	9
356	2.99	5	2.8	1	12
359	3.01	3	2.7	1	59
371	3.16	3	3.19	1	99
373	1.8	1.83	1.5	4	458
379	2.25	2	0	1	0
416	7.27	8	7.2	1	5
444	5.6	15	9.5	1	2
450	2	1	0	1	0
477	8.71	3	5.3	1	9
493	2.64	5	3.8	1	6
Total	4.72	4.44	4.96	73	864

TABLE #1

DRG	Cases Receiv. OMT	Cases not Receiv. OMT	Difference in LOS to Average	Average LOS	LOS with OMT	LOS w/o OMT	DRG Description
430	12.00	276.00	-3.14	7.24	8.14	11.28	Psychoses, medical
130	22.00	152.00	-2.59	5.93	3.72	6.31	Periph. Vasc. Disorder, w age 70 cc, medical
416	30.00	374.00	-2.01	8.23	6.32	8.33	Septicemia, age 18+, medical
204	24.00	170.00	-1.72	6.00	3.65	5.37	Disorder of pancreas other than malig., medical
154	12.00	75.00	-1.74	16.40	10.14	11.61	Stomach/esophagus/duodenum proc., age 18+, w age 70 cc
180	16.00	134.00	-1.42	6.82	5.14	6.57	Intestinal obstruction, w age 70 cc, medical
15	17.00	101.00	-1.39	4.16	3.53	4.92	Specific cerebrovascular disorder, principle dx of TIA, medical
121	37.00	73.00	-1.32	7.30	6.43	7.76	Circ. disorder w acute MI, dischgd alive w CV comp., medical
124	29.00	259.00	-1.31	4.92	3.62	4.93	Circ. disorder w acute MI, dischgd alive, wo CV comp., medical
110	11.00	40.00	-.91	10.92	14.20	15.11	Vasc. OR proc., w/major reconstruction, w age 70 cc
188	12.00	41.00	-.91	5.10	4.67	5.57	Other digestive system dx, age 18+, w age 70 cc, medical
197	13.00	65.00	-.79	7.02	5.30	6.09	Total Cholecyst., wo common bile duct explor. w age 70 cc
91	12.00	266.00	-.75	3.82	1.92	2.67	Simple pneumonia/pleurisy, w age 0-17, medical
98	13.00	193.00	-.67	2.76	1.23	1.91	Bronchitis/asthma, age 0-17, medical
90	21.00	87.00	-.56	3.98	2.47	3.02	Simple pneum/pleurisy, w age 18+, wo age 70 cc, medical
321	10.00	38.00	-.52	3.05	3.87	4.39	Kidney/UTI, age 18+ wo age 70 cc, medical
209	35.00	505.00	-.37	7.13	6.74	7.11	Major joint procedure
14	39.00	360.00	-.27	8.46	6.11	6.38	Spec. cerebrovascular disorder, wo princ. dx of TIA, medical
122	39.00	143.00	-.27	5.21	4.47	4.74	Circ. disorder w acute MI, dischgd alive, wo CV comp, medical
141	15.00	138.00	-.27	3.13	4.05	4.32	Syncope and/or collapse, w age 70 cc, medical
96	22.00	103.00	-.18	4.08	5.25	5.43	Bronchitis/asthma, age 18+, w age 70 cc, medical
174	44.00	448.00	-.16	5.21	4.99	5.15	Gastro-intestinal hemorrhage, w age 70 cc, medical
371	74.00	389.00	-.09	2.70	2.58	2.67	Cesarean section, wo cc
296	39.00	402.00	-0.2	5.99	5.98	6.01	Nutr./meta. disor. not inborn errors of metab., age 18+, w age 70 cc, medical
356	11.00	76.00	.05	2.86	2.76	2.71	Reconstruction, female reproductive system
68	10.00	28.00	.06	3.76	2.44	2.38	Otitis Media/URI, age 18+, age 70 cc, medical
127	116.00	1204.00	.16	6.49	6.57	6.41	Heart failure/shock, medical
373	130.00	2451.00	.17	1.37	1.52	1.35	Vaginal delivery wo complicating diagnosis
182	64.00	767.00	.17	3.76	4.66	4.48	Gastrointestinal disorder, age 18+, w age 70 cc, medical
24	15.00	69.00	.36	4.83	5.30	4.94	Seizure/headache, age 18+, w age 70 cc, medical
494	11.00	23.00	.41	2.43	2.80	2.38	
215	13.00	254.00	.55	3.46	3.91	3.37	Back/neck procedure, wo age 70 cc
478	13.00	71.00	.59	8.32	8.65	8.06	
183	20.00	271.00	.68	2.67	3.54	2.86	Gastrointestinal disorder, age 18+, wo age 70 cc, medical
294	25.00	203.00	.71	5.62	6.00	5.29	Diabetes, age 36+, medical
79	27.00	111.00	.72	10.57	8.53	7.81	Infection/inflammation, w age 18+, w age 70 cc, medical
97	29.00	127.50	.79	3.29	4.02	3.24	Bronchitis/asthma, age 18+ wo age 70 cc, medical
395	11.00	41.00	.83	4.01	4.30	3.47	Red blood cell disorder, age 18+ medical
25	12.00	61.00	.84	3.27	4.16	3.32	Seizure/headache, age 18+, wo age 70 cc, medical
131	12.00	20.00	.95	5.83	6.80	5.85	peripheral vascular disorder, wo age 70 cc, medical
112	12.00	164.00	1.01	4.14	5.08	4.07	Vascular OR procedure, ex. maj. recon.
278	11.00	63.00	1.10	3.54	4.78	3.68	Cellulitis, w age 18+, wo age 70 cc, medical
263	13.00	32.00	1.16	27.27	10.66	9.50	Skin graft w principle dx of skin ulcer/cellulitis w age 70 cc
320	36.00	145.00	1.23	6.21	6.50	5.27	Kidney/UTI, age 18+, w age 70 cc, medical
358	13.00	48.00	1.32	3.79	5.23	3.91	Uterine/adnexal proc. wo princ. dx of malig. wo tubal interruption

