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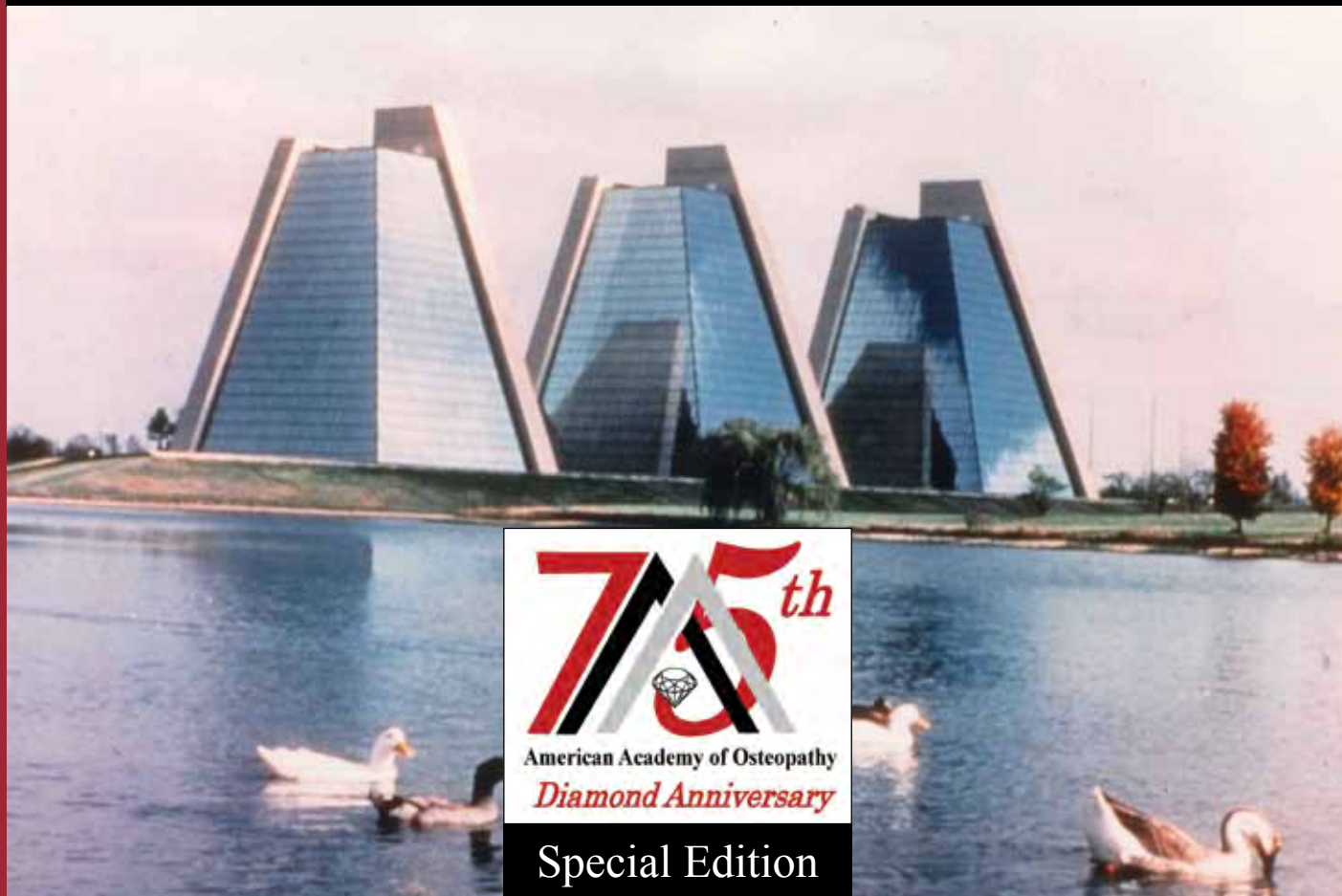
**FORUM FOR OSTEOPATHIC THOUGHT**

# JOURNAL

Official Publication of the American Academy of Osteopathy

**TRADITION SHAPES THE FUTURE**

**VOLUME 22 NUMBER 1 MARCH 2012**



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

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TRADITION SHAPES THE FUTURE • VOLUME 22 NUMBER 1 • MARCH 2012

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

#### IN THIS ISSUE:

AAO Calendar of Events ..... 8  
Component Society Calendar of Events ..... 91

#### REGULAR FEATURES:

View From the Pyramids ..... 4  
*Murray R. Berkowitz, DO, MA, MS, MPH*

#### ORIGINAL CONTRIBUTIONS:

The Ram of Reason Seal: Musings on its Origin and Meaning..... 9  
*Raymond J. Hraby, DO, MS, FAAO*  
What's in a Name? A Brief Look at the History of Board Certification in Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine ..... 12  
*Raymond J. Hraby, DO, MS, FAAO*

#### 75TH ANNIVERSARY HISTORICAL REPRINTS:

The Neural Basis of the Osteopathic Lesion..... 22  
*Irvin M. Korr, PhD*  
The Role of the Fasciae in the Maintenance of Structural Integrity ..... 31  
*Leon E. Page, DO*  
Osteopathic Rhythmic Resistive Duction Therapy ..... 36  
*T. J. Ruddy, MD, DO, DSc (Hon.), FOCO, FACOS*  
Reflex Relationships of Paravertebral Muscles ..... 48  
*John Nelson Elbe, PhD*  
Spontaneous Release by Positioning ..... 54  
*Lawrence Hugh Jones, DO*  
Structural Pelvic Function..... 63  
*Fred L. Mitchell, DO, FAAO*  
Respiratory and Circulatory Care: The Conceptual Model ..... 86

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# “Yesterday, Today, and Tomorrow” – a look at our past with a view toward our future

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

“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.**” (emphasis added)

I am honored and humbled to be the Scientific Editor (Editor-in-Chief) of the *American Academy of Osteopathy Journal* on the august occasion of the 75<sup>th</sup> anniversary of the Academy. As I considered what to include in our journal for this issue and how, I realized that I very much needed to look at where we’ve been, where we are now and where we may be headed (or possibly, *should* be headed). The title of the 1964 movie “Yesterday, Today, and Tomorrow” came to me. This movie came out when I was a young teenager, dare I say teenage boy, and was a “foreign film” starring the beautiful Sophia Loren. I then looked at how, as a then 40-year-old United States Air Force Lieutenant Colonel and aviator, I decided to apply to osteopathic medical schools. Flashing forward to today, as I was looking at material to include in this important milestone issue, I was drawn to many articles written and published in both this journal and elsewhere. I have previously stated in my editorials that I am following and standing on the shoulders of Anthony Chila, DO, FAAO; Robert Clark, DO, MS; and, most recently, Raymond J. Hraby, DO, MS, FAAO, as editors of this journal. As I looked at the older issues of the journal and the Yearbook, I further see that I am standing on luminaries such as Thomas L. Northup, DO, George W. Northup, DO, FAAO; Perrin T. Wilson, DO, and so many others. By this knowledge, I am even further humbled.

We all took the same Osteopathic Oath at the commencement ceremonies where we were awarded our DO degrees and assumed the mantle of Osteopathic Physician. The first sentence of the last paragraph of that oath states, “I will look with respect and esteem upon all those who have taught me my art.” I must give public

thanks and acknowledgement to David Boesler, DO, then Chairman of OMM at Des Moines, Scott Sutherland, DO; Donald D. Downing, DO, FAAO; and Gerald J. Cooper, DO, FAAO, FCA. These men were my first teachers of OMM. They introduced me to the science and art of osteopathic manipulation, and to the underlying osteopathic principles and practices of osteopathic medicine. They introduced me to how osteopathic manipulative treatment (OMT) plays a role in the overall thinking of the osteopathic physician as he/she provides comprehensive care to our patients, however and wherever they may present themselves to us. While each of these men contributed significantly to my journey in developing as an osteopathic physician, I was unable to see and understand all they presented to me at that time. Dave gave me an appreciation for the teachings of J. Gordon Zink, DO, FAAO, and understanding of the Common Compensatory Pattern (CCP). If you have never had the privilege of seeing Jerry Cooper treat a patient, all I can say is – masterful! He was the first to truly show me the power of “other than HVLA” in treating my patients with OMT. They gave me the foundation upon which to build, to learn and to grow. Thank you.

My DO degree in hand just gave me a “license to learn” (borrowing from my aviation credo). Many of my friends in this profession contributed to my further learning as an osteopathic physician. Herb Yates, DO, FAAO, and John Glover, DO, FAAO, furthered my abilities in Counterstrain. Herb is responsible for starting me on the path toward becoming an FAAO – a road upon which I am still traveling due to having to delay things for personal reasons. Herb, I promise to be back on that path again soon. Judith O’Connell, DO, FAAO, and Ann Habenicht, DO, FAAO, contributed significantly to my development in the fascia and to enhancing my palpatory skills. This prepared me to really be able to learn Osteopathy in the Cranial Field. I was fortunate to be able to study the basic

courses offered by both the Sutherland Cranial Teaching Foundation (SCTF) and the Cranial Academy. There were many teachers at these courses, but I most remember Wm. Thomas Crow, DO, FAAO; William Lemley, DO, FAAO; Laura Rampil, DO; Hugh Ettlinger, DO, FAAO; Jane Carreiro, DO; and Melicien Tettambel, DO, FAAO. Tommy not only taught me cranial techniques, but also ligamentous articular strain. Jane taught me how to better approach pediatric patients, especially infants. Melicien has tried to help me learn to develop patience within the osteopathic profession. That she has only been partially successful is my failing, not hers.

