THE AAO

FORUM FOR OSTEOPATHIC THOUGHT

JOURNAL

Official Publication of the American Academy of Osteopathy®

TRADITION SHAPES THE FUTURE VOLUME 16 NUMBER 2 JUNE 2006

Sacroiliac Mechanics Revisited

pages 11-17

Instructions to Authors

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

The AAO Journal welcomes contributions in the following categories:

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

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

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

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

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

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

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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.

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American® Academy of Osteopathy

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

The AAO Journal is the official publication of the American Academy of Osteopathy®. Issues are published in March, June, September, and December each year.

Third-class postage paid at Carmel, IN. Postmaster: Send address changes to: American Academy of Osteopathy®, 3500 DePauw Blvd., Suite 1080, Indianapolis, IN., 46268. Phone: 317-879-1881; FAX: (317) 879-0563; e-mail snoone@academyofosteopathy.org; AAO Website: http.//www.academyofosteopathy.org

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TRADITION SHAPES THE FUTURE • VOLUME 16 NUMBER 2 JUNE 2006

A PEER-REVIEWED JOURNAL

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

IN THIS ISSUE:

American Academy of Osteopathy®

Calendar of Events

2006

Jul 1	AOBNMM application deadline
Jul 14-16	*Visceral Manipulation: Urogenital* in San Francisco
Aug 18-20	*The Still Technique (Applications of a Rediscovered Technique of Andrew Taylor Still, MD)* at Southpoint Hospital in Cleveland, OH
Sep 15-17	*Advanced Clinical Jones Strain-Counterstrain: Emphasis on Extremities* at University of Indianapolis
Oct 15	One-day course – *Introduction to Osteopathic Medicine for the Non-physician Licensed Health Care Provider* in Las Vegas
Oct 16-20	*AOA Convention* in Las Vegas
Nov 3-5	*Prolotherapy: Below the Diaphragm* at UNECOM
Dec 1	AOBNMM application deadline
Dec 1-3	*Visceral Manipulation: Membranes* in San Francisco

2007 Course Calendar

Dates and locations tentative – pending confirmation in August 2006

Jan 18-21	*Contemporary OMT at the Contemporary*; Ann L. Habenicht, DO, FAAO, Program Chairperson, Walt Disney World®, Buena Vista, FL
Feb 16-18	*Diagnosis of Muscle Imbalance and Exercise Prescription; The Greenman Protocol*; Philip Greenman, DO, FAAO, Featured Speaker and Brad S. Sandler, DO, Program Chairperson. AZCOM, Glendale, AZ
Mar 19-21	*Visceral Manipulation: GI-Abdominal*; Kenneth J. Lossing, DO, Program Chairperson, Colorado Springs, CO
Mar 21-25	*AAO Convocation, Neuromusculoskeletal Medicine: An Osteopathic Evolution*, George J. Pasquarello, DO, FAAO, Program Chairperson, Colorado Springs, CO
April TBD	*Osteopathic Treatment of Headache*; Dennis J. Dowling, DO, FAAO, Program Chairperson, Site TBD
May 4-6	*Prolotherapy: Above the Diaphragm*; Mark S. Cantieri, DO, FAAO, Program Chairperson, Site TBD
June 8-10	*Muscle Energy-Counterstrain*; Walter C. Ehrenfeuchter, DO, FAAO and Edward K. Goering, DO, Program Chairpersons, PCOM/Georgia Campus, Suwanee, GA
July 14-16	*Master Series: Title TBD*; Stephanie Waecker, DO, Program Chairperson, CCOM, Chicago, IL
Aug 20-22	*Visceral Manipulation: Manual Thermal*; Kenneth J. Lossing, DO, Program Chairperson, San Francisco, CA
Sep TBD	*Advanced Clinical Jones Strain-Counterstrain*: *The Extremities*; Edward K. Goering, DO, Program Chairperson, Indianapolis, IN
Sepr 29	*One-day course: OMT without an OMT Table*; Ann L. Habenicht, DO, FAAO, Program Chairperson, San Diego, CA
Sep 30-Oct 4	*AOA Convention*; John E. Balmer, DO, AAO Program Chairperson, San Diego, CA
Nov 16-18	*Prolotherapy: Below the Diaphragm*; Mark S. Cantieri, DO, FAAO, Program Chairperson, Site TBD
Nov 30-Dec 2	*Visceral Manipulation: Colon*; Kenneth J. Lossing, DO, Program Chairperson, San Francisco, CA

View from the Pyramids

Anthony G. Chila

Emerging Leadership

The 2004 Thomas L. Northup Memorial Lecture was delivered by John C. Glover, DO, FAAO.[1] Doctor Glover addressed the development and implementation of a CORE COMPETENCY COMPLIANCE PROGRAM resulting from the work dedicated to osteopathic graduate medical education (OGME). He offered suggestions to strengthen those proposals. The competencies are given as:

1. Osteopathic Philosophy and Osteopathic Manipulative Care
2. Medical Knowledge
3. Patient Care
4. Interpersonal and Communication Skills
5. Professionalism
6. Practice-based Learning Improvement
7. System-based Practice Competencies

Robert C. Clark and Thomas M. McCombs (p. 26) address the probability that osteopathic medical students will spend some or all of their clinical rotations in allopathic institutions. Their proposal for a protocol of osteopathic manipulative treatment (OMT) techniques for postoperative patients is designed to address this consideration. As a protocol, the techniques represent fundamental skills levels amenable to administration by any student or physician. As a contribution to a larger picture, the proposal represents a response to the question posed in the 2004 Thomas L. Northup Memorial Lecture.

Clark and McCombs direct their concerns to Years 3 and 4 of the osteopathic training program. In his summary recommendations for this period of training, Glover suggested:

1. Standardized set of protocols tailored to specific patient populations that serve as a base line of OMM care and expand knowledge and improve efficiency.
2. Stress OMM integration with pharmacologic, surgical, nutritional, and behavioral treatment.
3. Stress the role of OMM in optimizing systems functions, not just for alleviation of motion, restriction or pain.
4. Required OMM rotation that requires delivery of OMT by the students, but all rotations should encourage, allow and foster the integration of OPP and OMT into patient management.
5. Designated OMM faculty on staff in the hospitals who consult on hospital patients and work with students.
6. Requirement that students evaluate, treat, and document in the progress notes a minimum of 100 supervised treatments to graduate.
7. Require OMM competency/proficiency exam to graduate.

Emerging leadership is a category of recognition addressed annually by the *American Osteopathic Foundation* through its *Committee on Educational Grants.* The *WYETH Emerging Leader Award* seeks to recognize and honor osteopathic physicians who exhibit exemplary characteristics of emerging leaders within the osteopathic profession. This award considers osteopathic physicians engaged in AOA-approved internship or residency, or in practice less than 5 years. Specific characteristics and skills include:

1. Commitment to osteopathic philosophy and the profession.
2. Strong leadership skills and demonstrated use of these skills.
3. Noteworthy accomplishments demonstrating his/her role as a leader.
4. Outstanding character and the drive to be a leader.
5. Demonstrated contributions in osteopathic organizations, such as teaching, committee work, and national associations.
6. Membership in the AOA and the individual's specialty college.

The timeline for the implementation of the CORE COMPETENCY COMPLIANCE PROGRAM began in July 2004. At that time, (1.) Osteopathic Philosophy and Osteopathic Manipulative Care and (2.) Medical Knowledge were the specified competencies. Assessment began in January 2005. Introduction of the remaining competencies and their assessment will require a period of three years. Taken individually and as a whole, the question posed by Glover, the response offered by Clark and McCombs, and the auspices of Wyeth Pharmaceuticals appear to contribute significantly to the American Osteopathic Foundation goal of "Ensuring the ideals of osteopathic medicine by initiating and supporting programs that enhance the profession, advance the quality of peoples health, and recognize excellence in the areas of education and research".

1. *Where Do We Go From Here? AAOJ:* Volume 15, Number 1; March 2005, 11-14.❐

Contributors

Theodore R. Jordan. Sacroiliac Mechanics Revisited. The author continues the study of *Conceptual and Treatment Models in Osteopathy.* His first publication (*AAOJ.* Volume 13, Number 1; Spring 2003) addressed the evolution of treatment of hip dislocation. This paper addresses sacroiliac mechanics. In both papers, the necessity to distinguish between *treatment* and *conceptual* models is emphasized. The contention is made that "the osteopathic profession uses avery successful *treatment* model for treating SIJ dysfunction, but maintains a flawed *conceptual* model of SIJ mechanics." **(p. 11).**

Deanna Mitchell and Jerry L. Dickey. Crohn's Disease: A Case Report Including Theories And Principles Of Treatment. The authors review the occurrence and management of this idiopathic, chronic and recurrent inflammatory bowel disease. The subject is a 30-years old female. The pathogenesis of Crohn's disease remains unclear. Dysregulation of the immune response of the gut has been proposed to be the reason for occurrence of inflammatory processes. When viewed as a genetic disorder with an immunological basis, the osteopathic treatment of somatic dysfunctions is an appropriate and rational intervention. **(p. 22).**

Robert C. Clark and Thomas M. McCombs. Postoperative Osteopathic Manipulative Protocol For Delivery By Students In An Allopathic Environment. In the 2004 Thomas L. Northup Lecture, John C. Glover, DO, FAAO discussed the development of a Core Competency Compliance Program for osteopathic graduate medical education (OGME). The authors respond to the challenge of Core Competencies by offering a protocol of osteopathic manipulative treatment techniques for the immediate postoperative period. The procedures described represent fundamental skills levels, and strategies for implementation are offered. **(p. 19).**

Jennifer Hurrell, Arthur J. Speece and Stuart F. Williams. Manipulation Of Adhesive Capsulitis Under Anesthesia. A primary (idiopathic) form and a secondary (traumatic or illness) form of adhesive capsulitis can be categorized in three stages. While the utilization of manipulation under anesthesia for this problem remains controversial, the authors describe the successful outcome in the case of a 47-years old male patient. The discussion includes consideration of various reported series shoulder mobilization under anesthesia. **(p. 27).**

Regular Features

DIG ON. Myron C. Beal, DO, FAAO served as Editor, *American Academy of Osteopathy* ® , 1988-2004. Doctor Beal has been Professor Emeritus, Michigan State University since 1989. *Sciatic Neuritis—A Research Study* was written during his years of private practice in Rochester, New York (1951-1974). Presentation here is a fitting complement to his recently published volume *Contributions to Osteopathic Literature.* **(p. 7)**

FROM THE ARCHIVES. *The Practice of Osteopathy* (Carl Philip McConnell and Charles Clayton Teall, 1906) describes treatment of the sacrum in ways that may have become lost in the multilayering of terms and approaches which seem to characterize contemporary teaching and practice. Read a century later, the authors appear to favor a minimal number of adjustive considerations. **(p. 9).**

BOOK REVIEW. The release of two volumes in 2005 effectively spans osteopathic thought in the 20th century and leads into the early years of the 21st century. *The Collected Writings of Robert G. Thorpe, DO, FAAO* (1917-1999) and *Contributions to Osteopathic Literature—Myron C. Beal, DO, FAAO* will offer the reader an unusual opportunity to appreciate theory and research applied to practice by two of New York's finest gentlemen. **(p. 29).** *THIEME Atlas of Anatomy* (2006) is the accomplishment of a goal "to find out what the 'ideal' atlas of anatomy should be". In addition to seeking opinions and needs of students and lecturers in the United States and Europe, the publishers devoted 8 years to the development of an approach and preparation of new illustrations. The result is an atlas which sets a new publishing standard. **(p. 29-30).**

ELSEWHERE IN PRINT. As recently as ten years ago, there was little optimism about the prospects for ultimately defeating **Alzheimer's disease**. The biology of Alzheimer's was little understood. Its origins and course were generally thought to be so complex as to be hopeless. Recent tremendous strides have been made in the understanding of molecular triggering events. Under exploration now are a variety of strategies for slowing or halting destructive processes. **Pain** has a variety of descriptors: throbbing, itching, aching, stabbing, stinging, pounding, piercing. The common denominator: all those who endure it want it to stop. René Descartes' 17th century theory of "fast moving particles of fire create a disturbance that passes along the nerve filament until it reaches the brain" is essentially being utilized in contemporary research effort. Better understanding of cellular and molecular transmission of pain signals is providing new targets for drugs capable of relieving various kinds of pain. **(p. 31).**

CME CREDIT. In response to reader requests, *AAOJ* will offer CME Credit to readers completing the enclosed quiz. At this time, 1 Hour II-B Credit will be offered, with request for upgrade as *AAOJ* qualifications are reviewed by the *American Osteopathic Association.* **(p. 18).**

Dig On

Sciatic Neuritis: A Research Study

Myron C. Beal

Clinical research studies of osteopathic practice have been advocated to examine the role of manipulation in health care. Few studies have been conducted in a private practice setting. The reasons cited are the paucity of trained personal, the time involved, the difficulty in establishing an acceptable diagnosis, and the problem in obtaining an adequate number of related cases.

The following study was conducted to determine the feasibility of conducting a clinical research project in a private practice. Sixty-one case histories of sciatic neuritis were selected from my patient files covering a period of 10 years.

History

Each patient in this series presented with a history of low back pain with involvement of the sciatic nerve. Fifty-five patients gave a history of strain or trauma preceding the onset of symptoms. Forty-seven had prior histories of low back injury or strain. Six had previous involvement of the sciatic nerve and one had had disc surgery. The study consisted of 18 women and 43 men. They ranged in age from 24 to 76 years of age.