Cases DRG	Receiv. OMT	Cases not Receiv. OMT	Difference in LOS to Average	Average LOS	LOS with OMT	LOS w/o OMT	DRG Description
138	36.00	224.00	1.34	4.48	5.85	4.52	Arrhythmia/cond. disorders w age 70 cc, medical
88	99.00	696.00	1.43	6.05	6.59	5.16	COPD, medical
139	13.00	52.00	1.51	2.06	3.53	2.02	Arrhythmia/cond. disorders wo age 70 cc, medical
140	55.00	101.00	1.90	2.53	4.28	2.38	Angina, medical
277	20.00	106.00	1.96	5.82	7.54	5.58	Cellulitis, w age 18+, w age 70 cc, medical
75	12.00	38.00	2.34	11.94	13.73	11.39	Major chest OR procedure
210	20.00	53.00	2.79	8.07	9.99	7.20	Hip/femur proc. other than major jnt w age 18+, w age 70 cc
489	10.00	7.00	2.97	7.67	10.40	7.43	
203	11.00	14.00	3.28	9.13	9.60	6.32	Malig. of hepatobiliary system/pancreas, medical
116	10.00	71.00	3.44	4.13	7.19	3.75	Perm. pacemaker implant wo princ dx of AMI or CHF
87	21.00	38.00	3.53	7.59	10.17	6.64	Pulmonary edema/resp. failure, medical
148	44.00	217.00	4.07	12.55	15.15	11.08	Major small/large bowel proc. w age 70 cc
144	20.00	46.00	4.29	5.45	8.90	4.61	Other circulatory diagnosis, w cc, medical
134	11.00	36.00	4.54	4.43	7.05	2.51	Hypertension, medical
462	15.00	251.00	5.24	12.72	17.67	12.43	Principle dx of rehab. medical
150	13.00	34.00	5.52	11.59	14.43	8.91	Peritoneal adhesiolysis, w age 70 cc
468	16.00	37.00	7.40	14.41	18.82	11.42	
243	86.00	390.00	7.81	4.23	12.24	4.43	Back disorder, medical
82	16.00	40.00	9.75	8.65	16.44	6.69	Neoplasm of resp. system, medical
89	112.00	790.00	10.63	6.53	16.92	6.29	Simple pneumonia/pleurisy, w age 18+, w age 70 cc, medical
143	45.00	523.00	12.03	2.21	14.37	2.35	Chest pain, medical
359	39.00	553.00	19.07	3.06	22.22	3.15	Uterine, adnexal proc. wo principle dx of malig. w tubal interruption