I was in the private practices of David Winter, DO, and Michael Porvaznik, DO, where I learned the “business” of operating a private osteopathic medical practice. Michael had one of the most crucial roles in my coming into the osteopathic profession – not only did he allow me to practice in his office, but he wrote my “DO letter” when I was applying to osteopathic medical school. He predicted that I would practice OMT/OMM – even before I was aware that I would do that, he knew. Along the way, I studied under, and became a disciple of, Richard L. Van Buskirk, DO, FAAO, and became a practitioner of the Still Techniques. Rich and I share a number of experiences outside of osteopathic medicine – thank you for all you have taught me and for being my friend, comrade and brother-in-arms (although at different times). Rich and I share some unique idiosyncrasies.

A few years ago, I came across the copy I made of my AACOMAS application before I mailed it. I re-read my handwritten essay (yes, handwritten) and saw that I had stated that I would love to teach osteopathic medicine later in my career. It happened earlier than I thought it would, but I am doing what I had hoped when I first applied to osteopathic medical school. Long before I joined the faculty at the Georgia campus of Philadelphia College of Osteopathic Medicine (GA-PCOM), my friend, practice partner and current Department Chair, Walter C. Ehrenfeuchter, DO, FAAO, increased my knowledge of Muscle Energy techniques. Walt is unbelievably light in his touch and hugely effective in his treatments. Years later, Walt called me to join him outside Atlanta and help him build the program at GA-PCOM, where I am currently a tenured Associate Professor, Director of the Family Medicine/OMM Clerkships, and Director of Preventive and Community-Based Medicine. I have the privilege of learning from him every day! He and I see a variety of “interesting” patients and treat very eclectically. I am honored to have patients come from all over to see me for a variety of ailments – I only wish I could have been successful with them all.

As a Des Moines graduate, I am steeped in the teachings of Zink and CCP. His work with the fascia and CCP,<sup>1,2,3</sup> along with his development of the Respiratory-Circulatory Model,<sup>4</sup> are significant both within the osteopathic profession and also referenced in other manual medicine and therapy professions. The Respiratory-Circulatory Model is one of the five models of manipulation (along with the Biomechanical, Neurological, Bioenergetic, and Biopsychosocial Models) in the osteopathic profession. Dr. Zink’s Respiratory-Circulatory Model paper is reprinted in this issue. As I looked further back regarding interest in the fascia, I happened upon a 1952 paper by Leon Page, DO, where he describes just how important the fascia is for maintaining the structural integrity.<sup>5</sup> As I read through Dr. Page’s paper, I kept thinking of “The Bodies” exhibition. Those of us who have seen that recall the exhibit showing the human fascia, and clearly seeing how it has the shape of the human body. Dr. Page presaged this exhibit by several decades.

This being the 75<sup>th</sup> Anniversary issue, I looked back at the 25<sup>th</sup> Anniversary issue (the *1962 Year Book of Selected Osteopathic Papers*). Therein, I found a number of interesting papers. Two papers by John Nelson Elbe, PhD, were reprints of papers from the *American Journal of Physiology*, originally published in 1960 and 1961, respectively.<sup>6,7</sup> Dr. Elbe’s latter paper is reprinted here. These papers provide basic science underpinnings for such osteopathic concepts as somatic reflexes, and also osteopathic techniques used in OMM/OMT such as Muscle Energy, later formalized by Fred Mitchell, Sr., DO, FAAO.

Dr. Elbe acknowledged the work of Irvin M. Korr, PhD, which led me to Dr. Korr’s many writings. In my opinion, Dr. Korr provided invaluable contributions to the basic science underpinning much in the osteopathic profession. His monumental works and contributions have been acknowledged and applauded far more than my insufficient praise can ever relate. This led me to consider which of his papers should be included here. I selected his treatise on “The Neural Basis of the Osteopathic Lesion”<sup>8</sup> which today would be known as “The Neural Basis of the Somatic Dysfunction.”

I mentioned earlier that Fred Mitchell, DO, FAAO, formalized the Muscle Energy techniques. His Muscle Energy treatise, ultimately becoming the definitive three-volume work by his son, Fred Mitchell, Jr., DO, FAAO, articulated the work originally published by T. J. Ruddy, MD, DO, DSc (Hon.), FOCO, FACOS, “Osteopathic Rhythmic Resistive Duction Therapy.”<sup>9</sup> Dr. Mitchell, Sr., made other contributions as well. He developed the model of the sacrum<sup>10</sup> that all osteopathic medical students learn as they come to understand the myriad of sacral

dysfunctions. In looking at the various techniques in OMM/OMT, Larry Jones, DO, FAAO's work in developing Counterstrain techniques is one of the major indirect techniques applied by osteopathic physicians. Dr. Jones's original paper, "Spontaneous Release by Positioning," appeared in the January 1964 issue of *The DO*. All of these seminal papers are reprinted in this 75<sup>th</sup> Anniversary issue.

As we are all aware, "Evidence-Based Medicine" has become the latest buzzword, and I think we can all agree that basing our treatment decisions on scientific evidence that supports our decision-making is completely rational and preferred. What is meant by "evidence" has changed over the years of both the osteopathic and the allopathic professions. Today, the gold standard for evidence has been the "double-blinded" (or "masked" for those in ophthalmology) placebo-controlled trials. Randomization and formal allocation to a "study" group and a "control" group, followed by statistical analyses, are the mainstays of developing "evidence." Many of our famous osteopathic physicians indeed performed studies with their patients. They treated some one way and some another ("study" vs. "control"?). They wrote that they treated thousands of patients. They often did this over the course of ten or twenty years or more. The problem is, we do not know exactly how many patients were treated in one way and how many in another. What was their "n" number? If we knew this, then their old studies would be acceptable by today's standards of evidence. Just think of where the osteopathic profession might be today if our forebears had only reported in the literature something like the following: "Over the past ten years I have seen 3,213 patients with low back pain. Out of these, I treated 1,602 with Muscle Energy, and treated the rest with Soft Tissue techniques. I found that ..."

We would be able to perform statistical studies. We could perform epidemiological studies. We could determine the strength of any associations. Unfortunately, in the first half of the twentieth century, the notions of evidence were not the same as they are today – not for either the osteopathic or the allopathic professions.

The osteopathic profession has taken great strides toward applying modern constructs of "evidence" to advancing the science underlying osteopathic medicine. Lisa Hodge, PhD, at the Osteopathic Research Center and University of North Texas Health Science Center has followed in the traditions of Dr. Korr. She and her colleagues, including Hollis H. King, DO, PhD, FAAO, and Scott Stoll, DO, PhD, have published a number of studies demonstrating the effects of lymphatic pump techniques.<sup>11,12,13,14</sup> These have been in high-impact basic science journals. The osteopathic profession has

begun initiatives in the area of patient-based research networks (PBRNs). The low back pain guidelines are published. Clinical research is expanding. The Osteopathic Research Center in Texas is not the only center to perform osteopathic-oriented research.

The osteopathic profession has long been researching better ways to improve the health and lives of our patients. We are applying the modern standards of evidence to our research. We are increasing our clinical research base. Raymond J. Hruby, DO, MS, FAAO, has written a concise history of board certification in Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine. This is particularly important for the osteopathic profession generally, and for this Academy. Applications to osteopathic medical schools are at an all-time high and increasing. Osteopathic medical school matriculations are increasing. We need to continue to develop more osteopathic graduate medical education opportunities. We need to continue to individualize the treatment of our patients as we treat them osteopathically. "Tomorrow" is almost here.

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- March 20** *The Legacy of Stanley Schiowitz, DO, FAAO: Facilitated Positional Release and Beyond*  
Dennis Dowling, DO, FAAO—The Galt House Hotel, Louisville, KY
- March 21-25** *The Unified Osteopathic Field Theory, AAO 75<sup>th</sup> Anniversary Convocation*  
Kenneth J. Lossing, DO—The Galt House Hotel, Louisville, KY
- April 20-22** *Beginning Percussion Vibrator Course*—Rajiv Yadava, DO; Richard Koss, DO  
TCOM, Fort Worth, TX
- June 8-10** *Exercise Prescription: Greenman's Method*—Brad Sandler, DO  
South Pointe Hospital, Warrensville Heights, OH
- July 7-8** Board of Trustees Meeting—The Pyramids, Indianapolis, IN
- July 20-22** *Osteopathic Considerations in Systemic Dysfunction: Common Clinical Problems*  
Hugh Ettlinger, DO, FAAO; Michael Kuchera, DO, FAAO—NYCOM, Old Westbury, NY
- August 4-5** Education Committee Meeting—University Place Conference Center & Hotel, Indianapolis, IN
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- August 10-12** *Myofascial Trigger Points*  
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# The Ram of Reason Seal: Musings on its Origin and Meaning

Raymond J. Hruby, DO, MS, FAAO

The American Academy of Osteopathy (AAO) has long used a Ram's head as its official seal. Members of the AAO are familiar with this icon, seen prominently on the AAO Web site, and on Academy publications such as the AAO Yearbooks, program brochures and letterhead. It is also featured on the medallion proudly worn by Fellows of the AAO.