Diagnosis

The diagnosis consisted of a history and physical examination with special attention to the musculoskeletal system. Palpatory examination was used to evaluate areas of muscle contraction and tender points that elicited an aggravation of the patient's pain pattern. Particular attention was paid to the lumbar spine and pelvis. The straight leg raising test, achilles and patella reflexes were a consistent part of the physical examination. X-rays were ordered if the physical findings warranted. They were routinely ordered 1) in cases of trauma where bone damage was likely, 2) in cases of unremitting pain particularly where the physical findings did not correlate with the symptoms, 3) where the patient had had the problem for several months prior to his visit and had had no x-rays, 4) if the patient did not make adequate progress within a two week interval of treatment.

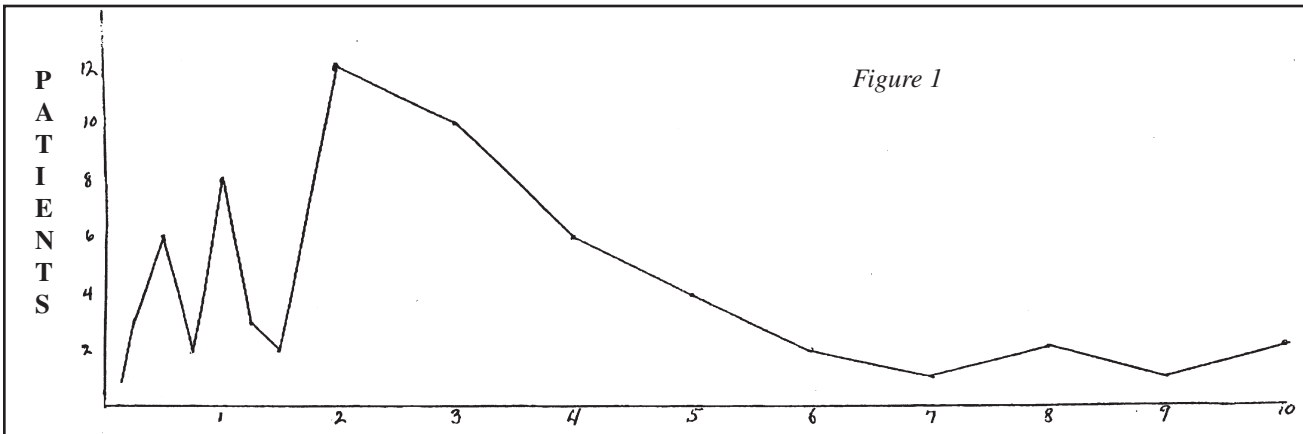
Treatment

Each patient was given manipulative treatment to identified areas of musculoskeletal somatic dysfunction. The duration of treatment was from a few days to several months. (Figure 1) Other measures were utilized where appropriate such as heat, back supports, lift therapy, and medication. Four patients had two episodes of sciatic neuritis, one patient had three episodes. Approximately 20 percent of the patients were under treatment longer than four months. Eight of these patients were Workman's Compensation cases. Their duration of treatment was well above average.

The acute symptom period with pain in the leg lasted from a few days to three months. The acute symptoms had subsided in the majority of patients within four weeks time. Thirty-seven patients made a recovery with no recurrence of their problem. Six of these patients made a good recovery but still had some back or minor leg symptoms. One patient with a congenital hip still had some symptoms in her back. One patient had occasional symptoms in her leg and another had low-grade symptoms in the back. One patient had osteoarthritis and another patient had had previous disc surgery. One patient had sensitivity in her back and leg related to three operations for a tumor on her foot and the resultant scar tissue.

→

Figure 1



Fifteen of the remaining patients had recovered from their symptoms when they were discharged. No further contact had occurred with them.

Seven patients had surgery. One patient had a neuroma of the spine. Six patients had disc surgery. One patient went to the hospital after one week of treatment. Another transferred to another physician after two weeks of treatment.

Of the six patients having disc surgery, one had recovered from an attack of acute sciatic neuritis and then five months later re-aggravated the condition and failed to respond to treatment. A second patient was under treatment for two months and seemed to be making progress except when he squatted he got a sharp pain in his leg. He was an electrician and could not work. A third patient was under treatment for two weeks without making substantial progress. He had already seen a neurosurgeon and was waiting for a date to enter the hospital. A fourth patient was under treatment for four months. He was improving after the first two months of treatment when he suddenly aggravated his problem at work and finally went to surgery. A fifth patient was seen for two weeks in acute pain. He could not tolerate the pain and was advised to have surgery. The last patient was treated for four weeks without improvement. She had already had her problem for five months. She finally went to surgery.

Summary

I have presented a study of 61 patients with a history of sciatic neuritis and their response to manipulative treatment as a clinical research study conducted in a private practice. Patients were treated for a period of from 3 days to 10 months. Fifty-two responded with clinical improvement. Nine failed to respond to treatment.❒

Address Correspondence to:
Myron C. Beal, DO, FAAO
110 Ferris Hills
Canandaigua, NY 14424

Did You Miss the Audioconference on Coding?

If you did not have a chance to participate in the May 24 live, one-hour continuing medical education program via audioconference, you can still order an audio CD or audiocassette tape of the program for $125. **Douglas J. Jorgensen**, DO delivered a presentation on *Osteopathic Documentation and Coding: Managing Patients with Ongoing Problems*. Dr. Jorgensen currently serves as chairperson of the Academy's Osteopathic Medical Economics Committee and is a frequent presenter on coding and reimbursement topics at AAO Convocation. Log onto http://registration.glyphics.com/php/sem-online/semSelect.php?cmpId=35 and click on the May 24 course, which will lead you to directions on how to place your order.

This program had the following objectives: (1) proper documentation of the osteopathic evaluation in the *objective* section of the SOAP note; (2) proper documentation of the diagnoses of somatic dysfunction(s) in the *assessment* section of the SOAP note; (3) proper documentation of OMT procedure(s) in the *plan* section of the SOAP note; and (4) basic understanding of the coding for the evaluation and management component of the patient encounter and the OMT procedure.

From the Archives

The Sacrum

The Practice of Osteopathy. Carl Philip McConnell and Charles Clayton Teall
 pgs 60, 90-92

Examination of the sacrum is best made with the patient lying on the side, with the osteopath standing in front and with the hand palpate its posterior surface. In the sitting posture its relation with both innominates can be determined. It is displaced posteriorly but seldom, the most frequent being anterior, downward, and a combination of the two. In the anterior conditions tenderness at the sacroiliac articulations is a good point, but it must not be confounded with an innominate lesion. The downward displacement is shown by comparison with the lower lumbar vertebrae. Observe the relation between the sacrum and fifth lumbar and carefully differentiate between the two, as a change in contour of the spine will also change the angle of the sacrum and vice versa.

The sacrum. – Adjustments of the sacrum, as distinguished from the ilium in strictly innominate lesions, are not many. When posterior with the patient on a stool, the knee of the osteopath covered by a pillow and placed against the sacrum, and both hands grasping the anterior borders of the ilia, strong traction will move it into position. In a downward displacement with the aid of an assistant from behind holding the crests of the ilia firmly as the patient sits on the table, the osteopath in front clasping both arms about the patient and with a rocking motion from side, disengages the sacrum and at the same time lifts it into position.

For anterior displacements use the technique described in replacing upward and backward innominate dislocation first right side and then left, which will result in correcting the lesion.

The preceding osteopathic technique includes the majority of treatments given by the osteopath. Although many osteopaths use methods not given here, they have been left out, as some are dangerous treatments and should be excluded from osteopathic therapeutics, and besides those outlined are sufficient for treatments in all practical work and will be found extensive enough for all illustrative purposes. A point which cannot be too thoroughly impressed upon the student is that osteopathic treatment is in reality constructive work, that is, re-adjustive, not only in detail, but in viewing the body structure as a whole. Detailed readjustment is an essential, still do not lose sight of the relation of the part to the whole. In our distinctive work anatomical construction is the basis of physiological function, although physiological stimulus is essential to anatomical development.

How often to treat. – How often to treat a case depends entirely upon the nature of the disease from which the patient is suffering. Just as in giving drugs the frequency of treatment is entirely dependent upon the seat of the disease and its severity. Acute cases require a thorough treatment at least once daily, and many times in severe cases the treatment has to be repeated several times daily. In subacute and chronic cases, as a rule, treatment should not be given as often as in acute cases; possibility once a day, but usually alternate days is better. In office practice cases are commonly treated two or three times weekly. Still it is better not to treat some cases oftener then once per week.

There is more danger in treating too often than in not treating often enough. The distinctive work of an osteopath is to correct disordered anatomical structures; and when a certain derangement has been corrected the tissues should have rest and plenty of time for repair. When treatments are given often, it simply keeps the tissues in an irritated state and nature does not have time to heal the diseased tissues. Always make it a point at each treatment to correct some definite lesion, and when the work is accomplished let the parts alone until the tissues have recovered as much as possible from the effects of the previous treatment before another treatment is attempted. The reason why some cases do not get cured under osteopathic treatment is simply because the osteopath keeps the diseased tissues in an aggravated state by the constant treatment so that they do not have the least chance to heal; the physician is thus adding irritation to the disease.

It is only by experience that one can tell how often to treat. Each case is a special study; what would be quite sufficient for a certain individual with a given disease would not be all suitable for a second individual with the same disease. As in drugs what is suitable for one person would not be adapted to another, because the make-up of each individual is entirely different from others; but here the parallelism diverges, for in drugs there is a foreign agent introduced into the system, while in osteopathic treatment the curative agent is entirely harmonious with the idiosyncrasies of the individual. It is for this reason that experience in practice is so essential.

Most cases should not be treated, as a rule, after a meal unless the patient is suffering from some digestive disturbance; for in treating other regions of the body outside of the digestive tract causes more or less stimulation of the parts treated and thereby draws blood away from the organs of digestion. Cases of disordered brain circulation, where the patient is unable to rest or sleep at night, should be treated at about their retiring time so that the circulation of the body may be equalized, thus giving the patient undisturbed rest.❐

Conceptual and Treatment Models in Osteopathy II:

Sacroiliac Mechanics Revisited

Theodore R. Jordan

An up-to-date osteopath must have a masterful knowledge of anatomy and physiology.[1] *-A. T. Still*

Introduction

Osteopaths have understood for over a century that the sacroiliac joint (SIJ) moves. Furthermore, the SIJ may be a source of pain and dysfunction and can be successfully treated by using manipulation. However, our explanation of how these treatments work is outdated. In other words, the osteopathic profession uses a very successful *treatment* model for treating SIJ dysfunction, but maintains a flawed *conceptual* model of SIJ mechanics. The difference between our treatment and *conceptual* models must not only be defined, but we must take special care not to confuse the two.

For example, Dr. Andrew Taylor Still became famous for treating what he called "displaced hips". He taught that in many patients with hip or leg pain, or altered gait, the head of the femur had actually slipped out of the acetabulum (complete and partial subluxations of the acetabular joint) and could be replaced with manipulation. Dr Still became famous for his treatment of the hip dysfunctions because he helped so many people by manipulating their hips. When x-rays were developed and used to image these "partially dislocated hips", they failed to show the routine existence of hip dislocations. With his technique, A. T. Still was undoubtedly altering the mechanics of the pelvis and lower extremities with great clinical success, but he was not replacing partially dislocated hips. Although treating "displaced hips" was a successful treatment model in the hands of A. T. Still, it was shown to be an invalid conceptual model of acetabular mechanics.[2]

Therefore, a valid *treatment model* must fulfill three criteria: (1) Provide a framework to interpret physical findings, (2) prescribe a treatment to correct the findings, and (3) give predictable results with the prescribed treatment. For example, the muscle energy model of sacral dysfunction is an elegant and successful treatment model in that it fulfills all three criteria.

On the other hand, the validity of conceptual model is wholly dependant upon outside knowledge. A conceptual model must provide the most accurate description and understanding possible; it must closely represent reality, (although a model may idealize away extraneous facts for simplification). As scientific advances increase our knowledge and newer better understanding becomes available, our conceptual models must change to stay current.

The purpose of this paper is to review the osteopathic conceptual model of SIJ mechanics in light of recent scientific studies. In order to do this, we will start with an historical overview of how our concepts developed.

Evolution of osteopathic sacral diagnosis and treatment

"The anatomy text that you are studying (Gray's) is one of the standard anatomies of the world and it states that the sacro-iliac joint is an immovable joint and l stand here and expect you to support me that the sacro -iliac joint is a movable joint and that all the anatomies will be changed before many years… I may not live to see it but some of you will."[3] –A. T. Still

Dr. A. T. Still was ahead of his time in teaching that the SIJ moves and that lesions of the SIJ can be treated with manipulation. Dr. Still considered that the wedge shaped sacrum could become jammed downward between the two ilia. One of his favorite techniques involved holding one ilium of a seated patient firmly down on a chair with one hand, while pulling upward traction on the trunk and laterally shifting and slightly rotating the trunk to work the sacrum loose.[4]

Review of early osteopathic literature shows many attempts to understand the mechanics of this complex region. This early period gave rise to numerous technique approaches; including a variety one and two operator techniques and the adjunct use of straps, slings, and wedges. Many of these were reasonable techniques, others were rather brutal. To bring some light on the matters of SIJ mechanics and treatment, the "International Society of Sacroiliac Technicians" was formed in the 1930s. But, until the 1940s, there was no single accepted concept of sacroiliac dysfunction, despite many attempts.