revealed that 17 percent of all osteopathic hospitals are not in compliance with this requirement.[5] A standardized structural examination must be performed at all osteopathic institutions to provide a database for future research and to encourage the use of OMT. Future studies should endeavor to discern the time of intervention—at which point OMT is utilized: Is it utilized early in complicated cases, or is it brought in as a very late adjunct? Clinical experience suggests consultation on the use of OMT is obtained later and in "sicker" cases. This study tends to confirm the clinical experience, in that several cases utilizing OMT revealed outliers with a greater than 100-day length-of-stay. Studies need to be carried out that evaluate the impact of OMT in clinical situations where it is not commonly utilized. For instance, in this study, utilizing OMT in cases of acute psychosis produced the greatest impact on LOS—3.14 days reduction. In most cases, a reduction in LOS such as this could result in significant economic savings.

Correlation needs to be made between the DRG and the reason OMT was used. Other parameters need to be evaluated with regards to OMT in the inpatient population including: Patient satisfaction – Do patients that receive OMT have a higher degree of satisfaction than those that do not?; Cost – Is the overall cost of hospitalization and utilization of hospital resources different in those populations that do and do not receive OMT? It is hoped that this paper will provide some direction toward these ends.

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Clinical implications of a cervical myodural bridge

by Richard C. Hallgren, PhD[1]
Gary D. Hack, DDS[2]
CDR James A. Lipton, MC, USN[3]*

[1]*Department of Osteopathic Surgical Specialties, Michigan State University, East Lansing, MI*
[2]*Department of Restorative Dentistry, University of Maryland at Baltimore, Baltimore, MD*
[3]*Specialty Leader to the Surgeon General of the Navy in Physical Medicine and Rehabilitation, 4th Deck, Pain Clinic, Naval Medical Center, Portsmouth, VA*

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Abstract

The existence of a previously unreported myodural bridge at the level of the atlanto-occipital junction suggests a direct and dynamic central-peripheral connection which may be directly related to some instances of idiopathic head and neck pain. Artificially functioning the muscular component of the bridge appears to influence the cerebrospinal fluid system by directly affecting dural tension. Because the myodural bridge has a direct influence upon the dura mater, a component of the reciprocal tension membrane system that is also a pain-sensitive structure, we propose that it offers a possible association between cervical musculature and headache pain.

Keywords

cranial manipulation, chronic pain, suboccipital muscles, spinal dura, cervical spine, cranial compliance

Background

The existence of a cervical anatomic relationship,[6] termed the myodural bridge,[7] is of significant importance to the osteopathic physician because it provides a direct physical link between the musculoskeletal system and the dura mater. The dura is intimately attached to the foramen magnum of the occiput, to the upper two or three cervical segments, and by fibrous slips to the posterior longitudinal ligament. It forms a tubular sheath around the spinal cord, terminating at the level of the second sacral vertebra with additional connections to the coccyx.[8] While the cranial dura has been recognized to have extensive innervation, the extent of innervation of the spinal dura has been disputed. Recent work on rats has shown that the spinal dura is innervated and that there is a robust network of pain fibers in the dura at the level of the craniocervical junction.[9] While the role of spinal dura as a source of pain at levels below the craniocervical junction is still not clear, there is no doubt that the dura mater at the level of the craniocervical junction has all of the necessary components of a pain-sensitive structure.

Gray's Anatomy[10] states that the posterior atlanto-occipital membrane is in relation with the rectus capitis posterior minor (RCPMI) muscle dorsally and with the spinal dura, to which it is "intimately adherent" ventrally. However, nowhere in this edition is any functional relationship described between the RCPMI muscle and the dura mater. Because of the continuity of dural attachment between cranium and sacrum, influences such as trauma and postural strain that affect one component of the reciprocal tension membrane (RTM) system have an affect upon the entire system. The discovery