But what do we know about the AAO Ram's head seal? Why was it chosen? What does it mean? How long has it been in existence? As the reader will soon see, some of these questions are difficult to answer, as the information remains obscure. But a little digging does produce some facts and insight, and sheds some light on the subject.

The ram figure is no stranger to most cultures. The astrological sign Aries is the most familiar connection to the symbol of the ram. Aries is the first of the twelve Zodiac signs and represents rebirth and renewal, signaling the start of the vernal equinox. This association is not unique to astrology; the ram figures prominently in a diverse range of mythologies, including Pharoanic Egypt, pre-Christian Europe, Classical Greece, West Africa, and the Judeo-Christian tradition, and it is often associated with celebrations of the "solar return" or return of spring and fertility after the hiatus of winter.<sup>1</sup> In various contexts, the ram has been seen as a symbol representing such qualities and characteristics as sacrifice, breakthrough, achievement, virility, creativity, the sun and solar power.<sup>2</sup>

For the AAO, the use of the ram's head seal originates with Dr. Andrew Taylor Still himself. In his autobiography,<sup>3</sup> Dr. Still devotes almost the entire text of Chapter 31 to the recounting of a dream in which he had an encounter with a ram. This encounter proved to be a life-changing event for him.

Given that this event is described in Chapter 31 of a 33-chapter autobiography, it would seem that Dr. Still is looking back on his life. In his "first life," as he calls it, he describes several business ventures that proved financially disastrous for him. He had reached a point in his life where he had not only lost money, but had also lost confidence in himself. He was physically and mentally exhausted, and he sat down under a tree to sleep. As he slept, he dreamt that an old ram jolted him on the side of the head, and was about to jolt him again (Figure 1). To escape, Dr. Still climbed up the tree, whereupon he found a label that



*Figure 1: Dr. Still about to be jolted by the Ram of Reason.*



*Figure 2: The Ram of Reason, as shown on page 433 of Autobiography of A. T. Still, 1897.*

circled the trunk of the tree. The label read, "This is the tree of Knowledge, in whose shade all persons have received that instruction that was necessary to each individual's success in life, without which no man has ever succeeded."<sup>3</sup> Looking around, he saw there were many labels on the tree, arranged alphabetically. After some searching, he chose a label marked "success," which gave him the information he needed to succeed beyond all his previous expectations.

Thus, it would seem that Dr. Still's encounter with the ram in his dream would logically lead to the choice of the ram's head as a seal for the AAO. Oddly enough, although we commonly refer to it as the "Ram of Reason," Dr. Still does not use this term in the text of his chapter. The only

place where the phrase occurs is as a caption for a ram's head figure that appears on page 433 of the autobiography (Figure 2).

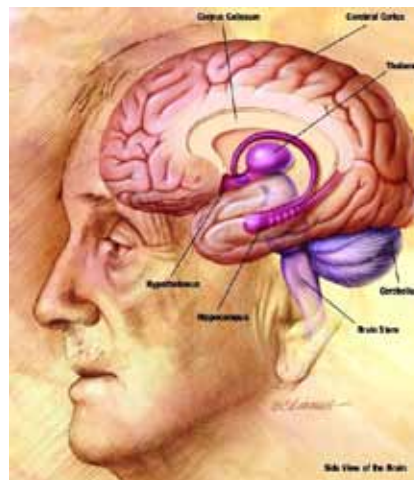
The actual timeline for the adoption and use of the ram's head seal is not clear. The seal commonly appeared on the covers of the annual AAO Yearbooks, with the earliest appearance on the 1954 Yearbook.<sup>4</sup> Thus, the seal was obviously adopted sometime between 1938 (the year the AAO was founded) and 1954.

*[As an interesting side note, the 1954 AAO Yearbook is listed as the "tenth anniversary issue." Could the seal have been designed and adopted around this time so that its use on the cover of the Yearbook from this time forward would coincide with the publication of the tenth anniversary issue of the Yearbook? In addition, the 1954 Yearbook marks the inaugural appearance of The Yearbook Index, arranged first by subject and then by author. Regular index issues of the Yearbook have been published since that time.]*

John P. Goodridge, DO, reports the following information regarding the AAO seal: "The Ram on the Academy's seal was designed by Reginald Platt, Jr., DO. He designed it 'long before he was introduced to the cranial concept. He apparently picked it up from Still's writings. The idea of the ram's horns coiling and uncoiling like the ram's on the seal. When he saw the crooked horn on the ram in the photograph, he remarked on how it fit the cranial concept.' When his son Reginald Platt, III, DO, remarked 'that it didn't look quite right from an artistic point, [his father] decided to stay with it because it fit the cranial concept so well.'"<sup>5</sup>

The reference to the "ram's horns coiling and uncoiling" and the cranial concept may seem cryptic, but is easily explained. In describing the embryological development of the brain relative to the Primary Respiratory Mechanism (PRM), Harold I. Magoun, DO,<sup>6</sup> notes the following: "Proliferation of the [cerebral] cortex occurs in all directions, giving a bean shape to the hemispheres. Anterior growth is limited by the frontal bone, hence the hemispheres curl like a ram's horn in their development, moving superiorly (frontal lobe), posteriorly (parietal lobe), inferiorly (occipital lobe and anterolaterally (temporal lobe))." (Figure 3).

Dr. Platt, Jr. wished to incorporate this "message" into the AAO seal. Thus, the original ram's head seal depicted one ram horn as curled and the other as uncurled, signifying the curling and uncurling of the brain during motion of the PRM (Figure 4). At a later time, probably in the mid-to-late 1980s, the seal was modernized to its present form (Figure 5).



**Figure 3:** The ram's horn development of the cerebral cortex.



**Figure 4:** Original depiction of the AAO ram's head seal.



**Figure 5:** Current depiction of the AAO ram's head seal.

There is much more that could be known about the timeline for the origin and development of the AAO ram's head seal. Perhaps further research into the AAO archives can help. Perhaps there are members of the AAO who could shed more light on this subject. We would welcome such input to complete the story of the American Academy of Osteopathy's ram's head seal.

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*Accepted for publication:* January 2012

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# What's in a Name? A Brief Look at the History of Board Certification in Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine

Raymond J. Hruby, DO, MS, FAAO

## Introduction

The opportunity to become certified in what is now known as Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine (NMM/OMM) has been available to members of the osteopathic profession in the United States since 1977. But how did this process come about in the first place, and why? How has it grown and developed over the years to its present status? This article is an attempt to chronicle the history and development of certification in NMM/OMM, in hopes that it will bring some clarity to a process that has been, and sometimes still is, misunderstood and misinterpreted.

## Formation of the American Academy of Osteopathy

During the late 1920s and early 1930s, there was a growing perception among groups of osteopathic physicians that there was a serious decline in the use of osteopathic manipulative treatment (OMT). Out of an interest in stimulating a renaissance in the development, research and use of OMT, sectional groups interested in OMT met during the American Osteopathic Association (AOA) conventions. A section devoted to the study and treatment of foot problems, and another interested in treatment of the sacroiliac region, were two of the most prominent groups. They were not approved by the AOA at that time, but always secured a room away from the convention program where they could meet. These sections were well attended.<sup>1</sup> There was also another organized group during that time that called itself the Society of Sacroiliac Technicians.

The American Academy of Osteopathy (AAO) began in 1937 as the Osteopathic Manipulative Therapeutic and Clinical Research Association. It was during that year that Thomas L. Northup, DO, wrote to 135 members of the AOA, inviting them to a breakfast meeting on July 6, 1937. Sixty-three attended the meeting, which preceded the AOA convention. Dr. Northup presided and stated that “his purpose was to initiate the combining of clinical experience and practice into some written form . . . and (emphasized) the need for a section or an organization of the American Osteopathic Association, not just a technic

or technical section. (He stated the) purpose would be to develop, investigate, and perpetuate the considerations of osteopathic philosophy and practice, which needed to be preserved. His original support for this idea came from members of the Society of Sacroiliac Technicians.”<sup>1</sup>

The group petitioned the AOA for affiliation of its newly-formed association, known as The Osteopathic Manipulative Therapeutic and Clinical Research Association, with the AOA. Its purposes were:

1. Banding together those who are primarily interested in manipulative therapy.
2. Exchange of experiences and ideas relative to manipulative therapy.
3. Collecting and studying clinical reports of cases treated primarily by manipulative therapy.
4. Disseminating among its members the results of its discussions and research investigations as it applies to manipulative therapy.
5. Recording for publication and further study the experiences of men who have been long in practice and have relied for their results principally on manipulative therapy

The petition stipulated that only AOA members would be accepted as members of this new organization, and its section would be a pre-convention meeting and “only registered convention visitors” would be admitted. The petition was signed by 62 AOA members.<sup>2</sup>

In the next few days, the AOA granted a “one year provisional approval of the section of manipulative therapeutics.” The newly-affiliated association selected a committee to put on the program for the 1938 AOA Convention in Cincinnati, and a committee to draft objectives and aims for the association.<sup>3</sup> At the 1938 Cincinnati section meeting, the “sponsoring and supporting” group, the Osteopathic Manipulative Therapeutic and Clinical Research Association, adopted its General Objects and Purposes.<sup>4</sup>

Meetings of this organization continued on an annual basis. In 1942, the Society of Sacroiliac Technicians dissolved for its members to join the Osteopathic Manipulative Therapeutics and Clinical Research Association. In 1943, the name was changed to the Academy of Applied Osteopathy, and in 1970, the name was changed to the organization's current name, the American Academy of Osteopathy.