In the 1940s, one sees the beginning of our current concepts of sacral dysfunction. Dr. H. Magoun was lecturing on sacral dysfunctions in 1942 and emphasized that sacral lesions that occur on an oblique axis are the most prevalent.[5] In 1945, Drs. Kenneth Little and H. V. Hoover wrote of three accepted types of sacral dysfunction: flexion, extension, and rotation, and added the descriptions of five more patterns of dysfunction. In this paper, they give directions to diagnose sacral mal-position by noting the relative depth of the sacral sulci.[6]

In 1954, Harrison Fryette wrote extensively on the sacroiliac joint, its anatomy, dysfunctions, diagnosis and treatment in his "Principles of Osteopathic Technic" rather than emphasize axes of rotation, torsion, etc.

Dr. Fryette recognized the complexity of this joint and stated that "there is such a great variety of sacroiliac lesions that almost any method of diagnosis and treatment might be more right than wrong, occasionally."[7]

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Finally, in 1958, the osteopathic concept of sacral and sacroiliac dysfunction reached maturity in the influential paper "Structural Pelvic Function" by Fred Mitchell Sr. In this paper, he acknowledged the work of Drs. H.V. Halladay, C.G. Beckwith, and Harold Magoun as contributing to his model. This paper by Dr. Mitchell was so complete and elegant of a model, and lead to so much reliable clinical success, that it overshadowed further attempts to describe SIJ dysfunction. Suddenly, after over 70 years of osteopathic research and thought, a clinically successful model was proposed and adopted. Since that time, Mitchell's muscle energy model of sacral dysfunction has become standard, not only for the majority of the osteopathic profession, but also for manual medicine practitioners throughout the world. This speaks well of the utility and excellent clinical results that this model provides.

Despite the success of this model, for nearly a half-century, any advancement of our knowledge of sacral dysfunction has stopped. The concepts being taught in nearly all osteopathic textbooks today, reflect those put forth by Fred Mitchell Sr. in 1958. New scientific studies demonstrate the need to update this conceptual model.

Current concept of sacral dysfunction

The osteopathic concept of sacroiliac joint dysfunction is that the SIJ subluxes. A subluxation is defined as a partial or incomplete dislocation of a joint. In this model, the sacrum changes its position in relation to the ilium in any direction, rotating about a vertical, horizontal, or oblique axis. These changes result in diagnoses defined as sacral flexion, extension, shear, or torsion.

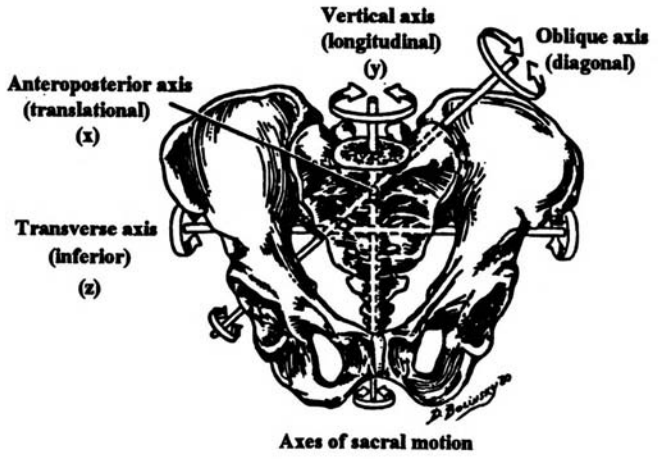

Figure 1. *Axes of sacral rotation from AOA glossary of osteopathic terminolgy.*

Diagnosis of sacroiliac dysfunction

Although many physical findings are used, two major components of sacral diagnosis rely on the comparative depth of the two sacral sulci in different positions and the relative position of the inferior lateral angles (ILA). Palpatory diagnosis of the static position of the sacrum is usually performed with the patient prone and by pressing bilaterally, medial to the posterior superior iliac spines (PSIS) on the sacrum. Positional diagnosis of a sacral dysfunction relies heavily on asymmetry of the depth of the sacral sulci, asymmetry of the apex of the sacrum, the relative tensions of attached ligaments, and both active and passive motion tests.

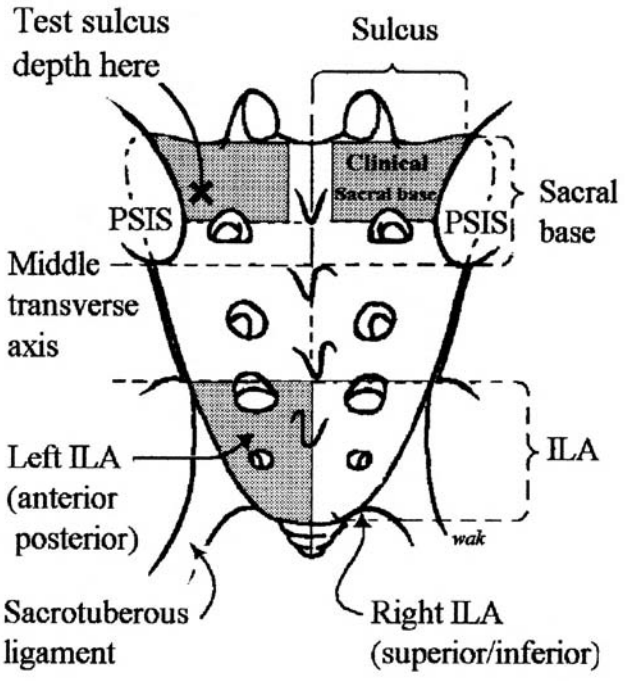

Figure 2. *Landmarks for Sacral Testing from the AOA glossary of osteopathic terminology.*

Scientific evidence of sacroiliac joint motion

A series of experiments have confirmed that the SIJ does in fact move. A study using fresh cadavers demonstrated sacroiliac motion with extremes of physiological motion, even though the cadavers used were from elderly persons, where one would expect less SIJ motion.[8] More important are studies utilizing the roentgen stereophotogrammetric analysis (RSA) technique as described below. This technique has allowed measurement of exact amounts of sacroiliac motion in live human volunteers,[9,10] and has documented sacroiliac motion both during the standing hip flexion test[11] and in the reciprocal straddle position.[12]

Role of surrounding ligaments and muscles

The SIJ is a synovial joint and is surrounded by thick ligaments. As mentioned, the SIJ moves, but the surrounding ligaments act to check motion. Force applied to induce sacral nutation stresses the sacrotuberous ligament and counternutation stresses the long dorsal sacroiliac ligaments.[13] Many of these ligaments are also linked to muscles, therefore surrounding muscle tension modifies SIJ mechanics. Tension applied to the tendon of the biceps femoris is transmitted to the sacrotuberous ligament,[14] therefore biceps femoris tension can presumably

help to limit sacral nutation. Moreover, deep and superficial layers of fascial aponeurosis overlay the thoracolumbar region and sacrum. Muscles that connect to this fascial system, and therefore influence the mechanics of the lumbar spine and pelvis include the trapezius, latissimus dorsi, external and internal obliques, gluteus maximus, and gluteus medius.[15] These muscles represent the "global" system of muscles that modify sacroiliac joint mechanics. More central to these muscles are the "core" muscles.

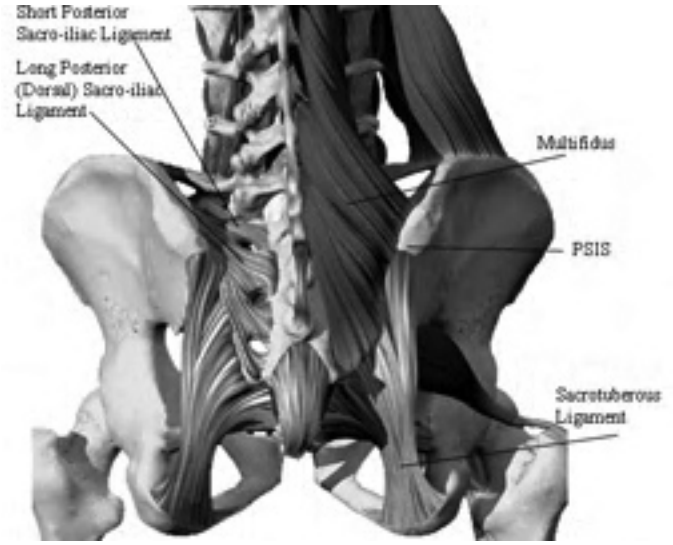

Figure 3. Posterior Pelvic Anatomy. Permission to reprint received from Primal Pictures Ltd., Copyright 2001

Core muscles as stabilizers

The core muscles act together to create a rigid cylinder of the abdominal cavity, thereby protecting the lumbar spine and SIJs from mechanical stress and transferring mechanical loading from the trunk to the pelvis and lower extremities. The core muscles include the transversus abdominus, obliques, rectus abdominus, multifidus, respiratory and pelvic diaphragms. They are also essential to pull the three bones of the pelvis snugly together, therefore stabilizing the sacrum between the ilia. This mechanical action is termed, *force closure of the pelvis,* and is central to understanding pelvic mechanics.

The multifidus specifically has been found to be a lumbar and lumbo-sacral stabilizer that can also act to stiffen individual segments.[16] The multifidus, with the transverses, appears to play a crucial role in stabilization of the lumbar spine and trunk. This co-contraction occurs in a "feed-forward" manner, so that electromyography shows transversus abdominus and multifidus muscles contracting several milliseconds before other motor activity actually occurs, or before an anticipated mechanical challenge occurs (such as catching a ball, or before moving an arm). This mechanism, combined with the action of the respiratory and pelvic diaphragms, work in this feed-forward mechanism to increase intra-abdominal pressure and therefore stabilize the lumbar spine and pelvis by forming a semi-rigid cylinder. In low back pain patients, analysis has shown that this "feed-forward" contraction is lost; the core muscles either contract after the mechanical challenge or fail to contract at all. Likewise, failure of the pelvic diaphragm to contract with mechanical challenge has been documented in low back pain patients.[17,18,19] In these persons, the joints and tissues of the lumbar spine and pelvis are subject to greater injury from any mechanical challenge, even from simple motions. Recent advances in low back rehabilitation have focused on restoring this essential function of these core muscles.[20] SIJ motion and stability is therefore dependent on the proper function of both the "core" and "global" neuromuscular and fascial networks.

Position of sacroiliac joint before and after manipulation

In 1998, Tycho Tullberg, MD, PhD, Stephan Blomberg, MD, PhD, Björn Branth, MD, and Ragnar Johnsson, MD, PhD, published a study in *Spine* titled "Manipulation Does Not Alter the Position of the Sacroiliac Joint: A Roentgen Stereophotogrammetric Analysis."[21] This experiment was designed to accurately measure the amount of movement that results from manipulation of dysfunctional SIJ's in humans.

In this study, ten persons with significant sacroiliac dysfunction were studied. Three pairs of radio-opaque tantalum markers were embedded in the bone of the sacrum and ilium of the dysfunctional sacroiliac joint in these subjects about 2 days before the experiment. With Roentgen Stereophotogrammetrical Analysis (RSA), the precise three-dimensional position of each marker could be identified with an accuracy of roughly 0.1mm. This involved shooting two simultaneous crossfire x-rays with the radio-opaque markers in place. By comparing the RSA films before and after manipulation, any change in the translation and rotation of the sacrum and ilium could be more accurately calculated than ever before possible.

On the day of the experiment, the subjects were examined by a manual medicine practitioner and were found to have a majority of positive sacroiliac tests (strongly indicating sacroiliac dysfunction). The first RSA films were then obtained. The manual medicine practitioner immediately treated the sacroiliac dysfunction. Following manipulation, the subjects were manually retested and found to have normalized sacroiliac tests, indicating that their sacroiliac dysfunction had been resolved with treatment. A second set of RSA films were then immediately performed. The RSA films before and after manipulation were later analyzed.

Surprisingly, no significant change in sacral position was found before and after manipulation in any of the subjects, despite the apparent resolution of the dysfunctions with manipulation. To quote the authors: "In none of the ten patients did manipulation alter the positional relation, defined by RSA, between the sacrum and the ilium. Positional test results changed from positive before manipulation to normal after manipulation without corresponding alteration in skeletal position. Thus, positional tests did not provide a valid description of the sacrum-ilium position.[22] Subsequently, the model of sacroiliac mechanics must be re-examined and redefined.

From this study, our concept of sacral subluxation appears to be an incorrect conceptual model, even though our treatments fulfill the criteria for a valid treatment

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The question suddenly presents: does palpation of the sacral landmarks actually represent sacral position?

Problems with palpatory diagnostic methods

In the clinical setting we only have access to the surface of the body. Using vision and palpation, only discreet landmarks and their relative position in space can be noted. The entire pelvis and sacrum cannot be fully visualized, only asymmetry between landmarks of the two sides of the body. Conceptual models have been constructed to explain these findings in terms of skeletal mal-position, such as sacral torsions, flexions, extensions, iliac rotations, out-flares, etc. Just because these models have been widely accepted does not make them a true representation of underlying anatomy.