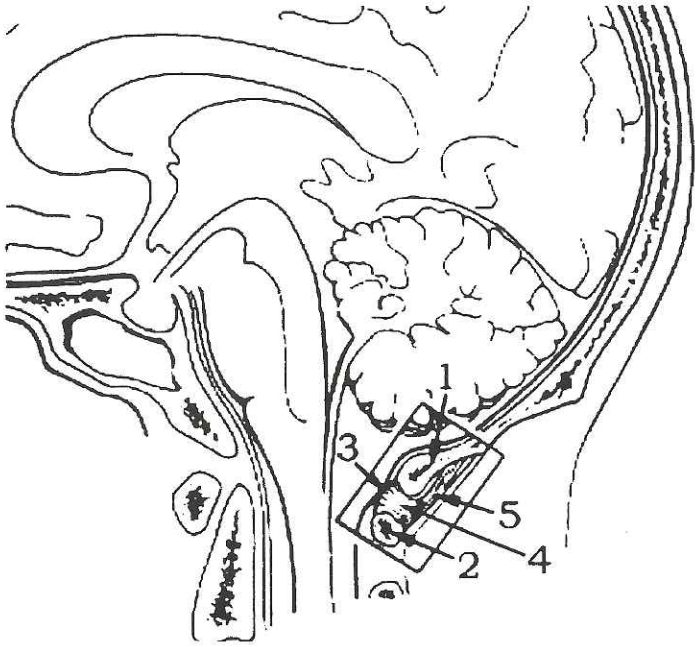

Figure 1. *Line drawing of a hemisected head showing the region displayed in Figure 2: 1) posterior border of foramen magnum; 2) posterior arch of C1; 3) posterior atlanta-occipital (PAO) membrane-spinal dura complex; 4) connective tissue attaching the RCPMI muscle to the PAO membrane-spinal dura complex; 5) rectus capitis posterior minor (RCPMI) muscle.*

Figure 2. *Photograph of fresh hemisected cadaveric specimen showing: 1) posterior border of foramen magnum; 2) posterior arch of C1; 3) posterior atlanto-occipital (PAO) membrane-spinal dura complex; 4) connective tissue attaching the RCPMI muscle to the PAO membrane-spinal dura complex; 5) rectus capitis posterior minor (RCPMI) muscle.*

of a cervical myodural bridge (**See Figure l**) presents the possibility that the musculoskeletal system can have a direct influence upon central components. We speculate that this tissue bridge may offer a possible association between cervical musculature and headache pain.

Methods and Materials

A head and neck specimen obtained from a fresh unembalmed human adult male cadaver was procured from the Maryland State Board of anatomy. A midline sagittal section was performed. Specifically studied was the RCPMI muscle and its relationship to the dura mater. The RCPMI muscle was immediately visible arising from the posterior arch of the atlas and ascending to its insertion into the surface of the occipital bone from the inferior nuchal line to the foramen magnum (**See Figure 2**). A well-organized connective tissue bridge was observed passing from the RCPMI muscle through the atlanto-occipital joint and inserting onto the spinal dura via the posterior atlanto-occipital (PAO) membrane. The PAO membrane was securely fixed to the surface of the dural tube by multitudinous fine connective tissue fibers, and the two structures appeared to function as a single entity. These observations were also confirmed in ten fixed, sagittally hemisected head and neck specimens. The fixed specimens were from five females and five males, who ranged in age from 54-94 years. Review of medical histories of these individuals was unremarkable for head and neck trauma, autoimmune diseases, or medications associated with various forms of fibrosis.

The influence of the RCPMI muscle upon the dura mater was artificially produced in the hemisected specimen by manipulating the tissues in an attempt to simulate physiologic motion. The resultant motion produced