### **Development of a Certification Process**

The AAO continued to flourish. However, as time went on, there was a perceived need to find a way to recognize those DOs who had achieved the highest levels of expertise in the field of OMT. A meeting was held in 1958 to study and establish the Fellowship program of the American Academy of Osteopathy (FAAO). The program was to recognize DOs with special proficiency in manipulative skills, and to encourage others to improve their skills. In the 1959 AAO Directory, the report by President Allan Eggleston contained the following paragraph:

A proposal was presented to the Board of Governors of the Academy, and to a special committee of the Advisory Board for Osteopathic Specialists, for the formation of a new certifying board called the 'American Osteopathic Board of Manipulative Arts and Sciences.' The proposal was made by a group of osteopathic physicians headed by Dr. T.F. Schooley, Phoenix, Arizona. Proposals for certification in the field of manipulative therapy have been studied for several years with no success in reaching agreement relative to the propriety and value of such a program. Those favoring such a step contend that there must be established a means of recognizing and accrediting the members of the profession who have developed a high degree of knowledge and skill in the field, and whose practices are based principally upon the structural approach. Those opposed to certification in the field contend that the manipulative application of osteopathic principles is basic to every osteopathic physician's approach to the problems presented by his patients, and certification of this basic and fundamental aspect of osteopathy would be improper and would limit the profession. All who have studied the matter are in agreement that a means must be established for recognizing outstanding ability in the field.

In 1960, the committee presented detailed recommendations for the functioning of the American Osteopathic Board on Fellowship of the Academy of Applied Osteopathy (AOBFAAO), which was adopted by the Academy Board of Governors and the American

Osteopathic Association's Board of Trustees. The fellowship was described as an "earned" fellowship because it required certain prerequisites, including a 5,000-word written thesis, and oral and written examinations.

The proceedings of the Academy's annual business meeting in Hawaii in November 1971 reported the adoption of a resolution that the President of the American Academy of Osteopathy appoint three members of the Board of Governors, and requested the President of the American Osteopathic Association appoint three members of the Board of Trustees of the AOA to constitute a joint committee to determine the steps necessary to obtain a certification program in osteopathic manipulative medicine. Drs. David Heilig and John Goodridge attended the 1972 AOA Board of Trustees meeting, and spoke to the reference committee to promote raising the FAAO to the level of board certification in the AOA. The resolution was not approved at that time. However, on July 14, 1977, the AOA approved Resolution 60, establishing certification of the FAAO. The Board on Fellowship (FAAO) was now an AOA Board under AOA control.

The AOA asked for a name change of the board in 1983. After surveying the Fellows on their choice of several options, the Academy submitted the name "American Board on Osteopathic Manipulative Medicine," that was approved by the American Osteopathic Association's Board of Trustees in July 1984. Members received AOA membership cards that year stating they were certified in OMM. Somehow, this name change led the American College of General Practitioners in Osteopathic Medicine and Surgery (ACGPOMS), the largest affiliated group in the AOA, to raise concerns. Their concerns were: 1) that designating a certain segment of the profession as being "certified" in osteopathic principles and methods would lead other members of the profession not so designated to feel disenfranchised, and thus fractionate the profession, and 2) that certification of some segment of DOs as specialists (FAAO) would lead to difficulties with reimbursement for the use of OMT by those DOs who were not certified. For reasons still unclear, the AOA requested the name of the board be changed back to the original AOBFAAO, and this was agreed upon by the AAO.

In 1988, physicians emphasizing sports medicine in their practices requested certification by the AOA. The AOA Board of Trustees at this time did not want to establish more certifying boards within the profession. Their response to the sports medicine group was that they should organize an earned fellowship program like that of the AAO without AOA certification. When the leadership of the AAO pointed out that the AOBFAAO was indeed a certifying board, and had been treated as such since the

passage of Resolution 60 in 1977,<sup>3,4,5</sup> the AOA Board of Trustees put forth the argument that the 1977 AOA Board of Trustees did not intend to establish the AOBFAAO as a certifying board.

On October 28, 1988, a joint AOA/AAO meeting in Chicago was called by the AOA President for the purpose of resolving this issue. However, such a resolution was not forthcoming. “At this meeting, a position of the current [1988] AOA Board of Trustees was made abundantly clear. This current 1988 AOA Board of Trustees believed that the 1977 AOA Board of Trustees did not intend to establish the American Osteopathic Board on Fellowship of the American Academy as a certifying board.”<sup>6</sup>

Resolution 76 was generated at the March 1989 AOA Board of Trustees meeting. It would have eliminated AOA certification of the earned FAAO and returned certification to the Academy’s control. At the Academy Convocation in Phoenix on March 28, 1989, Resolution 76 was declared not acceptable to the Academy Board of Governors and a letter, dated March 30, 1989, and signed by AAO President Barbara Briner, DO, was sent to AOA President Marcelino Oliva requesting an April 1989 meeting with the President, President-Elect, Immediate Past President, Chair of the Department of Educational Affairs, Chair of the Department of Professional Affairs, and the Executive Director of the AOA “to gain understanding of this action #76” as the Academy’s Board of Governors find some aspects of Resolution 76 “remain obscure.”

An Ad Hoc Committee of the AAO met in Washington, DC, with the top three AOA officers and the AOA Executive Director in April 1989. No progress was made toward resolving the disagreement between the AAO and the AOA at this meeting, and it seemed clear the AOA Board of Trustees was prepared to vote on Resolution 76 at their July 1989 meeting.

The Ad Hoc Committee of the AAO requested a special meeting of the AAO Board of Governors. This meeting took place in Cincinnati on June 17, 1989. Two motions were passed:

1. “Move adoption of the recommendation of the Ad Hoc Committee to draft a substitute to Resolution 76 to be submitted to the AOA Board of Trustees and a resolution to be submitted to the House of Delegates to reaffirm the action of the AOA Board of Trustees in the 1977 development of the American Osteopathic Board on Fellowship of the American Academy of Osteopathy.”<sup>7</sup>
2. “Move the Board of Governors authorize the Ad Hoc Committee to take all legal steps necessary to

reaffirm the status of the [AOBFAAO] as a certifying Board of the AOA.”<sup>7</sup>

After the special Board of Governors meeting in Cincinnati, the AAO Ad Hoc Committee prepared resolutions to be submitted to the AOA House of Delegates at their meeting in July 1989. Representing the AAO at this meeting were Drs. Richard Darby, Barbara Briner, and Raymond J. Hruby, who were the Immediate Past President, President, and President-Elect of the AAO, respectively.

In July 1989, when asked at the Nashville meeting of the AOA Board and House of Delegates by the AOA President and later the AOA Executive Director if there was any room for negotiating, Dr. Briner answered “No. We’ll take it to a vote.”<sup>8</sup> However, after further negotiation by Drs. Briner and Hruby with the AOA President and Executive Director, an agreement was reached whereby the AAO would withdraw its resolutions to the House and Board, and the AOA Board of Trustees would initiate a resolution to reconsider Resolution 76. The vote on this matter was successful.

The AOA then appointed a joint AOA/AAO committee to continue discussions, and a meeting occurred on September 30, 1989, in Chicago. Representing the AAO, Drs. Briner, Hruby and Darby, along with AAO Executive Director Richard Dyson, met with Drs. William Voss, Gil Bucholz, Mary Burnett and Donald Krpan, along with AOA Executive Director John Perrin. Based on meetings, correspondence and discussions up to this point, the following topics were to be discussed:

1. The continued existence of the AOBFAAO as a full certifying board of the AOA.
2. Restructuring of the OMM residency process.
3. Concerns regarding the potential for difficulties in reimbursement for OMT of DOs not deemed certified in OMM.
4. Concerns regarding potential fractionating of the profession if a certain segment of DOs were deemed certified in OMM.

During this meeting, the AOA representatives presented two overarching concerns on their behalf:

1. The process of earning Fellowship in the AAO should be separated from the process of becoming certified in OMM. The AOA representatives pointed out that all other specialty colleges within the osteopathic profession had a certifying board that reported directly to the AOA Board of Trustees, and that the AOA’s main concern was to have oversight

over certification within the profession. Fellowship in a specialty college, whether earned or honorary, was a process left to officers of the specialty college itself, and was awarded only after certification in that specialty by the AOA Board of Trustees.

2. OMM residencies needed to be upgraded to meet standards similar to other AOA specialties. At that time, OMM residency consisted of one year of specialized training in OMM following successful completion of an AOA-approved internship. All other AOA-accredited residency programs consisted of at least two years of post-internship training. The AOA wished to see that OMM residents had at least two years of OPP-oriented post-internship training, and further, that this training included OPP aspects of areas including medicine, surgery, pediatrics and other such disciplines, to ensure that certified OMM specialists maintained a high degree of general medical knowledge and skill, as well as OPP expertise. At the same time, they also desired (as did the AAO representatives) to maintain a pathway for DOs trained in other specialties to achieve certification in OMM.