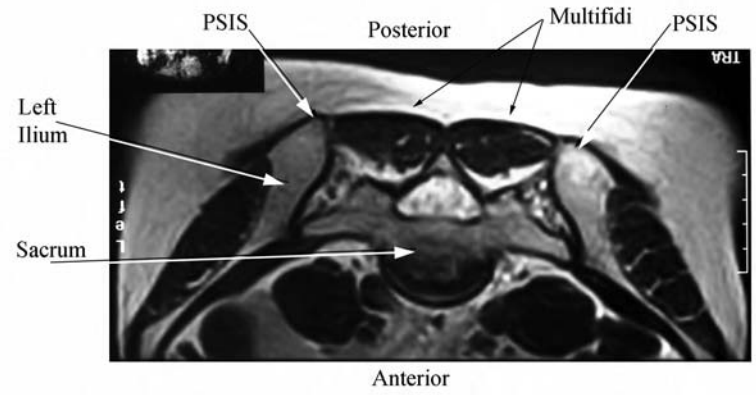

Figure 4. MRI cross-section. Sacrum of 32 year-old female showing multifidi muscles overlaying the sacrum between the ilia. Even in this petite female the multifidi are nearly 2.5 cm in A-P dimension. (The MRI has been inverted as if the patient was laying prone, to correspond to the following illustrations.)

Palpation of the deeper skeletal structures necessitates pressing through skin, fat, fascia, and muscle. Particularly when palpating for sacral sulcus depth, the role of underlying muscle is ignored and sacral position is misinterpreted. Although the multifidus is only one of many anatomical structures that influence our diagnosis of the SIJ, it will be emphasized because of its important role in the diagnosis of sacral dysfunction, and new understanding of its function.

Multifidus anatomy

The multifidus muscle is attached to the posterior surface of the sacrum, medial posterior superior iliac spine, posterior sacroiliac ligaments, sacrotuberous ligament, aponeurosis of the erector spinae muscle and mammillary processes of the lumbar vertebrae. The muscle then runs medial and superior to attach to the spinous processes of the lumbar vertebrae L1 - L5. The multifidus sends fibers over the sacrum to unite with the sacrotuberous ligament.[23,24] There is more muscle mass near the base of the sacrum than the apex, especially filling the space between the posterior superior iliac spines (PSIS), than near the inferior lateral angles (ILA). It is easy to overlook how prominent of a muscle the multifidus is in the lumbar and sacral region. Transverse plane imaging shows a significant cross sectional area. It is directly into this muscle mass that palpation occurs to diagnose sacral dysfunction (see figure 2). The multifidus receives its innervation segmentally from the medial branch of the lumbar dorsal rami. Dissections indicate that each medial branch innervates only one segmental level.[25]

When one palpates down into the sacral sulci and checks for relative sacral sulcus depth, the relative depth does not reflect sacral position, but rather reflects multifidus thickness. Even in the petite female illustrated in Figure 4, the multifidus is nearly 2.5 cm thick at the level of the PSIS. In addition, overlying the multifidus is the lumbo-sacral fascia, a very thick layer of collagenous connective tissue. This thick layer of fascia can feel quite solid and be mistaken for bone. Asymmetry in the relative sacral sulcus depths is then mistaken as representing an uneven sacral base. Instead, this asymmetry should be interpreted as asymmetry in the relative thickness of the multifidus at that level.

Documented asymmetry of multifidus

The cross-sectional area of a muscle, as seen on ultrasound, CT or MRI, represents either the relative contraction of a muscle, or muscle hypertrophy or atrophy as may occur over time. When imaged, healthy subjects exhibit symmetric cross sectional measurements of the multifidi. Conversely, low back pain patients commonly demonstrate significant asymmetry of the cross sectional area of the multifidi muscles. This asymmetry often occurs in a discreet segmental manner.[26,27,28,29] In the lumbar region, if there is significant dysfunction of a single segment, the smaller muscle segment is found only at that symptomatic segment and on the same side as the symptoms.[30]

There are two major theories as to why this segmental asymmetry in multifidus cross-sectional diameter might occur. The first theory is that one muscle segment atrophies. Muscle atrophy occurs over time and is often visualized on scans with increased fatty infiltration of the multifidus. However, in a study by Hides, et al., one patient developed segmental multifidus asymmetry within 24 hours after an acute back injury, which lead them to conclude that the mechanism of multifidus asymmetry in back pain is most probably reflex inhibition.[31]

The importance in sacral diagnosis is that if one multifidus at the sacral base is more contracted than the opposite muscle, it produces a greater cross sectional area, and that sulcus will then appear shallower. Palpation of the sacral sulcus, then, is primarily evaluating relative segmental multifidus contraction, not sacral base position. The asymmetry represents dysfunction, not in the position of the sacrum, but in the function of the muscle overlying the sacrum; a muscle intimately responsible for stabilization of protection of the mechanics of this region. After osteopathic manipulation, symmetry is most often reestablished, pain alleviated and function restored. This represents a normalization of neuromuscular function mechanics, not a replacement of a displaced bone.

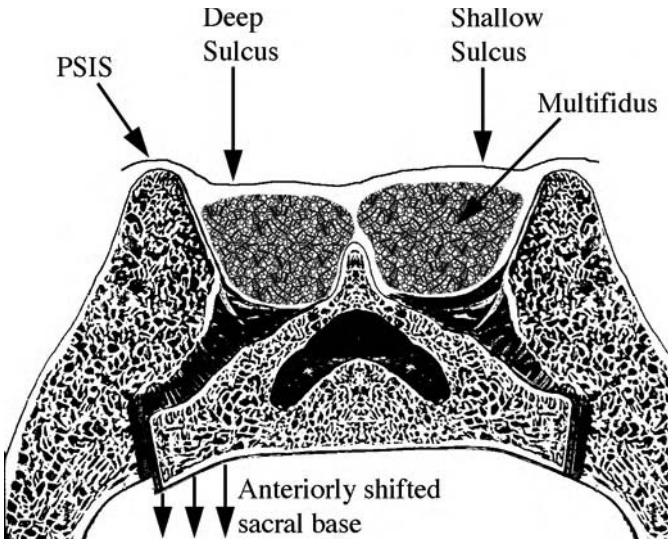

Figure 5. *Diagram of transverse cross section of pelvis through the PSIS, illustrating concept of deep sacral sulcus as a result of an anteriorly displaced sacral base. This concept of sacral subluxation has been thrown into question with recent Roentgen Stereophotogrammetrical Analysis studies.*

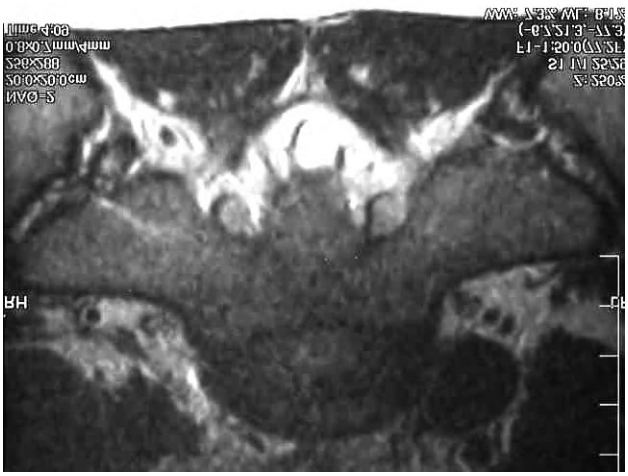

Figure 7. MRI cross-section of pelvis through PSIS of a 29y/0 female who developed severe low back pain following childbirth. Note the asymmetric cross sectional area of the multifidi. (The image has been inverted to correspond to the previous illustrations.)

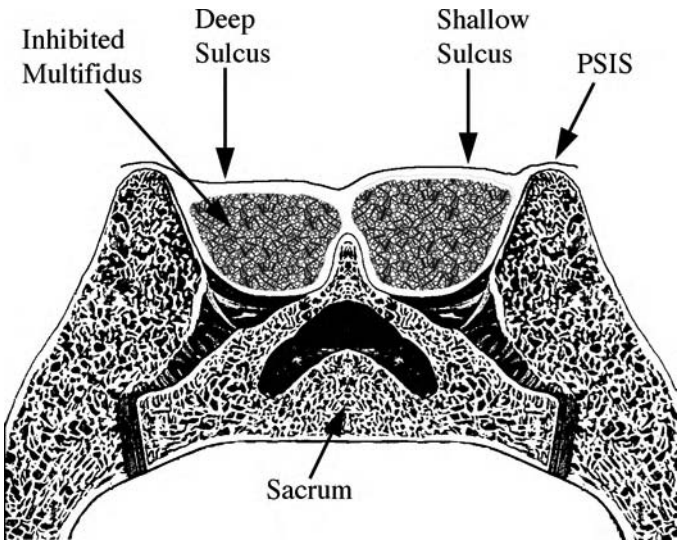

Figure 6. Diagram of transverse cross ection of pelvis through PSIS, illustrating deep sacral slcus as result of multifidus asymmetry.

Sacroiliac stiffness

From these recent studies, the concept emerges that the SIJ works more as a spring than as a joint that can be subluxed. The SIJ is capable of being deformed with force, but it returns to neutral after the force is removed. The "spring" of this joint is likely dependent on surrounding muscular and ligamentous tension as well as local ligament integrity and overall body posture. Certainly, this "spring" function is essential for gait. During heel strike, the SIJ absorbs mechanical energy and transform it into potential energy, then releases the energy as mechanical energy at the push off phase of gait; thus conserving energy and facilitating locomotion. Moreover, recent studies suggest that relative asymmetry of the "stiffness" of these "springs" is correlated with SIJ pain.

A research group in the Netherlands has devised a noninvasive way of measuring this SIJ stiffness. This method involves laying a subject prone with one ASIS upon a vibrating transducer. A Doppler ultrasound is then held over the SIJ. When the transducer is vibrating, the vibrations can be seen via the Doppler ultrasound in the PSIS as they are transmitted directly through the ilium. If the joint is stiff, transmission of vibration occurs across the SIJ and vibration is seen on both the sacrum and ilium as they vibrate as one unit. When the SIJ is "loose," the ilium is observed vibrating, but at the same energy level, vibration is not seen in the sacrum. By then turning up the energy (or "volume") of the transducer, eventually the vibrations are observed transferring across the SIJ to the sacrum. By determining how much energy it takes to transmit vibrational energy from the ilium across to the sacrum, a rough estimate can be made as to the relative stiffness of the SIJ.

This method of testing SIJ stiffness was first validated on cadavers.[32] Then a group of normal women without back pain was tested.[33] The normal subjects showed symmetric SIJ stiffness with these measurements. A further study of peripartum women with pelvic pain demonstrated significant asymmetry in the SIJ stiffness, right to left. The authors could not conclude that SIJ associated pain was due to a looser or tighter joint, only that asymmetry in tightness was associated with pain.[34]

This relative stiffness of the SIJs can be observed in several examination procedures, such as the iliac spring and the sacral spring tests. The relative stiffness may actually represent a mechanical characteristic of the SIJ, but may also reflect the function of the surrounding core and global muscle and fascial systems. Clinical experience suggests that manipulative techniques can normalize asymmetrical SIJ stiffness.

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Discussion

"The great tragedy of science-the slaying of a beautiful hypothesis by an ugly fact."
-Aldous Huxley

Clearly, it appears that our long held concepts of sacral mechanics need revision, yet our treatments are quite successful. I propose that the treatment model for sacral dysfunction is valid based on its clinical efficacy, but that the conceptual model of sacral subluxation is invalid based on recent scientific studies. Osteopathic treatment techniques are not replacing subluxed SIJs, but actually modifying the complex interaction of the myofascial networks that control sacral mechanics.

On a personal note, when I first considered this, it was a daunting revelation. Then, as I thought about it, many previously mysterious observations suddenly made sense. When I was a student, I remember watching Kenneth Dye, DO treat a very marked sacral torsion by using Jones' strain-counterstrain of three anterior tender points. Nowhere in his treatment did I see any mechanical force that would have replaced a torsed sacrum, yet the dysfunction completely resolved. Likewise, at an AAO convocation I saw Dr. Wynne Steinsnyder present the "F.A.K.S.S." technique to pelvic dysfunction that simply involved applying cross fiber pressure for a few seconds to bilateral muscle groups in a sequential process. It was obvious that this technique did not directly alter SIJ mechanics, yet this treatment was also successful. Additionally, I have seen gentle indirect techniques and craniosacral techniques of sacral balancing. In none of these mentioned techniques did I ever see the type of mechanical force that was necessary to move a sacroiliac joint. Even the muscle energy technique for treating a forward (or backward) sacral torsion never made sense as far as the mechanics of replacing a displaced sacrum. Yet all of these techniques seem to work under the hands of a competent osteopath.

Moreover, I have treated several unfortunate patients with true sacral instability after trauma. One such patient's sacrum would audibly crack as pressure applied to the sacral apex caused the sacral apex to shift anteriorly nearly a centimeter. Another patient with total loss of core muscle integrity would lay supine and her sacrum would counter-nutate in small creaking increments, resembling the feeling of two wet pieces of rubber rubbing and creaking as they moved in a jerking motion. In these patients, the sacrum rotated about a horizontal axis. Because of gravity, these patients with SIJ instability tend to have hyper-nutation of the sacrum and resultant increased lumbar lordosis. In these cases of gross sacral instability, the sacrum is clearly moving between the ilia. One does not get the same dramatic sense of motion when using osteopathic techniques to treat common sacral dysfunctions.