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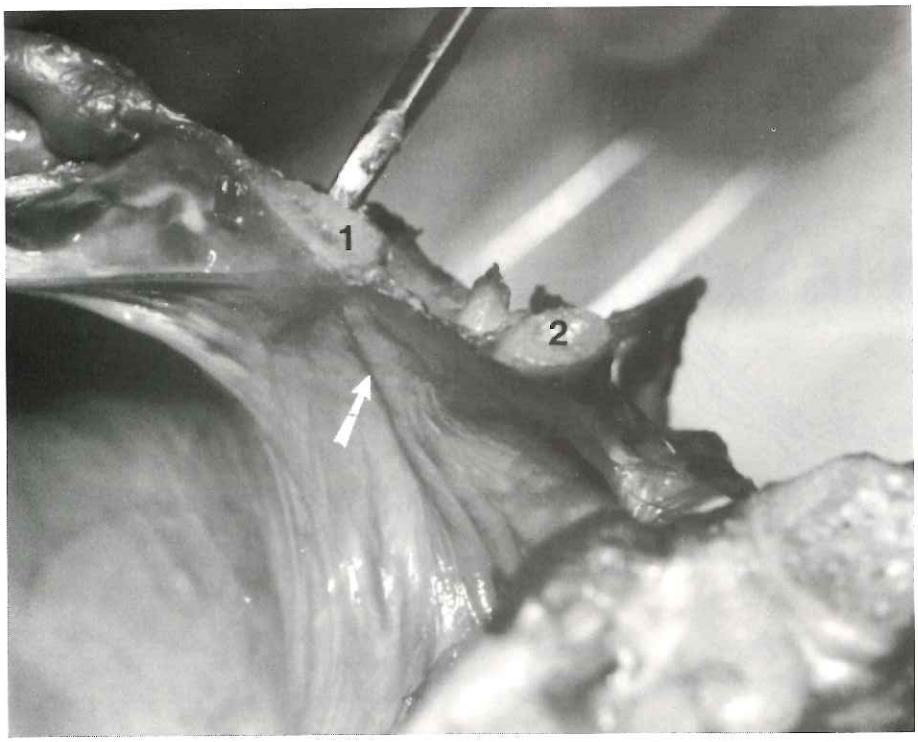

Figure 3. *Photograph of fresh hemisected cadaveric specimen showing the spinal dura at rest with no tension of the RCPMI muscle. 1) posterior border of foramen magnum; 2) posterior arch of C1.*

Figure 4. *Photograph of fresh hemisected cadaveric specimen showing the effect upon the spinal dura when tension is applied to the RCPMI muscle. 1) posterior border of foramen magnum; 2) posterior arch of C1.*

obvious movement of the spinal dura with fluid movement observed to the level of the pons and cerebellum **(See Figures 3 and 4)**. Brain tissue shrinkage occurred rapidly upon dissection and with the passage of time the observable fluid movement was not as broad, but still evident. Once the brain tissue was removed, artificially functioning the muscle again produced observable changes in the position and tension of the dura mater, as well as the dura of the posterior cranial fossa, and would account for the observed fluid movement to the level of the pons and cerebellum. Head and neck extension of all fixed specimens produced infolding of the spinal dura complex accompanied by stretching of the connective tissue bridge.

Discussion

A growing body of literature relates head and neck pain to injury and/or pathology of the cervical spine. While etiology in some instances is certainly related to trauma affecting structures such as the zygapophyseal joints[11], the exact cause of tension headaches has been difficult to determine. One accepted hypothesis of tension headaches involves contraction of muscles in the head, neck, and/or face. Because the myodural bridge has a direct influence upon the dura mater, a pain sensitive structure, and a direct influence upon the reciprocal tension membrane system, we suggest that it may provide a link between cervical musculature and headache pain. Craniosacral techniques were added to the repertoire of the osteopathic physician around 1940 through the work of William G. Sutherland, DO. Sutherland[1] reasoned that cranial sutures formed joints between bones of the skull and were intricately fashioned for the maintenance of motion. He theorized that these bones would show normal mobility during health, and that mobility would be restricted in response to trauma or systemic disease[2]. The apparent rigidity of the skull has led

many traditionally trained physiologists and physicians to conclude that suture lines fuse when an individual becomes an adult. However, it has been demonstrated that a rapid injection of a bolus of fluid into the lateral cerebral ventricle of anesthetized cats results in both an increase in intracranial pressure and cranial bone movement at the midline sagittal suture where the bilateral parietal bones meet.[3] This reinforces the theories of Sutherland, leading many to believe that cranial bones in the human bend in harmony with the complex patterns of intracranial forces resulting from respiration and arterial, venous, and cerebrospinal fluid (CSF) pressures.[4] In spite of the subtlety of these movements, they can convey important diagnostic information to a trained physician, and it has been shown that appropriate treatment protocols can yield therapeutic results.[5]