After a long but congenial meeting, all of the above issues were resolved with the following proposals:

1. The AOBFAAO would be terminated and replaced with a new board, which would be known as the American Osteopathic Board of Special Proficiency in Osteopathic Manipulative Medicine (AOBSPOMM). This new board would continue, as did the AOBFAAO, to be a full certifying board of the AOA and report directly to the AOA Board of Trustees.
2. Fellowship in the AAO could still be offered by way of having the AAO appoint a Committee on Fellowship, which would function within the AAO itself, similar to other AOA specialty colleges offering fellowship.
3. The name “American Osteopathic Board of Special Proficiency in Osteopathic Manipulative Medicine” was felt to be one that would not confuse the issue of reimbursement for OMT for DOs, whether certified or not, and would be far less likely to produce feelings of fractionation or disenfranchisement among members of the profession.
4. A plan (see Appendix A) was agreed upon that would establish a) a two-year, post-internship residency in OMM, leading directly to eligibility for certification by the AOBSPOMM; b) a one-year residency in OMM for any DO who completed an

AOA-approved residency in orthopedics, general practice, internal medicine or pediatrics (this later became known as the “Plus One” program and was available to qualified DOs from any specialty field), which would also allow for eligibility for certification by the AOBSPOMM; and c) a practice track leading to AOBSPOMM certification, available to any DO who had met internship and residency requirements and been in practice for a specified length of time and met other requirements, such as CME hours in OMM/OPP.

Subsequently, these recommendations were approved by the AOA and AAO Boards of Trustees. In March 1990, one of Dr. Hruby’s first acts as then-President of the AAO was to initiate the changes outlined above.<sup>9</sup>

### **The Next Phase**

The AOBSPOMM and the Committee on Fellowship of the AAO functioned quite well. In time, however, it became clear that the use of “special proficiency” as part of the name of the certifying board produced difficulties. The term was often misunderstood, both within and outside the osteopathic profession. Specifically, it was often interpreted as being a certificate of added qualification rather than a full certification.

In an attempt to resolve this problem, the AOBSPOMM voted to change the name of the certifying board to the American Osteopathic Board of Osteopathic Manipulative Medicine (AOBOMM). This request was submitted to, and approved by, the AOA’s Bureau of Osteopathic Specialists. However, because the AOA Committee on Basic Documents of Affiliated Organizations raised concerns, the AOA Board of Trustees disapproved the recommendation, and appointed a special task force to study the matter and make further recommendations at a later time.<sup>10</sup>

The special task force considered a number of objections, not only to the requested name change, but also to the existence of a certifying board for OMM. Many of the objections were similar to those that were resolved at the September 30, 1989, meeting, and many of these objections were again raised on behalf of the ACGPOMS. Another issue included this time, though, was a proposal by the AAO to allow allopathic physicians (MDs) to complete AOA-approved residencies in OMM, and receive a credential (not a certification) indicating special proficiency in OMM. Resolution of this topic, however, was considered to be dependent on any final resolution regarding OMM certification, and so did not receive nearly as much attention by the special task force.

After several meetings and much discussion, it seemed that the situation could, in the last analysis, be resolved by adopting a different name for the OMM certifying board than that proposed by the AAO (i.e., American Osteopathic Board of Osteopathic Manipulative Medicine). It appeared all concerns and objections could be alleviated by having the certifying board **not** use the words “osteopathic manipulative medicine” in its name. The American College of Osteopathic Family Physicians (ACOFP) [Note: *The ACGPOMS changed its name to the American College of Osteopathic Family Physicians in 1993*] seemed particularly comfortable with this solution. Summarizing the situation in a memo to the AAO Executive Director dated May 13, 1998, Boyd Buser, DO, made the following comment:

“...I would suggest consideration of a change of the name of our certifying board to the American Osteopathic Board of Musculoskeletal Medicine or some similar designation that does not use the phrase ‘osteopathic treatment’ or ‘osteopathic manipulative medicine.’ This may better describe our practice focus and also remove some of the emotional objection of the ACOFP. If this will allow us to maintain jurisdiction for general certification

and preservation of our residency programs, it would seem a small price to pay.”

The reader is referred to Appendix B, the May 7, 1998, AAO white paper on certification in OMM and training of MDs in OMM, for more complete description of the issues facing the special task force.

In May 1998, a by-mail vote of the members of the AOBSPOMM approved changing the name of the certifying board to the American Osteopathic Board of Neuromusculoskeletal Medicine. After approval by the AAO Board of Trustees and Board of Governors, and eventual approval by the AOA Board of Trustees, the final name of the board was the American Osteopathic Board of Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine (AOBNMM/OMM). This is the name under which the board currently continues to operate. Certification granted is in Neuromusculoskeletal Medicine and Osteopathic Manipulative Medicine (NMM/OMM).

The road to certification in OMM has been a long and convoluted one. Nevertheless, the AOBNMM/OMM is thriving, and has become a recognized influential force in the promotion of the integration of osteopathic principles and practice into all aspects of the osteopathic profession.



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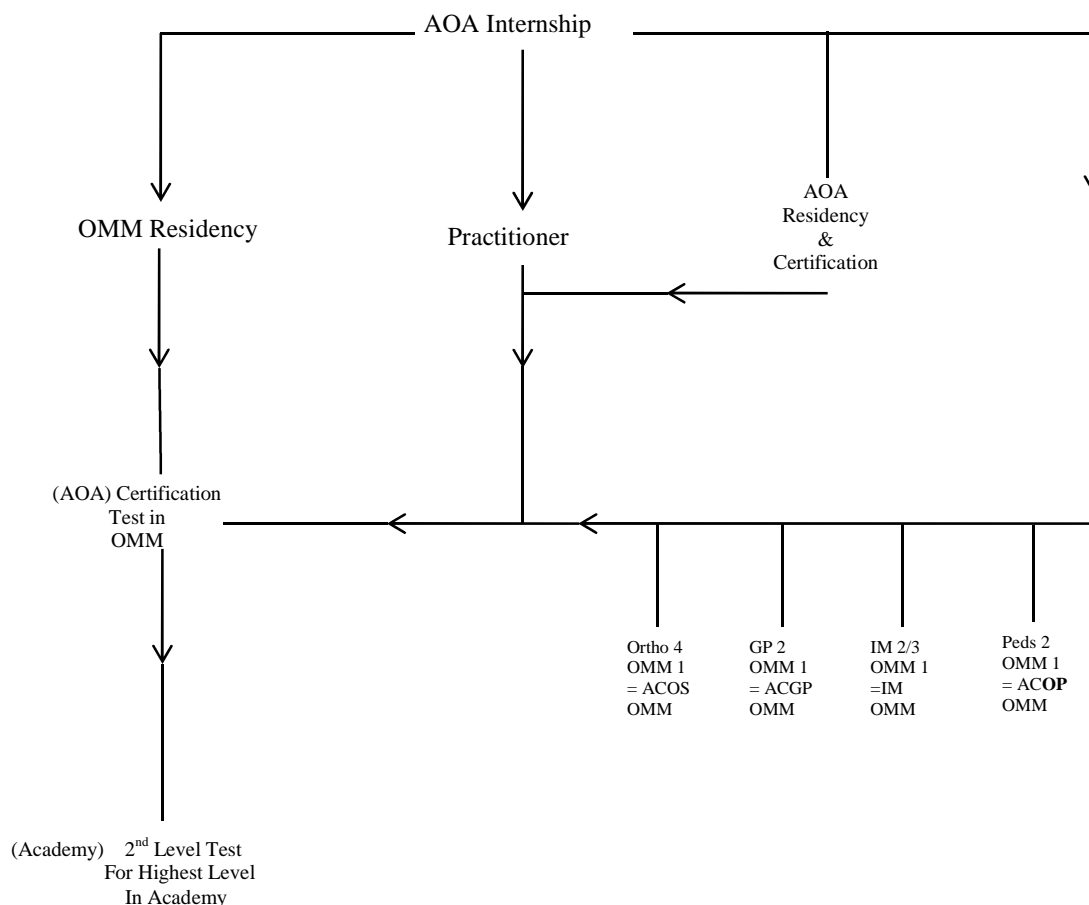
*Accepted for publication:* February 2012

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## Appendix A

### Proposed Pathways to OMM Certification September 30, 1989



# Appendix B

## “White Paper”

### The American Academy of Osteopathy

The American Academy of Osteopathy is one of 22 practice affiliates of the American Osteopathic Association in Chicago, the parent organization of the osteopathic profession. All osteopathic physicians (DOs) are educated in the basic principles of osteopathy, and are trained in the use of osteopathic manipulative treatment (OMT) as part of the curriculum in colleges of osteopathic medicine and postdoctoral training in AOA-approved institutions. The most recent demographic data illustrate that over 50 percent of AAO members are osteopathic family physicians, with the remainder integrating OMM in a variety of osteopathic medical specialties, the majority of those being specialists in osteopathic manipulative medicine (OMM).

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

### Certification

The Academy fully recognizes and supports certification granted by all of the AOA's 18 certifying boards. However, the Academy has special interest in the American Osteopathic Board of Special Proficiency in Osteopathic Manipulative Medicine (AOBSPOMM), and annually nominates candidates to serve on this certifying board for appointment by the AOA President.

AOBSPOMM was established in 1990 by the AOA Board of Trustees and granted the jurisdiction for general certification in “special proficiency osteopathic manipulative medicine.” Currently, the Board provides two pathways for certification in OMM—either through completion of a two-year residency in OMM or via a five-year practice requirement accompanied by 250 hours of continuing medical education (CME). The AOBSPOMM has examined and recommended for certification a total of 195 osteopathic physicians since 1990.