I must conclude that osteopathic techniques work by modifying the relative tension of the many tissues that control the mechanics of the SIJ, and not simply by replacing a displaced joint, except in cases of gross sacral instability. This is a much more dynamic concept than that simply of two mal-positioned bones that need to be manipulated back into place. The living tissues of the body will assist the operator on correcting a dysfunction, and under trained hands, minimal force is required. A developed sense of touch is the primary tool needed to successfully assist in the correction. This is what so many great osteopaths intuitively know and practice daily. Yet our conceptual model lags behind our practice and our nomenclature is likewise outdated. New conceptual models need to be introduced to more closely describe the dynamic complexity of the mechanics of the sacroiliac joint.[35]

Summary

1. The subluxation model of the SIJ is a valid treatment model: It gives a theoretical explanation of palpatory findings, prescribes treatment, and gives predictable results.
2. The subluxation model of the SIJ is not a valid conceptual model: Recent research has failed to show any change in position of the SIJ before and after manipulation.
3. The SIJ does not sublux, as described in osteopathic texts. This theory was developed due to misinterpretation of palpatory observations.
4. Palpation of anatomic landmarks used to diagnose sacral dysfunction do not accurately reflect skeletal position, but rather reflect underlying muscular and fascial tension.
5. The healthy SIJ moves. It deforms with force but returns to its neutral position. Mechanically it acts as a spring to transform mechanical energy into potential energy and back into mechanical energy, especially important for normal gait.
6. SIJ mechanics are under the influence of surrounding muscles, ligaments, and skeletal posture. Altered symmetry of the surrounding muscular and fascial network will reflect as altered SIJ mechanics.
7. Asymmetrical stiffness of the SIJ's has been associated with pain.
8. Gross sacroiliac instability occurs rarely, and only with traumatic disruption of SIJ ligamentous integrity, and/or loss of core muscle competency.
9. To treat SIJ dysfunction, the surrounding muscular and fascial dysfunctions must be corrected. Successful osteopathic techniques work primarily on normalizing muscular, fascial and ligamentous function that influence SIJ mechanics, not on repositioning a mal-positioned joint.

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35. Of course this begs the question: If the conceptual model of sacral mechanics is not valid, what will we ask about on osteopathic board exams?❐

Accepted for Publication: March 2006

Address Correspondence to:

Theodore R. Jordan, DO
5100 W. Broad St., Suite 107
Columbus, OH 43228
Fax: 614/878-8031

CME QUIZ

The purpose of the quiz found on the next page is to provide a convenient means of self-assessment for your reading of the scientific content in the "Conceptural and Treatment Models in Osteopathy in Osteopathy II: Sacroiliac Mechanics Revisited" by Theodore R. Jordan AND in "Post Operative Osteopathic Manipulative Protocol for Delivery by Students in an Allopathic Environment" by Robert C. Clark and Thomas M. McCombs. For each of the questions, place a check mark in the space provided next to your answer so that you can easily verify your answers against the correct answers that will be published in the September 2006 issue of the *AAOJ*.

To apply for Category 2-B CME credit, transfer your answers to the AAOJ CME Quiz Application Form answer sheet on the next page. The AAO will record the fact that you submitted the form for Category 2-B CME credit and will forward your test results to the AOA Division of CME for documentation.

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

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Conceptural and Treatment Models in Osteopathy in Osteopathy II: Sacroiliac Mechanics Revisited
Author: ***Theodore R. Jordan, DO***
Publication: *Journal of the American Academy of Osteopathy*, Volume 16, No. 2, June 2006, pp 11-17

Questions 4-6: Name of Article:
Post Operative Osteopathic Manipulative Protocol for Delivery by Students in an Allopathic Environment
Authors: ***Robert C. Clark, DO & Thomas M. McCombs, DO***
Publication: *Journal of the American Academy of Osteopathy*, Volume 16, No. 2, June 2006, pp 19-21

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March 2006 AAOJ CME quiz answers:
1. A
2. D
3. True
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5. B
6. D

CME QUIZ

1. When palpating over the sacral base, just medial to the PSIS bilaterally, the relative depth of the sacral sulci most directly represents:
   a. Psoas muscle tone or contraction
   b. Bicepts femoris muscle tone or contraction via tension transmitted through the sacrotuberous ligament
   c. Relative position of the sacrum in relation to the ilia (innominates)
   d. Multifidus muscle tone or contraction
   e. Ipsilateral external oblique muscle tone or contraction via tension transmitted through the thoracolumbar fascia

2. When using a vibration transducer over the ASIS to observe the transmission of vibration across the sacroiliac joint, researchers have concluded that:
   a. Asymmetry of stiffness between the two sacroiliac joints is only observed in cadaver studies
   b. Asymmetry of stiffness between the two sacroiliac joints is associated with pain, but the painful side cannot be concluded to be either the "stiffer",or the "looser" side
   c. When there is asymmetry in the stiffness of the sacroiliac joints, the painful side is most commonly the "stiffer" sacroiliac joint
   d. Asymmetry of stiffness between the two sacroiliac joints is only observed pregnant females
   e. When there is asymmetry in the stiffness of the sacroiliac joints, the painful side is most commonly the "looser" sacroiliac joint

3. Recent scientific studies have concluded that:
   a. The sacroiliac joint deforms when external forces are applied to it
   b. There is no change in the positional relation between the sacrum and the ilia before and after manipulation of the sacroiliac joint
   c. Asymmetry in the cross sectional diameter of the multifidus can occur, and is often seen after injury, and in low back pain patients
   d. Relative stiffnesses of the sacroiliac joints is influenced by the tone of the surrounding muscles (gluteus, hamstrings, latissmus, etc.)
   e. All of the above

4. Condylar Decompression not only counteracts the mechanical effects of intubation, but serves to optimize the physiology of:
   a. The Phrenic Nerves
   b. The Trigeminal Nerves
   c. The Vagus Nerves
   d. The Splanchnic Nerves
   e. The Sympathetic Nerves

5. Treatment of the mid-cervical spine is advocated for Post Operative OMT, to counteract the mechanical effects of intubation and to optimize the physiology of:
   a. The Phrenic Nerves
   b. The Brachial Plexus
   c. The Vagus Nerves
   d. The Splanchnic Nerves
   e. The Recurrent Laryngeal Nerves

6. The Respiratory Diaphragm ventilates the lung bases, and when robust, its motion (during inhalation) will also:
   a. Displace the abdominal wall posteriorly
   b. Narrow all bronchial lumens
   c. Slow venous return to the thorax
   d. Relax the lower esophageal sphincter
   e. Stimulate peristalsis

Post Operative Osteopathic Manipulative Protocol for Delivery by Students in an Allopathic Environment

Robert C. Clark and Thomas M. McCombs

Abstract

Today's students are faced with the probability that some or all of their third year clinical rotations will be in allopathic hospitals. This affords them little if any opportunity to practice their osteopathic manipulative skills as there are:

a. no 0MM credentials offered by the hospital
b. no opportunities in the busy schedule
c. no permission from the Attending Physicians, and
d. rarely qualified supervisors present.

The authors have devised a protocol of osteopathic manipulative treatment techniques for use on patients who are in the immediate post-operative period. This protocol can be administered by qualified third year or fourth year osteopathic students without supervision. The techniques selected represent fundamental skill levels that any osteopathic student or physician should be able to administer.

(Key Words: Lymphatic Pump Technique, Osteopathic Manipulative Treatment [OMT], Post operative Pain, Soft Tissue Technique, Rib Raising Technique)

Introduction

Studies by Stiles,[1] Radjieski,[2] Cantieri,[3] No.11[4] and others show that osteopathic manipulative treatment has a positive impact on length of stay for hospitalized patients in a variety of diagnoses - or diagnostic related groups also known as DRGs.

Stiles' work from 1974 shows that patients length of stay was reduced by roughly one day. Radjieski's[2] work shows that in the case of pancreatitis, length of stay was reduced by about one half. Cantieri's study 3 from the AAO Journal Winter 1997 showed that for a variety of DRGs, OMT combined with normal medical care reduced the length of stay by an average of 1/2 day compared to normal medical care alone. There were a large number of DRG's and in several cases no comparison can be made i.e. no patient did not receive OMT. Cantieri posed a number of excellent questions for further analysis. No11[4] examined the role of OMT in hospitalized elderly patients with pneumonia and evaluated several parameters. In his study, length of stay in the hospital was reduced from a mean of 8.6 days without OMT to 6.6 day with OMT. Additionally, the length of use of intravenous antibiotics was reduced.

Sleszynski and Kelso[5] compared thoracic pump technique to incentive spirometry techniques in the prevention of post-operative atelectasis. Thoracic pump was used twice daily while spirometry was used three to four times a day. Both treatments were effective in reducing atelectasis from a 50 percent occurrence rate to a five percent occurrence rate; however the OMT achieved the result with half the number of treatments and patients' recovery, as measured by pulmonary function tests occurred more quickly.

However, they did not observe length of stay in their study.

With this collection of data in mind, the authors looked at TUCOM-CA and its heavy reliance upon allopathic hospital training environments for its students. In these environments, it is extremely difficult for students to perform OMT as their attendings are unable to provide supervision. One of the authors (McCombs) provides weekly instruction in each of three San Francisco bay area hospitals which participate in the TUCOM third year training program; however, he is a staff member in only one of the three institutions and in that institution sees patients on a limited basis.

Informal conversation with students who rotate, at both local as well as distant institutions, reveals an extreme variability in the opportunities for students to give OMT. Some students present to their attending physicians a rational basis for giving a treatment and attendings grant their permission for students to perform treatments. Others have, on occasion, resorted to deception saying that they were not giving osteopathic manipulative treatment but they are giving treatment, which is "massage-like in nature." Sadly, this deceptive strategy may prove effective in allowing the student to treat; however, within the deception lies a functional absence of informed consent by both the patient and the attending because the student has not fully disclosed accurate and precise information as to what is being done. Students, therefore, are working without the benefit of experienced supervision, risking patient safety, lacking backup for management of treatment reactions, and lowering the stature of osteopathic medicine. Far more hospitals train osteopathic students than have adequate supervision available for OMM. To meet the needs of students who have permission but not supervision to apply OMM, the authors have formulated a protocol of treatment techniques suitable for students to administer without supervision to patients in the post-operative period.

The techniques chosen are basic techniques designed to support respiration, circulation, ventilation, and perfusion thereby augmenting the healing process following a surgical procedure. The techniques selected are those that

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are now taught in the first two years of OMM training at TUCOM-CA. These techniques are easy to administer and are very safe. Modifications for delivery in the hospital environment were developed by author McCombs.

Some of the impacts of surgery on the patients physiology include a central nervous system that has been stunned by the anesthetic agents. The authors observe a weakened Cranial Rhythmic Impulse, which is typically noted as having both a slower rate and a lesser amplitude. It has also been observed that prolonged intubation slows and restricts motion of the sphenobasilar synchondrosis.The autonomic nervous system experiences similar effects. One of the common effects of surgery is post-operative ileus. Additionally, the patient who is intubated as part of a general anesthetic procedure experiences marked extension of the occipital atlantal joints and midcervical spine. This can have adverse effects upon the vagus and the phrenic nerves, causing sub optimal enervation to the respiratory diaphragm, heart, lungs, and gastrointestinal system. Additionally, it has been observed that the use of ventilating machinery has an effect of reducing the venous and lymphatic flow returns. Lastly, the patient experiences incisional pain, which often manifests with guarded shallow respiration, which increases the risk of atelectasis, venous stasis and ileus. Additionally, early post-operative care often utilizes opiate pain control medications which can depress respiratory drive and depress gastrointestinal function - specifically peristalsis.

The natural sequelae of these cumulative insults to physiology are seen daily in every hospital in America: atelectasis, ileus and venous stasis (edema, deep venous thrombosis, skin ulcerations). Allopathic medicine offers incentive spirometry, early ambulation, continuous passive motion equipment, anticoagulation drugs, and skilled nursing practices to counteract the effects described. The authors submit that early intervention with osteopathic manipulative treatment (OMT) will avert or minimize such adverse outcomes. Indeed, we hope that by sending osteopathic students who are competent with this protocol into the allopathic world, that world will develop increased awareness of and respect for osteopathy.

The therapeutic goals of postoperative OMT are:

1) Restore the cranial rhythmic impulse to its full rate and excursion.
2) Restore ventilation to full capacity.
3) Maintain and/or restore peristalsis.
4) Restore the third space fluid to circulation.

A number of techniques can be used for each one of these four goals and some of these techniques will overlap and meet multiple goals.

Protocol

The protocol we recommend is a seven-step sequence of osteopathic manipulative techniques:

1. Condylar decompression (using a lateral approach if the head of the bed is inaccessible).
2. Sphenobasilar decompression (using a lateral approach if the head of the bed is inaccessible).
3. Correction of cervical spine dysfunctions utilizing soft tissue technique and if appropriate, high velocity low amplitude technique.
4. Rib-raising.
5. Redomeing of the diaphragm
6. Lumbosacral decompression and balancing of the pelvic diaphragm as indicated.
7. Lymphatic pump, such as the pedal pump, can be used to complete the protocol.

This protocol was independently derived by the authors. During the literature review, the No.11[4] protocol was discovered. Although technique selections and our sequence are slightly different, many of the same techniques are used. Nicholas and Oleski[7] practiced a four-step protocol composed of rib raising, treatment of the thoracic inlet, respiratory diaphragm and pelvic diaphragm. The overlap of the three protocols is notable.

Rationale for Selection of Techniques in this Protocol

Techniques were chosen because they are easily administered by students with very low risk to the patients and a high probability of successful outcome. The No.11[4] protocol was administered by second year students who received specific training in the protocol. This experience supports the contention that the techniques can be safely administered by students. The authors view their protocol as a set of recommendations or guidelines for treatment techniques to be administered to postoperative patients. It is recognized that a spectrum of circumstances, which cannot be predicted in this article, may be encountered by the student or physician. Therefore, appropriate clinical decision making to exclude a particular technique due to special patient circumstances must be exercised. For example, pedal pump is not an appropriate technique to be used if the patient has deep vein thrombosis, central venous lines, is intubated, or if the leg is immobilized in a cast or other fixation device.