In reviewing the literature, we found that the subject of functional relations between voluntary muscles and dural membranes has been addressed by Becker.[8] He suggested that voluntary muscles might act upon dural membranes via fascial continuity, changing the tension placed upon them and influencing cerebral spinal fluid (CSF) flow. Our observation that simulated contraction of RCPMI muscles results in flexion of the PAO membrane-spinal dura complex CSF movement supports Becker's hypothesis. Further, since the dural connection is in the immediate area of a major CSF reservoir, the cisterna magna, dural tension and movement in this region may influence CSF pressure. Becker also proposed that muscles attaching the skull to the spinal column might contribute to craniosacral motion. Since the dura links the cranium, spinal cord, and the sacrum, it is reasonable to expect that changes in dural tension at any one point of the central-peripheral membrane system should be transmitted through the cerebrospinal fluid to other parts of the system. Hypertrophy of muscles connected to the myodural bridge could result in excessive tension being placed upon the spinal dura, while atrophy of these same muscles could result in infolding of the spinal dura. We have observed atrophic changes in RCPMI muscles in chronic pain patients,[14] and suggest that functionality of the myodural bridge may be compromised when atrophy occurs. While the RCPMI muscles are functionally classified as extensors, their small size, relative to more massive muscles traversing multi-segmental levels parallel to them, minimize their contribution to motion. Other authors have suggested that the primary function of the RCPMI muscle is to provide static and dynamic proprioceptive feedback to the CNS, monitoring movement of the head and influencing movement of the surrounding musculature.[17,18,19] We suggest that RCPMI muscles may act to monitor and control movement and tension of the spinal dura mater, thus protecting cerebrospinal fluid hydrodynamics (flow) during head extension. For either case (hypertrophy or atrophy), pathology in a muscle having direct influence on a pain sensitive structure suggests an alternative mechanism for generation of cervical headache.[15] It has been demonstrated that massage and manipulation of the cervical spine are valuable for managing certain kinds of headache. A recent article[13] describes the effect of placing a physician's hands on the suboccipital region of the cervical spine and performing a circular kneading similar to the more involved occipito-atlantal technique of Sutherland. The study found that simply placing the physicians hands under the head caused vasodilation to occur in the subject's finger. A larger increase in pulse amplitude was observed when manipulation was applied. Since variations in digital pulse amplitude can be used as a relatively direct and immediate index of vasomotor tone of the dermal arterioles, the authors suggested that this sympathetic response may occur as a result of a perturbation of the cerebrospinal fluid resulting from mechanical pressure. We suggest that significant movement of the atlanto-occipital articulation can occur when the head is treated by the cranial manipulator, and that perturbation of cerebrospinal fluid can result from direct activation of the myodural bridge. This dynamic relationship may effect cervical-frontal muscle tension, with corresponding effect on blood flow through emissary veins which flow directly into dural sinuses. The clinical implication is that a possible feedback loop, yet to be investigated, may exist which could help explain the etiology and duration of commonly reported symptoms of tension headache, namely suboccipital muscle tension which can progress to frontal involvement along the shared continuity of the gala aponuerotica.[7]

Conclusions

We have described a previously unreported myodural bridge at the level of the atlanto-occipital junction that suggests a direct and dynamic central-peripheral connection which may be directly related to some instances of idiopathic head and neck pain. We propose that the suboccipital myodural bridge is in a position to dynamically affect tension within the dura mater, widely believed by some to be a point of origin for headache pain, and that it also represents a link between the periphery and the CNS which may be dynamically manipulated to treat headache.[12] We suggest that there are at least two possible sources of idiopathic head and neck pain in some individuals that may be related to functional pathology of the myodural bridge:

- Abnormally increased tension in the RCPMI muscles that results in increased tension in the spinal dura, a structure that is known to be pain sensitive.[20]
- Loss of functionality as a result of atrophic changes in the RCPMI muscles, resulting in abnormal infold-

ing of the spinal dura during extension of the head and neck.

An independent effort[16] has confirmed our report of a PAO membrane-spinal dura complex. These authors also suggest that the RCPMI muscles may monitor and/or control dural tension. They hypothesize that this mechanism may assist in resisting dural infolding and may have possibly failed in patients experiencing chronic pain resulting from whiplash-type injuries when atrophy of RCPMI muscles has occurred. This is consistent with reports of RCPMI muscle atrophy that we have seen in chronic pain patients.[4]

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