The years of postdoctoral training (internship/residency) and private practice influence the manner in which each individual expresses his/her practice of osteopathic medicine. In order to recognize extraordinary proficiency in osteopathic manipulative medicine, the AOA created the AOBSPOMM. This certifying board conducts an application and examination process, which enables the individual DO to demonstrate his/her special proficiency in an area of practice. This certification of special proficiency in osteopathic manipulative medicine is conferred by the AOA.

### AOBSPOMM Name Change

In the fall of 1997, the AOBSPOMM voted to change the name of the certifying board to the American Osteopathic Board of Manipulative Medicine (AOBMM) and submitted the change to the AOA's Bureau of Osteopathic Specialists. However, the AOA Board of Trustees disapproved the Bureau's recommendation at its February 1998 meeting with this explanatory statement: “The name change is not well understood by this Committee (on Basic Documents of Affiliated Organizations) and we need additional information, review and discussion before taking positive action on this request.” Subsequent to the Board's February meeting, AOA President Howard Levine appointed a special task force to study the matter and make a recommendation to the Board at the July 1998 meeting.

### Academy's Position

The Academy's Board of Trustees endorses the recommended name change to AOBMM. The rationale for this support includes, but is not limited to, the following points:

1. the inclusion of “special proficiency” in the name of the certifying board and individual physician's certificate has been widely misunderstood, both within and outside of the osteopathic profession, by some even being interpreted as a certificate of added qualification rather than the earned general certification. This is critical for those DOs who hold only general certification in OMM, especially complicated by the fact that there is no corresponding certification available in the allopathic community;

2. OMM-certified clinical faculty in the departments of osteopathic manipulative medicine in the nation's colleges of osteopathic medicine (COMs) should have their earned credentials recognized on the same level as their fellow faculty members, i.e., certified in OMM. Accreditation standards for COMs stipulate that "The department/divisional chair must have proven experience in teaching and academic leadership in a medical education setting. In the primary care disciplines, faculty must be *AOA Board-certified osteopathic physicians*." (emphasis added);
3. OMM-certified staff clinicians in departments of osteopathic manipulative medicine in the nation's AOA-accredited health care institutions should have their earned credentials recognized on the same level as their fellow DO medical staff members, i.e., certified in OMM. This is parallel to DOs who are certified in internal medicine, but also in cardiology, gastroenterology, etc. Further parallel are those DOs certified in general surgery, but also in thoracic surgery, urological surgery, etc.;
4. OMM-certified DOs who limit their practice to the federally recognized specialty of osteopathic manipulative medicine deserve to have their earned credential unequivocally recognized as general certification within their own profession;
5. Standards for the accreditation of Osteopathic Postdoctoral Training Institutions (OPTI) dictate that there be a provision "for the integration of osteopathic principles and practices (OPP) throughout all AOA postdoctoral programs approved within the OPTI in accordance with specialty college basic standards requirements." Leaders within the osteopathic profession are discussing the addition of a requirement that every OPTI have an OMM residency training program to ensure the integration of OPP into these postdoctoral programs. OMM-certified DOs are currently providing for this integration and will become increasingly in demand by OPTIs to fulfill this requirement.

### Objections from AOA Practice Affiliates

As AOBSPOMM has advanced the name change, there has emerged vocal opposition from a number of individuals and selected AOA practice affiliates. Some opponents have alleged that the change will be divisive within the osteopathic medical profession and have issued informal challenges to the change. However, up to this time, neither the AOBSPOMM nor the Academy have received any written objection to the change, with the exception of the Committee on Basic Documents of Affiliated Organization's explanatory statement to support its recommendation at the February 1998 AOA Board of Trustees meeting. Although the AOBSPOMM and the Academy have previously placed in writing their rationale for the change, the AAO now responds to the informal challenges received to date.

Challenge #1: The deletion of "special proficiency" will limit the delivery of OMT in the hospital and managed care plans to OMM-certified DOs.

AAO Response: During the years of pre-doctoral training, all future osteopathic physicians are taught the philosophy, sciences and art of their profession. A core exposure to, and preparation in, the various models of osteopathic manipulative medicine is central to this educational process. At the time of conferring the DO degree, each new Doctor of Osteopathy has been prepared to undertake the distinctive practice of osteopathic medicine. By virtue of their degree and licensure, all DOs are qualified to utilize OMT in the care of their patients, both inpatient and outpatient.

It is true that some AOA-accredited hospitals have chosen to require OMM certification as a pre-requisite for providing inpatient *specialty-level consultations* in osteopathic manipulative medicine. It is also true that some DOs who limit their practices to OMM have applied for and been granted "specialist" recognition in managed care plans.

However, the Academy strongly opposes the limitation of the appropriate utilization of OMT by any DO, and has assisted many AAO members in appealing the denial of such utilization. The Academy advocates the right of osteopathic family physicians to deliver OMT to their hospitalized patients. The AAO further advocates training for all staff physicians in the use of the osteopathic musculoskeletal examination of the hospitalized patient, and the delivery of OMT in the treatment of the somatic components of the patient's disease/condition. Finally, the Academy offers assistance to all AOA practice affiliates as they promote increased utilization of osteopathic diagnosis and OMT in the delivery of health care to patients, regardless of the point of service.

Challenge #2: The deletion of "special proficiency" will create a two-tier level of reimbursement for OMT by third-party payors.

AAO Response: By virtue of earning the DO degree, all osteopathic physicians are trained in osteopathic diagnosis and OMT and should be equally reimbursed for these unique services. The Academy opposes all efforts by third-party payors to limit the utilization of, and reimbursement for, OMT by any DO in the treatment of patients.

In the American Medical Association's CPT Manual, there are five codes to categorize the delivery of OMT in patient care: 98925-98929. Academy representatives have served the AOA in a collaborative leadership capacity to advocate for the inclusion of OMT codes in CPT, and for determination and preservation of relative work values for these codes with the federal Health Care Financing Administration. There has never been an occasion when the Academy or its representatives have advocated for anything but a single level of reimbursement for OMT services. Rather, the Academy has worked for all DOs in promoting equitable physician payment policy.

Consider the recent data generated by the Health Care Financing Administration regarding 1996 Medicare program billing for evaluation and management services (E&M) and OMT on the same date of service. The data show that 69 percent of the OMT services in the sample file were delivered by general/family practice physicians, with the remaining 31 percent being delivered by various osteopathic specialty physicians (16 percent by OMM specialists).

Challenge #3: The deletion of "special proficiency" will infer the osteopathic profession's support for peer review of DOs to be conducted only by OMM-certified DOs.

AAO Response: The AOA maintains two positions on peer review. First adopted in 1981, and most recently reaffirmed in 1994, one states that "all peer review under the peer review organization program of osteopathic diagnosis and therapeutics be performed by osteopathic physicians." The other, adopted in 1996, further states that the AOA "supports peer review of osteopathic physicians, where feasible, by other osteopathic physicians who have earned the same AOA certification credentials."

The Academy fully supports both of these AOA positions. However, at the request of its members, the Academy also strongly advocates a position to third-party payors that only OMM-certified DOs should conduct definitive peer review on other DOs who limit their practices to OMM. The Academy believes that this position is consistent with the 1996 AOA policy.

Challenge #4: The deletion of "special proficiency" will diminish the recognition of OMT expertise earned by DOs via the American Osteopathic Board of Family Physicians (AOBFP).

AAO Response: The Academy compliments the AOBFP for inclusion of an OMT component in its certifying examinations, and highly recommends similar action by the other 16 AOA certifying boards. However, the Academy does not believe that the name change will adversely affect the recognition of expertise in OMT delivered by family physicians any more than AOA certification in obstetrics, dermatology, cardiology, etc., diminishes the opportunity for family physicians to deliver babies, surgically remove skin lesions, manage patients' congestive heart failure, etc.

The fact of the matter is that certification in family practice is recognition of "special proficiency" in managing the general health care needs of all patients in the family. Certification in OMM recognizes "special proficiency" in the knowledge and use of osteopathic principles in the diagnosis and management of health problems with special emphasis on the role of the neuromusculoskeletal system in health and disease.

Challenge #5: OMM-certified physicians are specialists and should not be treating the general medical needs of patients.

AAO Response: First of all, OMM-certified physicians are certainly capable of managing the total health care of their patients. As of April 1998, the AOA physician master file data shows that there are 256 OMM-certified osteopathic physicians (of that number, 109 are also certified in family practice and 12 more are also certified in other AOA specialties). Hence, there are 135 DOs who hold only their AOA primary certification in OMM.

DOs who limit their practice to OMM are legitimately practicing a federally-recognized specialty, which is appropriately defined in basic documents approved by the AOA Board of Trustees, e.g., the *Basic Standards for Residency Training in Osteopathic Manipulative Medicine* and the *Glossary of Osteopathic Terminology*.

The Academy is on record in advocating that OMM is a primary care specialty. In fact, in its reports to the federal government, the AOA aggregates OMM-certified physicians with other primary care physicians. OMM, by its very nature, is primary care medicine as defined in the *Basic Standards for Residency Training in Osteopathic Manipulative*

*Medicine*. The definition, as found in Article II, A, states: “Osteopathic manipulative medicine is that component of medicine concerned with the implementation of that part of the osteopathic philosophy, which emphasizes the interaction of body systems as a principle tenet for understanding the total body as an integrated unit...”