The Condylar decompression technique was selected to offset the hyperextension necessitated by intubation. This technique also has beneficial effects of removing compression and irritation of the vagus nerve pathway through the jugular foramen, minimizing the probability of onset of postoperative ileus. The technique is easily administered. Patients report that it feels good.

The sphenobasilar synchondrosis (SBS) decompression technique also is beneficial in reducing the postoperative effects of anesthesia and intubation. A lateral approach to both condylar and SBS decompression is recommended because of the common problem of hospital beds being against walls with the head end inaccessible. It is best to not move the bed and disturb the various supportive hardware and monitoring equipment.

Treatment to the cervical spine is beneficial because the phrenic nerve originates at C3, 4, and 5 provides innervation to the diaphragm. In the extension of the neck for intubation this area is stressed. Anecdotally, many patients with post-operative singultus have dysfunctions of C3, 4, or 5. Treatment to this area can help normalize nerve supply to the diaphragm and eliminate the singultus.

Rib-raising techniques are selected for the protocol because they are easy to administer and have a long history of success dating from the 1890s. Rib raising enhances the inhalation phase of respiration, helps balance the autonomic nervous system, enhances lymphatic drainage through the thoracic duct, and can be beneficial in maintaining and restoring peristalsis!

Redoming the diaphragm is a technique beneficial in restoring ventilation, stimulating peristalsis, and restoring third space fluid to circulation. As a consequence of inhaled anesthesia techniques requiring paralytic agents, the diaphragm ceases to function and spontaneous restoration of function postoperatively is very slow. Rib raising techniques can be supportive as can the diaphragm redoming or diaphragm release techniques. The diaphragm has been found in recent research[6] to have significant lymphatic collection structures on its inferior surface. The rise and fall of the diaphragm with respiration helps accelerate the collection of ascitic accumulations in the abdomen and return them to lymphatic circulation.

This diaphragm release or redoming is a very valuable and clinically powerful technique.

Lumbosacral decompression and balancing of the pelvic floor, depending upon the surgery, can be very beneficial in assisting in the maintenance and restoration of peristalsis and urinary function.

Pedal pump was chosen because it is considered by many to be one of the gentlest lymphatic pump techniques. Since the patients in the early phases postoperatively are not ambulatory, there is accumulation of fluids in the legs. Pedal pump technique could be beneficial in the prevention of deep-vein thrombosis and peripheral edema both of which can be restrictive factors in ambulatory efforts.

Strategies for Implementation of these procedures

Implementation of this protocol first requires training students via lecture and lab with supervised practice of the protocol. Each technique is learned individually over the course of the first two years of training in OMM. Students have further skills practice opportunities in the Long Term TUCOM-CA OMM Patient care/Patient-Partner program. Techniques are presented in the protocol format in the last OMM lab of the second year. The protocol is revisited when the third year students are called back to campus.

Discussion with physicians at several allopathic hospitals affiliated with TUCOM leads us to the following recommendations:

The medical staff should receive exposure to these procedures. Grand Rounds presentations would be an ideal mechanism. The staff should be informed that the college(s) consider the students qualified to administer these procedures without direct supervision. An OMM specialist backup should be available in the unlikely event complications arise, ideally provided by a member of the hospital's medical staff.

Appropriate rationale should be given for the procedure and appropriate documentation prepared. These should be presented for medical staff approval just as any other procedure done in the hospital. Once such approval is obtained, students could then be directed by Attending Physicians to administer OMT, and document this by using progress notes or pre-approved forms. In conjunction with the attending physicians and the institutions; length of stay and patient outcome evaluations could be performed to create a database of clinical experience and evidence to validate the effectiveness of this protocol and these techniques.

If all OMT is coded using CPT codes 98925-98929, utilization review can monitor patient outcomes that contain OMT for comparison with non-OMT "controls." Length of stay, time to ambulation, use of pain medication, and ultimately cost savings can be tracked. This protocol treats 5-6 regions: head, neck, ribs, lumbar spine, sacrum, and lower extremities and the OMT Code: 98927 is applicable.

Conclusion

The techniques in this protocol are easily administered by osteopathic students during their third and fourth year rotations. As the majority of these techniques in one form or another are taught in most colleges of osteopathic medicine it should be easy to expand the application to involve all students from all schools in any clinical environment where appropriate approval has been granted for the administration of such procedures. These procedures are considered quite safe, with very low risk to the patient and can be administered without expert supervision. Clinical judgment is always indicated in determining the appropriateness of any given technique within the protocol and the duration of any given treatment session. Appropriate documentation of these procedures in both the D.O. and M.D. institutions will serve to expand an experiential database for clinical outcome studies. Also, with the appropriate support of the institutions, students who choose to administer OMT on a surreptitious basis can be converted to students administering OMT on a public, open, and accepted basis. This serves to enhance the image and effectiveness of the profession now and in the future.

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Accepted for Publication: March 2006

Address Correspondence to:

Robert C. Clark, DO
3243 Clayton Rd.
Concord, CA 94519
Email: osteopathywithdrbob@yahoo.com

or

Thomas M. McCombs, DO
TUCOM, Dept of OMM
1310 Johnson Lane
Vallejo, CA 94592
Email: tmccombs@touro.edu

Crohn's Disease: A Case Report including the most recent Theories and Treatment Principles

Deana Mitchell and Jerry L. Dickey

Introduction

Crohn's Disease is an inflammatory bowel disease that is idiopathic, chronic, and recurrent. It can affect any part of the gastrointestinal tract, but it is classically known for affecting the terminal ileum. It is characterized by an insidious onset of low-grade fever, diarrhea, cramping, right lower quadrant mass or tenderness. Often it can be confirmed with radiologic verification of ulceration, structuring, or fistulas. (Sartor, 2004). A strong genetic component has been linked to Crohn's disease, which may cause the immune system to work improperly in the gut. Current therapy involves corticosteroids, but they have only been effective in initiating remission for an attack. However, new therapies involving biological therapy have been promising, and will likely soon become the new standard of treatment for inflammatory bowel disease. The peak onset of the disease is around 20 to 40 years, and although research demonstrates a genetic component to this disease, the pattern is nonmendelian and complex.

Although the disease occurs equally in men and women, it can have a profound impact on women's healthcare. Women's issues involving Crohn's disease include body image, fertility, management during pregnancy, and osteoporosis (Sarathchandra, 2001). The patient in the case history below involves Ms. EN, who will have to deal with these unfortunate issues in her lifetime, and who likely already has in her 10 years of struggling with Crohn's. Carter et. al (2004) reports that, "The impact of IBD on society is disproportionably high, as presentation often occurs at a young age and has the potential to cause lifelong ill health" (p. vi). This report will detail the case history of Ms. EN, explain the disease process, as well as review the current literature regarding this topic.

Case Report

Ms. EN is a 30-year-old heterosexual Caucasian female with a chief complaint of muscle soreness and fatigue due to a recent flair of Crohn' s disease with a previous episode of cramping and diarrhea. The patient presents with an extensive history of chronic and remitting Crohn's Disease. She is a full time nanny, single, living in Dallas, Texas. This is her first evaluation by a UNTHSC third year medical student, Deana Mitchell. No other sources were available. The patient appeared to be cooperative, reliable, and rational.

History of the Present Illness

Ms. EN presented with cramping and diarrhea that started acutely two nights ago. She describes intense pain diffusely in her abdominal area, characterized as 10/10, as well as nausea and vomiting x3 during the course of the night. The patient states that her mouth began to dry out, with alternating feelings of being hot and cold. The patient describes becoming diaphoretic before the symptoms of cramping occurred. The cramping and diarrhea was constant, and lasted for about 12 hours. For treatment the patient took aspirin, but this did not help to alleviate the pain. Recently she has experienced several stressful life events, such as being terminated from her full-time job, loss of insurance, and other financial worries. She was not able to make her pain better. Ms. EN proceeded to the ER, where she was given IVsteroids of hydrocortisone, as well as pain medication of which she does not remember the name. She now presents with muscle tightness and soreness, especially in her thoracic, lumbar, and pelvic region that is characterized by an 8/10, which began to occur after her Crohn's attack.

Past Medical History

The patient is allergic to penicillin. The only medications, which she is taking regularly include Yasmin, Tegretol, and Pentasa 1 gram po qid. Her past medical history is significant for depression and a seizure disorder. Past surgeries include a lumpectomy in the left breast in 2003. She is a G1POO1O with a history of abnormal pap smears described as ASCUS. The patient has a previous history of HPV, but denies having any other STD's. Her periods are regular with a 28-day-cycle. Her family history is significant for Irritable Bowel Syndrome, which has been diagnosed in her grandmother, father, mother, and sister. The patient does not smoke, and has approximately 2-5 drinks per week. The patient denies any use of illegal substances.

Review of Systems

General Constitutional Symptoms: *No fever, chills, malaise.*

Skin: *No rashes or other changes.*

Head and Neck: *No history of head injury. History of periodic headaches, approximately one time per month, relieved by resting and aspirin.*

Eyes: *Wears contacts daily with a prescription of -6 and sees optometrist yearly.*

Ears: *No dizziness, discharge, or pain present.*

Nose: *Occasional respiratory infection, 1-2x a year with post-nasal drip. There is no problem reported with sense of smell.*

Mouth and Throat: *No soreness, change in voice, no difficulty eating or chewing food.*

Breasts: *No pain, discharge, nipple tenderness. Patient has had a lumpectomy in 2003, which showed benign fibrocystic changes.*

Cardiovascular: *No shortness of breath, chest pain, or difficulty performing activities, no pain, tenderness, discoloration, temperature change, or swelling in extremities.*

Chest and Lungs: *No history of asthma, bronchitis, or pneumonia. Patient has no breathing difficulties, cough, or pain.*

Endocrine: *No history of changes in thyroid, skin, hair, or temperature preference. No polyuria or polydipsia, and no history of diabetes.*

Lymphatic: *No known lymph node enlargement.*

Gastrointestinal: *10-year history of recurrent and remitting Crohn's Disease with cramping, diarrhea, and intense pain. Triggers to attacks include stressful life events, or spicy and irritating food. Past treatments have included pentasa, cortico steroids, B12 shots, and colestipol. The patient's last colonoscopy was conducted 6 years previously, which showed intense ulcerations and structuring of the terminal ileum. Neurologic: Patient has history of seizure disorder, which occur 1-2x a year. No history of motor or sensory symptoms. This is being controlled with Tegretol.*

Psychiatric: *Patient has a history of depression, which was controlled with Prozac for two years. The patient is not taking any antidepressants currently.*

Physical Examination

General Appearance: *Alert, oriented, cooperative, well groomed, communicates well*

Skin, Hair, Nails: *no lesions, tenderness, edema, erythema, no clubbing, brisk capillary refill, thick hair texture*

HEENT: *head normocephic, pupils are equal round, and reactive to light and accommodation, no AV nicking, exudates, Erythema, normal pearly gray tympanic membranes without exudates, no tenderness present over frontal or maxillary sinuses, trachea midline, thyroid not enlarged.*

Heart: *regular rate and rhythm without heaves, lifts, thrills, murmurs*

Lungs: *normal bronchio, bronchiovesicular, vesicular sounds, clear to auscultation bilaterally, no wheezes, normal anterioposterior diameter*

Abdomen: *flat abdomen, no masses, tenderness, no guarding or rigidity, normal bowel sounds heard in all four quadrants.*

Lymphatic: *cervical, supraclavicular lymph nodes not palpated*

Neuro: *+2DTR's in lower and upper extremity, cranial nerves II-XII intact, gross sensory and motor function normal, negative Romberg sign*

Musculoskeletal: *Restriction sidebending and rotating to the right, OA S_RR_L. C2-C7 R_LS_L. Ropy and tight over thoracics, especially the right side of T5-7. T1-T5 S_RR_L. T6-T7 S_LR_R. L1-L5 S_RR_L. Patient lateralized right with a left sacral shear and a right rotation on a right oblique axis with a negative spring test. Right anterior innominate.*

Therapy and Clinical Course

MS. EN had her first active disease of Crohn's in 1995. Her grandmother had just passed away, and the stress in her life was becoming intolerable. On her initial visit to the ER, the doctor sent her home with a diagnosis of "normal cramps." On subsequent visits to the ER, and with a confirmatory colonoscopy, the doctor was then able to make the diagnosis of Crohn's. The patient was then placed on steroids and was a prescribed Pentasa, and oral mesalamine agent. Ms. EN was slowly tapered off of steroids. She also changed her diet so that she did not eat spicy or fried foods, which irritated her condition.

Since her initial ER visit in 1995, Ms. EN has had approximately 10 attacks where she needed to be rushed to the ER due to intense pain, cramping, and diarrhea. Her last colonoscopy was six years ago in 1998. Ms. EN has elected not to take medication for her Crohn's, and to take care of acute attacks as they happen with steroids. She has not had insurance for the past three years, which is contributing to her decision to not manage her Crohn's with medication.

Osteopathic Considerations and Treatment

Although Crohn's is a genetic disorder with an immunological basis, somatic dysfunctions can be treated, the sympathetic and parasympathetic nervous systems addressed, along with lymphatic system. The goal of osteopathic treatment is to balance the autonomic nervous system, relieve lymphatic and venous congestion, and remove somatic dysfunctions for the patient. Kuchera (1994) describes the sympathetic innervations to the intestines: "Sympathetic innervation to the GI tract has its origin in cord segments T5-L2 ad innervates the intestines by way of the collateral sympathetic ganglia in the abdomen" (p. 112). Ms. EN did not have a non-neutral over this area, but it felt ropy and tight over her thoracics, especially the right side of T5-7. In order to balance the sympathetic nervous system, rib raising along with HVLA, soft tissue, and muscle energy was used to treat the thoracolumbar area. Also, inhibitory ventral abdominal techniques were utilized, along with mesenteric lift exercises. Parasympathetic innervation is supplied to the intestines via the vagus nerve. The left half of the colon and pelvis is supplied by the pelvic splanchnic nerves S2-S4 (Kuchera, 1994). For Ms. EN, the OA was treated, along with HVLA for her sacral shear and floating of the sacrum. The right anterior innominate was treated with muscle energy. Lymphatic techniques that were used including releasing the thoracic inlet and doming the diaphragm. During the course of one month, two OMM treatments were given to Ms. EN with satisfactory progress made. During this time she has not had a flare up of her Crohn's, and her thoracic somatic dysfunctions have gone from a 7/10 to a 3/10.

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Review of Literature

Crohn's Disease, as previously discussed, is an idiopathic inflammatory disease that can involve the entire gastrointestinal tract. Four factors have been described regarding the diagnosis of Crohn's, which include clinical symptoms, radiological, endoscopic, and histological signs. At present two of the four factors must be recognized before a diagnosis can be rendered. It is a difficult diagnosis because each patient can present differently, and it can be mistaken for many other disease processes (Sartor, 2004). The differential diagnosis includes infectious processes, medication complications, endocrine disorders, malabsorption syndromes, endometriosis, colonic ischemia, and irritable bowel syndrome (Sarathchandra, 2001).

It has been shown that 70% of patients have abdominal pain and diarrhea upon presentation. Other symptoms are fever, weight loss, and bleeding. Extraintestinal manifestations often include disease associated with joints, such as arthralgias and arthritis. Erythema nodosum, iredocyclitis, uveitis, and primary slcerosing colangitis have also been associated with inflammatory bowel disease. Complications of the disease involve obstruction, abscesses, fistulas, perianal disease, carcinoma, hemorrhage, leucopenia, lymphoma, and malabsorption syndromes, which can lead to anemia and osteoporosis (Sartor, 2004).

The disease process most commonly involves the terminal ileum, but in half of the cases the colon is also involved. It is described as a transmural process that can involve mucosal inflammation and aphthoid ulceration. The transmural representation involves aggregates of lymphoid hyperplasia, which can then lead to the formation of granulomas. Once in remission, the scarring and fibrosis can lead to strictures. The disease process is usually multifocal, which can lead to "skip lesions" and cobblestoning (Sartor, 2004, p. 409).

The pathogenesis of Crohn's Disease is still unclear, but many theories have been proposed. Dysregulation of the immune response of the gut has long been proposed to be the reason why inflammatory bowel disease occurs. Gordan and MacDonald (2003) believe that this dysregulation, "results in a strongly polarized mucosal CD4+ T helper cell 1 (Th1) response, characterized by increased production of the pro-inflammatory cytokines interleukin (IL)-2 interferon (INF) and tumor necrosis factor (TNF)- á." These authors further propose that in normal mucosal tissue, when these CD4 synthesized cells migrate to the lamina propina, they usually undergo apoptosis. In Crohn's however, they do not die and thus continue to secrete inflammatory cytokines. Furthermore, the text states that, "It appears that the normal negative regulatory function of TGFß1 in the gut is inoperative in Crohn's Disease (Gordan, 2003, p. 708).

The role of CD4 cells in Crohn's was first noticed when patients started to enter remission following the development of AIDS or after having a bone marrow transplant (Gordan, 2003). The introduction of harmful pathogens would need to occur to discover a dysfunctional immune system. Franchimont et al. (2004) states that, "Mounting evidence suggests a pivitol role of the enteric bacteria flora in the pathogenesis of inflammatory bowel disease" (p. 987). This suggests, of course, that there seems to be a disturbed host-bacterial reaction followed by an irregular and debilitating immunological response.

Many genes have been identified to suggest that variants are associated with Crohn's. Environmental triggers, such as infection or drugs, could be the cause of the disease in genetically susceptible people, but these triggers have not yet been identified. However, it does state in the literature that smoking is a trigger, as it increases one's risk of developing Crohn's. One such gene that could be the culprit codes for a pattern recognition receptor that can recognize and bind to lipopolysacchairdes (LPS) and peptidoglycans (PGN) from gram negative and gram-positive bacteria. A variant of this gene, NOD2/CARD15, is highly associated with Crohn's disease, and disrupt the recognition of LPS and PGN from bacteria. Franchimont et al. (2004) reports that, "Thus defects in LPS and/or PGN signaling seem to repair the innate mucosal immune response, essential to counteract early bacterial invasion, this leading to mucosal tissue destruction and chronic intestinal inflammation" (p. 987). The same article also found a connection between inflammatory bowel disease and a polymorphism in a LPS receptor TLR4, Asp299Gly. This receptor is important in recognizing LPS in gram negative bacteria, and has recently also found to be associated with decreased bronchial responses to bacteria (Franchimont et. al, 2004).

There have been many conventional, mainstay treatments for Crohns. These include nutritional therapy, antibiotics (metronidazole and ciprofloxin), probiotics, thiopurines such as azathioprine (AZA), and 6-mercaptopurine (6-MP), and 5-aminosalicyclic acid products such as Pentase and Sulfasalazine. Corticosteroids have been the mainstay of treatment for remission. However, according to Gordon, et. al (2003), "they are not effective in maintaining remission, do not promote mucosal healing or influence the natural history of Crohn's disease, and have significant side effects. Furthermore, approximately 30% of patients become steroid dependent within one year with a further 15% being steroid refractory" (p. 708).

A breakthrough therapy for patients with Crohn's is biological therapy. The premise of this is to use an agent that targets a specific immune pathway, by using monocolonal antibodies or small molecules. The targeted cytokine by biological therapy has been TNFα and this has been very successful. It is markedly elevated in Crohn's Disease and has a variety of immunological effects, such as activating macrophages, activating other cytokines, increasing adhesion molecule expression, and stimulating the activation of enzymes which are capable of mucosal destruction and ulcer formation. The drug name is Irifliximab, and it is an IgG antibody, which has the capability of binding to TNFα. It is capable of inducing remission of active disease, as well as promoting short-term healing of the mucosa and fistulating disease. It is now reserved for those with severe disease, or those whose disease is refractory to medication and other treatments (Gordon, 2003)

The popular belief that surgery is curative for Crohn's is a myth. Most often patients have to undergo multiple surgeries in their lifetime. Gordon, et. al (2003) has proclaimed that, "Over 60% of patients require surgery at some stage, following which, over 70% of patients have endoscopic evidence of recurrent disease at one year" (p. 708). Carter et. al (2004) states that, "In CD surgery is not curative and management is directed to minimizing the impact of disease" (p. v3). It further reports that within 10 years of having the disease 50% of patients will require surgery and 70-80% will need it within their lifetime.

A patient would most likely proceed to surgery for obstruction and pain. One would receive emergency surgery for Crohn's for failure to improve within five days of treatment, hemorrhage, toxic megacolon, obstruction, perforation, and peritonitis. Elective surgery would take place due to fistulas, abscesses, failure treatment, the inability to tolerate medication, dysplasia, or malignancy (Timothy, 2003).

Discussion and Summary

Much more research needs to go into the subject of Crohn's Disease. This includes how osteopathic OMT can affect the outcome of Crohn' s, especially in inducing and retaining remission. Such as in the case of Ms. EN, since she is not taking steroids or other medication to increase the probability of staying in remission, osteopathic OMT could prove to be beneficial in this cause. The discovery of biological therapy is very beneficial to patients with Crohn's because not only does it help suppress the immunological response, but it also seems to induce healing in the mucosa. Perhaps in the future it can be utilized in many more patients, and not just the ones with severe active diseases. Now that we are identifying specific genes, which transcribe aberrant receptor proteins, this condition may one day be treated with gene therapy, or with biological therapy which targets those specific receptors which seems to be awry in Crohn's.

Right now Ms. EN is in remission, and is not experiencing active disease. Until she can acquire insurance, she will treat each acute attack with emergency doctor visits and steroids. In the future she desires to take another colonoscopy to see how her disease has progressed, as well as take daily medication that may work to suppress her immune response. Until then, she will continue to control her disease with diet and OMT treatments. Ms. EN does not have a severe case of Crohn's, and thus far she has not required surgery to treat her illness. Unfortunately, this may change in the future because we know that Crohn's is a chronic and recurrent disease with non-curative therapies, which only serve to delay and repress the disease process.

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Accepted for Publication: March 2006

Address Correspondence to:

Deana Mitchell, OMS-III
4813 Dexter Ave.
Fort Worth, TX 76107
E-mail: docdea@sbcglobal.net

or

Jerry L. Dickey, DO, FAAO
UNTHSC/TCOM
Dept. of OMM
3500 Camp Bowie Blvd.
Fort Worth, TX 76107
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Component Societies' CME Calendar and other Osteopathic Affiliated Organizations

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2007

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Manipulation of Adhesive Capsulitis under Anesthesia

Jennifer Hurrell, Arthur J. Speece, and Stuart F. Williams

Introduction

Adhesive capsulitis is a syndrome of painful restriction of shoulder movement that results in global restriction of the glenohumeral joint often leading to prolonged pain and disability. Although many other terms have been applied to this condition such as frozen shoulder, periarthritis and adherent subacromial bursitis, adhesive capsulitis is considered the least misleading term, as it is derived from surgical findings of actual adherence of the capsule to the humeral head. Adhesive capsulitis can occur as either a primary or secondary disorder. The primary form is idiopathic, while the secondary form can be linked to a precipitating traumatic event or illness. The differential diagnosis for adhesive capsulitis is rather extensive, including arthritis, metastatic disease, referred pain from viscera, inflammatory disorders, rotator cuff pathology and fracture. Key history and physical exam findings aid the physician in making the diagnosis. The cardinal feature of adhesive capsulitis is a marked limitation in active and passive range of motion. The pain is generally unilateral, of subacute onset if it is primary and frequently worse at night. When testing range of motion the end point of passive motion feels firm, but not as much so as an anatomic barrier such as bone.

The natural history of adhesive capsulitis has been divided into three stages; the painful stage, the adhesive stage and the recovery stage. The first stage, the painful stage, consists of pain with movement, general ache, muscle spasm, night and rest pain. The second phase, the adhesive stage, involves a decrease in pain, but increased stiffness and restriction of movement with discomfort at extreme ranges of movement. Finally, in the recovery stage we see even less pain and marked restriction with gradual increase in range of motion and spontaneous recovery. The length of each phase varies widely, however, generally the painful stage lasts about 3-8 months, the adhesive stage may range from 4-12 months and the recovery stage lasts about 1-3 months. Although approximately 7-15 % of patients permanently lose their full range of motion, only a few have a true functional disability and many do not notice the limitation at all.

Many treatment options are available and in widespread use for patients with adhesive capsulitis although few have been proven effective in randomized controlled trials. Given the natural history of the disease most treatments are aimed at speeding recovery, limiting pain and improving motion outcomes. Therapy options include rest, analgesia, simple range-of-motion exercises, home exercises, physical therapy with mobilization; oral corticosteroids, corticosteroid injection, osteopathic manipulative therapy, capsular distention, manipulation under anesthesia, and arthroscopic capsular release. Manipulation under anesthesia is an advantageous way to perform manipulation techniques as the patient is relaxed and not guarded by pain. It is easier to feel and identify somatic dysfunction and loosen restrictions.

Case

A 47-year-old white male was injured three months ago while at work at a construction job. He is referred by another physician who up to this point has been managing the patient with conservative treatment such as physical therapy and medication. In the initial incident the patient was attempting to move a heavy checkout counter with a fellow worker. As they were moving the heavy, awkward object the other worker dropped his end and the patient felt an immediate pop in his shoulder, neck and low back. His pain began soon after the incident and was localized in his left shoulder, neck and low back with radiation and parasthesias from the low back down the right leg and from the neck down the left arm. The pain that was most debilitating to him at the time of his first visit was the low back pain. Palpation demonstrated a straight leg raise that was positive on the right at 40 degrees and positive on the left at 50 degrees. Pressure on top of his head increases the left arm pain. Consideration of epidural steroid injections due to his failure to improve with conservative treatment was the recommendation at his first visit. The patient agreed to consider this option and follow up soon. Patient returned 3 weeks later with the worst pain now located in his left shoulder especially with movement. He had very little active or passive motion on physical exam. The left shoulder pain had become debilitating, disturbing his sleep and making work impossible. The physician's plan for the patient was adjusted due to the development of severe limitation of the left shoulder overshadowing his back and neck pain. A steroid injection of the left shoulder with manipulation under anesthesia was recommended. One week later the patient returned for his first steroid injection in a series of three with manipulation of the teres minor, anterior and middle scalenes, first rib and articulation of the shoulder through a full range of motion under anesthesia. 5cc of

0.5% bupivacaine with 40mg of methylprednisolone was injected into the area of the left shoulder. The anterior and middle scalene and first rib were treated with ligamentous articular strain and inhibition, teres minor was treated with inhibition and the shoulder was

→

articulated through a full range of motion with some difficulty. The patient returned for the same treatment twice more at one month intervals, then a fourth treatment two months later. After each treatment, the patient reported decreased pain and improved range of motion. After the fourth treatment, his condition was nearly resolved but he will begin treatment on his low back, which remains painful.