In terms of primary care, this means the practicing OMM physician cares for the entire person, with a special emphasis on the neuromusculoskeletal system. The article further states, “Such knowledge and skill is not confined, therefore, to the care of specially-selected patients, but also includes the neuromusculoskeletal factors important for consideration in the *management of every patient* (emphasis added).

Physicians who limit their practices to OMM typically refer the management of the general health needs of their patients back to the family physician, just as other specialists within the osteopathic profession do.

The Academy advocates the integration of OPP and OMT into all AOA specialty training, and offers assistance to all AOA practice affiliates who wish to deliver CME programs which promote increased utilization of OMT by their members. OMM-certified DOs who are specialists (e.g., internal medicine, orthopedic medicine, OB/GYN, preventive medicine, etc.), by virtue of their degree and additional certification in OMM, should not be limited in their application and utilization of OPP and OMT in their practices.

### Graduate Medical Education and Credentialing for Allopathic Physicians (MDs)

For many years, the Academy has noted an increased interest in OMM on the part of allopathic physicians. Hence, the AAO presented a resolution to the AOA House of Delegates in July 1993 which called for the delegates to authorize the Academy to “propose a mechanism whereby allopathic physicians and surgeons may take post-doctoral training in OMM, which leads to appropriate credentialing by the AOA through AOBSPOMM.” The House of Delegates approved that resolution.

Subsequently, the Academy developed such a mechanism and presented it to the July 1994 AOA House of Delegates, which referred the matter to the AOA Bureau of Professional Education. From July 1994 through February 1996, the Academy’s leadership presented this mechanism and revised the proposal as requested by the Bureau of Professional Education, Council on Postdoctoral Training and Bureau of Osteopathic Specialists. Ultimately, the AOA Board of Trustees approved the mechanism at its February 1996 meeting, resulting in the required revisions in the *Basic Standards for Residency Training in Osteopathic Manipulative Medicine*.

Over a year later, the Bureau of Osteopathic Specialists considered required revisions in the AOBSPOMM Constitution and Bylaws necessary for examination and awarding a “credential” in special proficiency in OMM to MDs who had completed OMM residency training. There was opposition to the AOBSPOMM changes by individual members of the Bureau. Hence, in July 1997, the Bureau recommended that the matter be studied thoroughly by the Academy and the objecting parties before implementation.

The Bureau of Osteopathic Specialists recommended to the AOA Board of Trustees in February 1998 that the AOA President establish a special task force to study the matter and review all AOA policies which may be affected by such revisions. The Board of Trustees approved the resolution. However, the Board also rescinded its February 1996 approval of the mechanism to enroll MDs in OMM residency training.

### AAO Position

The Academy supports changes in the AOA’s basic documents which would permit enrollment of MDs in OMM residency training and examination of MD graduates of these residencies for a “credential” of special proficiency in OMM. The rationale for the Academy’s position is well documented in written public testimony and transcripts of the procedures at various AOA meetings. The Academy has sent a comprehensive, chronological set of documents to the AOA Special Task Force on OMT Certification and Credentials.

The Academy has no hidden agenda on these matters. The AAO leadership took the matter to the 1993 AOA House of Delegates and received approval to proceed. In 1994, the AOA House of Delegates approved the initial proposed mechanism and referred it to the appropriate AOA bodies for review. Everything has been out in the open and modified to accommodate concerns expressed by various AOA bodies.

# The neural basis of the osteopathic lesion\*† (1947)

Four of the main principles in osteopathy appear to be:

1. Joints and their supports are subject to anatomic and functional derangements.

2. These derangements have distant as well as local effects.

3. They are related, directly or indirectly, to other pathologic influences.

4. They may be recognized, and their local and distant effects influenced favorably by manipulation.

Accepting the existence of joint derangements (osteopathic lesions), it is our purpose in this paper to examine not the mechanical and etiological factors involved, but rather the fundamental basis for principles 2 and 3 and to a small extent principle 4, and to report progress in our understanding thereof.

The osteopathic lesion has many aspects which are partly revealed in the local and distant effects referred to as principle 2. Included among these are:

1. Hyperesthesia, especially of the muscles and vertebrae.

2. Hyperirritability, reflected in altered muscular activity and in altered states of muscular contraction.

3. Changes in tissue texture of muscle, connective tissue, and skin.

4. Changes in local circulation and in the exchange between blood and tissues.

5. Altered visceral and other autonomic functions.

How are these effects produced? What are the central factors responsible for these manifestations of structural and postural abnormalities? What in the intrinsic nature of the osteopathic lesion is the basis for the peripheral, palpable, and clinical effects? What fundamental changes take place as a result of effective manipulative therapy?

\*Presented before the Teaching Group on Osteopathic Principles, Diagnosis and Therapeutics at the Fifty-First Annual Convention of the American Osteopathic Association, Chicago, July 21, 1947.

†The research on which this paper is based was made possible by grants from the Research Committee of the American Osteopathic Association.

The detailed answers to these questions are, of course, not yet available, but reliably indicated are the general nature of the final answer and the direction in which we must proceed in order to obtain it. The research program of the Kirksville laboratories is designed to procure some of these answers through exploration of the intimate mechanisms involved in the osteopathic lesion. We believe that the answers are obtainable only through fundamental, experimental research and that the emerging concept of the lesion and its implications will have considerable impact on the practice of osteopathy.

In this paper will be presented some of our current views, some of the practical implications, and some speculations. The details of the experimental methods and the raw data, available in earlier publications,<sup>1,2</sup> will not be presented, but rather the general experimental approach and the immediate conclusions therefrom. From these, in turn, will be drawn some generalizations.

## The neural basis of the osteopathic lesion

Within the nervous system, in the phenomena of excitation and inhibition of nerve cells, and in synaptic and myoneural transmission, lie the answers to some of the most important theoretical and practical osteopathic problems. The existence of a neural basis for the lesion has been known, of course, for a long time. The segmental relation of the osteopathic lesion to its somatic and visceral effects is explainable in no other way.

The activity and condition of the tissues and organs are directly influenced, through excitation and inhibition, by the efferent nerves which emerge from the central nervous system and which conduct impulses to these tissues and organs (Fig. 1). For example:

### Muscle.

- A. Anterior horn cells (Motor neurons) — muscular contraction

- B. Lateral horn cells (Sympathetic

preganglionic neurons through postganglionic neurons) — vasomotor activity

### Skin.

- C. Lateral horn cells — vasomotor activity

- D. Lateral horn cells — sweat gland secretion

- E. Lateral horn cells — piloerection

### Viscera.

- F. Lateral horn cells — smooth muscle contraction

- G. Lateral horn cells — glandular secretion

- H. Lateral horn cells — vasomotor activity

The activity of these organs and cells is directly determined by the activity of their motor nerves. This nerve activity is measured in terms of: (a) The number of impulses conducted by each efferent nerve fiber and (b) the number of fibers involved. Thus, in the absence of impulses in the corresponding motor nerve, a muscle is completely at rest. The amount of contraction (tension produced or degree of shortening) at any moment is in proportion to the number of motoneurons which are conducting impulses at that moment and the average number of impulses per second which each is conducting to the muscle. With certain modifications this principle also applies to organs other than muscle. Abnormalities in these organs are produced by overactivity or underactivity of the efferent nerves.

## Secondary effects of neural imbalance

It is important to emphasize, however, that not all the effects of overactivity or underactivity of the efferent neurons are direct and immediate. Secondary effects often assume preponderant importance. Thus, a muscle's overactivity, over a long period of time, may result in fibrosis and major chemical and metabolic changes; underactivity, in atrophy. Overactivity of sympathetic fibers which control arterioles may result in local anoxemia, inflammation, altered capillary permeability, edema, etc. Imbalance in the efferent neurons controlling the smooth musculature of the gastrointestinal tract may result in flaccidity or spasm with serious effects on digestion and ab-

sorption and, therefore, on the entire body economy. Overactivity or underactivity of the neurons controlling glands may result in disastrous shifts in acid-base, fluid, and electrolyte balance and in such conditions as peptic ulcers. If the gland happens to be one of the endocrines, the effects may be especially serious and extensive. We may for the present purpose include the spinothalamic fibers among the "efferent" neurons. These convey pain sensations to the brain and, when overactive, produce not only physical but also important psychological changes with potentially serious and extensive changes in motor and visceral activity. With the crucial importance of the efferent neurons in mind, more precise formulation of the problem is possible. There are three main questions:

1. What factors control the activity, i.e., the number of impulses, in the efferent nerve fibers?

2. How does structural abnormality, i.e., the osteopathic lesion, play upon these factors to produce overactivity or underactivity of these fibers and, therefore, of the organs which they innervate?

3. How does manipulative therapy play upon these factors to restore balance and cause regression of signs and symptoms?

#### Factors controlling efferent activity

Let us proceed to the first question. What factors has physiological research demonstrated to be primary in the control of activity of the efferent neurons? Two main principles have special pertinence here.