Discussion

The use of shoulder manipulation under anesthesia in the treatment of adhesive capsulitis remains controversial. Some cite the risk of injury to the shoulder such as dislocation, fracture, nerve palsy, or rotator cuff tear as a deterrent to manipulation. A 1999 study by JP Reichmister from the Department of Orthopedic Surgery at Sinai Hospital evaluated 38 shoulder manipulations in 32 patients over 58 months and found that 97% of patients received relief of pain without injury.

Most studies have found that manipulation under anesthesia does speed recovery in the short term although there is no significant long-term difference when compared to the natural course. Due to the protracted course of adhesive capsulitis, any decrease in disability even in the short term will allow patients to resume as much of their daily activities as possible and spend less time away from work and in pain. Othman's 2002 study of 74 adhesive capsulitis patients found that manipulation under general anesthesia improves the range of more rapidly.

Sources differ as to whether steroid injections are effective. Bulgen, for example, has found that there is short-term benefit from injections into the joint, while Kivimaki compared manipulation under anesthesia with and without steroid injection and found that steroid injection did not produce an additional treatment effect. In other words, injections did not enhance the effect of manipulation.

Unfortunately there is little information on the use of specific osteopathic techniques under anesthesia as an adjunct to articulation of the shoulder through a full range of motion to loosen or break adhesions. A study of 29 elderly patients in 2002 did show that the use of the Spencer technique on non-sedated patients improved range of motion and decreased pain. No studies of specific osteopathic techniques for the shoulder under anesthesia were found. Many physical therapy and other techniques have been studied, no high-grade evidence has been produced to suggest one technique is superior to another. The limitations of the studies are often poor methodology and small sample sizes.

Manipulation of the shoulder can be offered to reduce pain and the level of disability in patients who fail conservative treatment. More studies are needed to produce a treatment algorithim for patients in different stages of the disease. Studies with larger populations and of specific osteopathic techniques would be extremely interesting. The addition of OMT to areas such as the teres minor, first rib and scalenes, which frequently have somatic dysfunction due to compensation for the limitation of the shoulder, is likely to provide added benefit with little additional risk. Our patient was functional with only slightly reduced motion and little shoulder pain at eight months.

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Accepted for Publication: March 2006

Address Correspondence to:

Jennifer Hurrell, OMS-III
UNTHSC / TCOM
3500 Camp Bowie Blvd.
Fort Worth, TX 76107

or

Arthur J. Speece, DO
3812 CR 530-B
Burleson, TX 76027
Email: mcdodi@earthlink.net

or

Stuart F. Willliams, DO
UNTHSC / TCOM
Dept. of OMM
3500 Camp Bowie Blvd.
Fort Worth, TX 76107
Email: docstuwms@yahoo.com

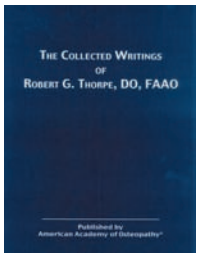
Book Reviews

Capobianco, John D. and Rivera-Martinez, Sonia (Editors): *The Collected Writings of Robert G. Thorpe, DO, FAAO.* Published by the American Academy of Osteopathy® , 2005. pp. 118, including Appendix and Index. Price: $35.00 plus s/h. Order on-line: www.academyofosteopathy.org/pub/cfm

King, Hollis H. (Editor): *Contributions to Osteopathic Literature—Myron C. Beal, DO, FAAO.* Published by the American Academy of Osteopathy®, 2006. 2005 AAO Yearbook: pp. 176. Price: $20.00 plus s/h. Order on-line: www.academyofosteopathy.org/pub/cfm

The state of New York has a distinguished history in the development of the osteopathic medical profession. The legislative battles of the late 19th and early 20th centuries are full of the determination to succeed in the establishment of rights for the new philosophy of practice. Throughout the years of the 20th century, foci of professional activity included the New York Osteopathic Clinic, the Postgraduate Institute of Osteopathic Medicine and Surgery, editorial supervision of the former journal *Osteopathic Annals* and the present programs of the New York College of Osteopathic Medicine/NYIT. These inclusions admittedly do not even scratch the surface of the value of numerous individual contributors.

In part, the latter consideration is addressed in the recent publication of the contributions of Robert G. Thorpe, DO, FAAO (1917-1999) and Myron C. Beal, DO, FAAO. The significance of each individual is perhaps best recognized by the editors of the respective volumes.



Robert G. Thorpe

"The year 1917 saw not only the passing on of the founder of the science of osteopathy, Andrew Taylor Still, but also the birth of one of the twentieth century's few osteopathic masters, Robert Grant Thorpe. Dr. Thorpe's inspiration and mentor was Roland Coryell, DO, a student of A.T. Still and graduate of the American School of Osteopathy in 1907. Dr. Coryell treated Thorpe's brother stricken with rheumatic fever who was abandoned and left for dead by the medical establishment of the day. Dr. Coryell saved his brother. Coryell's philosophy and methods as taught by the founder of osteopathy would also provide a bridge between Still and the twentieth century, leaving an indelible impression on young Thorpe.

Whether you realize it or not, by picking up this book you have entered into the world of Dr. Thorpe's musculoskeletal organ. In his world, the musculoskeletal system holds a central position that defines man. He refers to this system as the organ of behavior and action, for with it, our brain and mind become a person. In this capacity, the musculoskeletal organ is central to conceptual thought between our very being and our internal and external environments. It also becomes the protector in fight or flight. Further, he expands on the role of the musculoskeletal organ in relation to endocrine disease, stress, autonomic nervous system, infection and chronic disease. He fittingly describes the significance of the musculoskeletal organ, as without it, all other organ systems 'could do nothing but lie in a gelatinous heap and pulsate and quiver'. "

Myron C. Beal

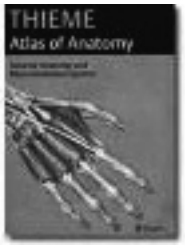
"For those of us who have observed the development of the osteopathic medical profession from the perspective of teachers, practitioners, and researchers of traditional osteopathic principles and practice, the name Myron C. Beal, DO, FAAO is well known and evokes feelings of respect and admiration. His osteopathic career has spanned the second half of the 20th Century and his contributions have served to propel the profession to the brink of 21st Century health care leadership.

Individually and in collaboration with others Dr. Beal was a pioneer in research related to validity and reliability issues particularly in palpatory diagnostic procedures. His publications on viscero-somatic reflexes are classics in this area central to one of the major contributions osteopathic medical practice is continuing to make in the understanding of the healing arts. Ever the proponent of solid research design, Dr. Beal appreciated the fullness of osteopathic philosophy in action by emphasizing palpatory skill in the osteopathic examination as an interaction between the patient and examiner. He appreciated the difference between sensing and perception, recognizing the mind body integration ever present in osteopathic philosophy and actualized in osteopathic education."

Read, savor and benefit in your practice and teaching from standing on the shoulders of these giants.

Book Review

Reviewer: Anthony G. Chila



Ross, Lawrence M. and Lamperti, Edward D. (Consulting Editors): *THIEME Atlas of Anatomy*. ©2006 Georg Thieme Verlag. Thieme New York, 333 Seventh Avenue, New York, NY 10001 USA. Pp. 541; 1694 Illustrations; 100 Tables. Price: $64.95 paperback; $119.95 hardback; order on-line: www.thieme.com or phone: 212/760-0888.

"……it was our intention to create an atlas that would guide students in their initial study of anatomy, stimulate their enthusiasm for this intriguing and vitally important subject, and provide a reliable reference for experienced students and professionals alike." In order to meet this goal, the creation of an entirely new set of illustrations began a task which required 8 years for completion. In the process, opinions and needs of students and lecturers were sought in Europe and the United States. The work of the original European authors (Michael Schünke, Erik Schulte, Udo Schumacher, Markus Voll, Karl Wesker) was reviewed by the United States consulting editors (Ross and Lamperti). This led to the next step, cooperation with the editors at Thieme, in making this resource available to North American students and professionals. In their words, the task for Ross and Lamperti was:

"….to review, for accuracy, the English edition of the *THIEME Atlas of Anatomy.* Our work involved a conversion of nomenclature to terms in common usage and some organizational changes to reflect pedagogical approaches in anatomy programs in North America. This task was eased greatly by the clear organization of the original text. In all of this, we have tried diligently to remain faithful to the intentions and insights of the original authors."

This atlas concerns itself with *General Anatomy* and *Musculoskeletal System.* The Contents consist of: *General Anatomy; Trunk Wall; Upper Limb; Lower Limb; Appendix (References, Index).* Any of these areas can be utilized as a study unto itself. The conceptual and organizational presentation of extensive information is coupled with the sound presentation of the contemporary knowledge base. The result is in fact a comprehensive educational resource. The superlative quality of illustrations sets this atlas well apart from similar efforts in this genre. Anatomical concepts are presented in a logical and progressive sequence. The liberal introduction of clinical concepts is facilitated through illustration, explanatory text and tabular summarization. This is what provides ease for integration by system and topography. Detail and aesthetics are not sacrificed.

Any given presentation in this atlas is displayed in 2 well-organized and visually pleasing pages. This is what facilitates easy access to and comprehension of the presentation. This also permits the incorporation of a numbering system which helps to guide progression through a given region. Two examples can be taken from the various sections to demonstrate:

General Anatomy---------8. General Neuroanatomy
- 5.5 Structure of a Spinal Cord Segment
- A. Structure of a spinal cord segment with its spinal nerve
- B. Spinal cord segment
- C. Topographical and functional organization of a spinal cord segment

The Trunk Wall----------2. Musculature: Functional Groups
- 1.1 The Muscles of the Trunk Wall, Their Origin and Function
- A. Trunk wall muscles in the strict sense
- B. Trunk wall muscles in the broad sense
- C. Muscles that migrated secondarily to the trunk wall
- D. Somites in a five-week-old human embryo
- E. Transverse sections through a six-week-old human embryo
- F. Diagram of the principal muscle groups in an eight-week-old human embryo

This atlas meets and exceeds all of the expectations of the original authors and the supporting efforts of the consulting editors. It is a superb product of publication from *Georg Thieme Verlag.* It sets a new standard for the discipline of anatomy. For the needs of educators, students and practitioners in the osteopathic medical profession, the traditional concepts of the profession and the basis for the art and practice of manipulative intervention are made clear: as clear as Andrew Taylor Still's insistence on retaining the "picture of normal anatomy in order to understand the presentation of the abnormal."

Elsewhere in Print

Shutting Down Alzheimer's

Michael S. Wolfe

The author is associate professor of neurology at Brigham and Women's Hospital and Harvard Medical School. His research activity focuses on understanding the molecular basis of Alzheimer's disease and identifying effective therapeutic strategies. He has recently founded the *Laboratory for Experimental Alzheimer Drugs* at Harvard Medical School. The effort here is toward development of promising molecules into drugs for Alzheimer's disease.

"The human brain is a remarkably complex organic computer, taking in a wide variety of sensory experiences, processing and storing this information, and recalling and integrating selected bits at the right moments. The destruction caused by Alzheimer's disease has been likened to the erasure of a hard drive, beginning with the most recent files and working backward. An initial sign of the disease is often the failure to recall events of the past few days—a phone conversation with a friend, a repairman's visit to the house—while recollections from long ago remain intact. As the illness progresses, however, the old as well as the new memories gradually disappear until even loved ones are no longer recognized. The fear of Alzheimer's stems not so much from anticipated physical pain and suffering but rather from the inexorable loss of a lifetime of memories that make up a person's very identity.

Unfortunately, the computer analogy breaks down: one cannot simply reboot the human brain and reload the files and programs."

Research focus is currently on the hypothesis that the peptide amyloid-beta (A-beta) is responsible for triggering the disruption and death of brain cells in Alzheimer's disease. One strategy is to seek clearance of toxic aggregates of A-beta from the brain. An approach involves inducing the patient's production of antibodies that recognize A-beta.

Scientific American. **Volume 294, Number 5; May 2006, 72-79.**

Toward Better Pain Control

Allan I. Basbaum and David Julius

Basbaum is professor and chair of the department of anatomy at the University of California, San Francisco. Julius is professor of cellular and molecular pharmacology at UCSF. The authors are often collaborators on studying the cellular and molecular mechanisms that underlie pain.

"Yet the most widely used analgesics today are essentially folk remedies that have served for centuries: morphine and other opiates derive from the opium poppy, and aspirin comes from willow bark. Although these treatments can give relief, each has its limitations. Aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs), such a ibuprofen, cannot ease the most severe types of discomfort. And even opiates, generally the strongest medicines, do not work for everyone. Moreover, they can have serious side effects, and patients tend to become tolerant to them, requiring escalating doses to get any relief at all."

Better understanding of the transmission of pain signals from cells and molecules is providing new targets for drugs under development. **Peripheral Targets.** Capsaicin receptor and ASIC (reduction of pain accompanying inflammation); TTX-resistant sodium channels (silencing of nociceptor signaling); Bradykinin receptor (easing of pain-related inflammation); Prostaglandin-producing enzymes (reduction of side effects; aspirin, ibuprofen, COX-2 inhibitors). **Spinal Cord Targets.** Calcium channels on noceptors (build on effects of existing drugs such as Neurontin and Prialt); NMDA receptors (impede transmission of pain signals by dorsal horn nerve cells; combat hypersensitivity of those cells); NK-1 receptors (use substance P to transport a toxin into dorsal horn cells).

Scientific American. **Volume 294, Number 6; June 2006, 60-67.**

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