A. The principle of reciprocity states that through the network of interneurons (also known as internuncial neurons, intercalated neurons, and connector neurons), which is situated within the central nervous system, every neuron potentially influences, and is influenced by, almost every other neuron in the body.<sup>3</sup>

B. The principle of convergence states that many nerve fibers converge upon, and synapse with, each motoneuron. These presynaptic fibers convey impulses from a large variety of sources to the efferent neuron which, therefore, represents a final common path.<sup>4</sup>

Let us examine how these principles operate with respect to the anterior horn cells, keeping in mind

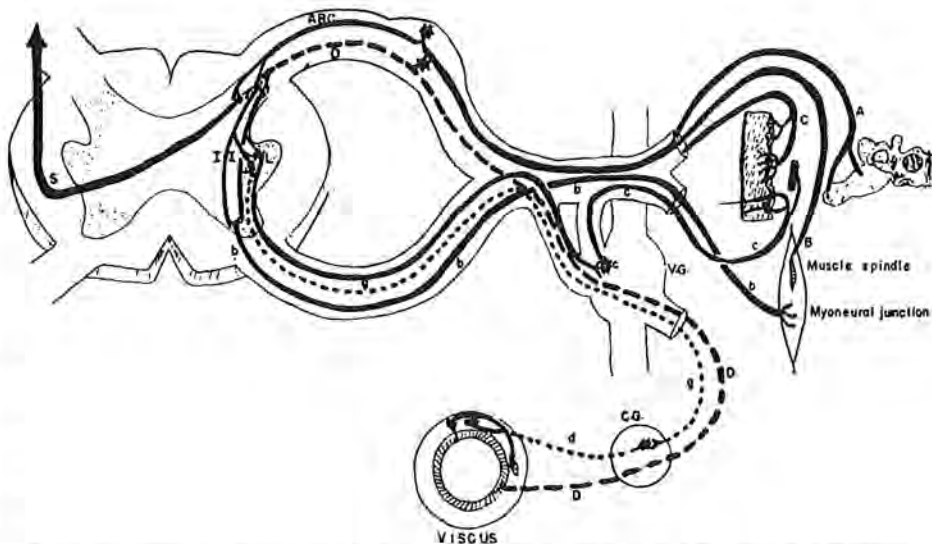


Fig. 1.—Diagrammatic representation of segmental reflex pathways among somatic and visceral afferents and efferents.

Afferents (Dorsal root neurons):

A—From spinous process, joints; B—From stretch and tension receptors (proprioceptors) in muscles and tendons; C—From touch, pressure and pain endings in skin; D—From viscera; ABC—Somatic afferents.

Efferents: b—motoneurons to skeletal muscle; c—sympathetic postganglionic neurons to blood vessels of skin and muscle; to sweat glands and pilomotor muscles of skin; d—sympathetic postganglionic neurons to visceral smooth muscle, blood vessels and glands; S—Spinothalamic fibers; I—Interneurons; L—Lateral horn cells (sympathetic preganglionic neurons); V.G.—Vertebral ganglion; C.G.—Collateral ganglion.

that they probably operate in a similar fashion upon the other efferent neurons (Fig. 1).

1. Each anterior horn cell receives impulses from a large number of sources through the presynaptic fibers which converge upon and synapse with it. All the descending tracts in the spinal cord, conveying impulses from such sources as the cerebral cortex, red nucleus, medulla oblongata, the vestibular nuclei, cerebellum, the pons, superior colliculi, and other higher centers, establish synaptic connections with the anterior horn cell for the mediation of voluntary motion, equilibrium, postural reflexes, visuospatial reflexes, and others. The proprioceptors, stretch and tension receptors situated in the tendons and in the muscles themselves, are a steady and continuous source of impulses. They exert their influence directly through the dorsal root fibers into which they discharge their impulses or, indirectly, through the higher postural and equilibrium centers. Afferent fibers from the viscera may also play an important role. In fact, every afferent nerve fiber, whether it mediates touch, pain, pressure, temperature, sight, or any other sense modality, exerts influence upon the final common

path represented by the motor nerves.

2. Some of the converging fibers exert an excitatory influence, others an inhibitory influence on the same motoneurons.

3. The activity of the motoneuron at any moment, that is, the frequency with which it delivers impulses to the muscle fibers, represents a dynamic balance among all the excitatory and inhibitory influences being exerted by the many neurons which converge upon it. The proprioceptors and some of the higher centers, through their steady, tonic control, act as governors or buffers. The balance, however, is shifted from moment to moment in accordance with changes in the internal and external environment and in response to volition. As previously stated, pathology results when the balance is shifted too far in one direction or the other (excitation or inhibition) for too long.

4. The collective action of the presynaptic nerve fibers upon the final common path is further reflected in the phenomena known to physiologists as reinforcement and facilitation. Before the anterior horn cell can discharge impulses into the muscle fibers, it must itself receive excitatory impulses simultaneously from a number of presynaptic fibers.<sup>5</sup> Stated

another way: Before a given stimulus (e.g., to the skin) can produce a reflex muscular response, the anterior horn cell must first be "warmed up" or "put on edge" (facilitated) by impulses from other (excitatory) fibers which synapse with it. The efferent neuron must already be in a state of subthreshold or subliminal excitation. In other words, the various fibers converging upon a given group of motoneurons must cooperate (reinforce each other) in order to open the final common path leading to the muscle. In a whole nerve it has been demonstrated that a considerable portion of the nerve fibers must be in a state of subliminal excitation before *any* of them fire and cause muscular contraction.<sup>6</sup>

5. This requirement serves as a margin of safety or an insulation, preventing muscles from responding to every impulse which reaches the anterior horn cell.

6. When a significant percentage of the anterior horn cells in a given segment of the spinal cord is maintained in a state of subliminal excitation, they require little additional stimulus to produce a reflex response. This is reflected in our frequent use of the terms "on edge," "jumpy," "tense," which imply motor aspects of psychic imbalance. In individuals thus characterized the anterior horn cells are maintained close to, or at, threshold, even during rest.

#### **The osteopathic lesion and the factors controlling efferent activity**

The second question in our series of three was "What is the relation of the osteopathic lesion to the above factors?" How do anatomic and functional derangements of the joints and their supports operate on these factors to produce seriously altered activity of the efferent neurons? Considerable light is being thrown upon this problem by the research in progress at Kirksville College of Osteopathy and Surgery under the directorship of Dr. J. S. Denslow. The research has revealed close relations between lesion mechanisms and certain well-established physiological principles. The general experimental approaches and the major conclusions from each are presented in the following section.

### **Experimental**

#### *Reflex threshold.*

Denslow,<sup>1</sup> proceeding from the observation made by all osteopathic physicians that pressure to the spinous processes of lesioned segments produces much more contraction in the spinal extensor muscles, and with less pressure, than is true at non-lesioned segments, set out to determine in a precise, objective manner how much pressure is required at each spinous process to elicit reflex contraction of the spinal extensor at the same level. In other words, his object was to determine whether, and to what degree, lesioned segments were distinguished from the normal by differences in reflex threshold.

Muscular activity was determined electromyographically, that is, by recording the electrical signs of muscular activity. Measured pressure stimuli were applied to the spinous processes by means of a calibrated pressure meter which simulated the action of the osteopathic thumb. At each segment gradually increasing pressure stimuli were applied to the spinous process until just detectable activity in the erector spinae mass was obtained; this represented the reflex threshold for that segment. The reflex arc under investigation might be said to consist of these parts: spinous process, dorsal root fiber, interneuron, anterior horn cell, and muscle fibers. (See Fig. 2, disregarding segmental designations and intersegmental connections.)

This pioneer study upon a large number of human subjects resulted in the demonstration that the reflex thresholds in lesioned segments were much lower than in normal segments. The more severe the lesion, as determined by palpation, the lower the threshold. The thresholds may be constant over periods of months.

What is the basis for the lowered reflex threshold of the lesioned segment? There were two obvious alternatives. (1) *The sore spines.* It was reasonable to suppose that the pressure receptors and nerve endings in the tender spinous process were hypersensitive and that, per gram of pressure, they fired more impulses at the anterior horn cells than did the corresponding endings in the normal spinous process. (2) *Hyperirritable*

*motoneurons.* It appeared equally reasonable to suppose that for some reason or other the anterior horn cells of the spinal extensor muscle in the lesioned segments were maintained at a higher level of excitability. In order to decide which was the more likely alternative, the following experimental approaches were undertaken.<sup>2</sup>

#### *Intersegmental spread of excitation.*

A lead to the answer was given in experiments in which spread of excitation from segment to segment was examined in relation to their respective thresholds, to the distance between them, and to other factors. The experiments were conducted as follows (Fig. 2). The four thoracic segments, designated as T4, T6, T8, and T10, were selected for this series of experiments on 30 subjects. Needle electrodes were inserted into the spinae erector mass 5 cm. to the left of the spinous process in each of the four segments, for the detection and recording of muscular activity. Pressure stimuli were applied to the spinous processes with the pressure meter.

The minimum pressure stimuli (threshold) required at each of the four spinous processes to elicit activity from each of the four muscle segments was then determined in turn. Thus, the pressure required upon the spine at T4 to elicit activity in the muscle at T4, in the muscle at T6, in the muscle at T8 and in the muscle at T10 was determined. This was then repeated at the other spinous processes, giving four thresholds at each spinous process, sixteen in all, in each experiment. The results will be summarized by illustrating with one hypothetical subject, eliminating some qualifications for the sake of brevity.

It was found that there was much more spread to lesioned segments than from lesioned segments. Thus, if T6 were a severely lesioned segment (very low threshold) while T8 and T10 (neglecting T4 for the moment) were normal or high threshold segments, the following obtained. It required very little pressure to the spinous process of T6 to elicit activity of the muscle in the same segment; but even very strong pressure stimuli to the same spinous process failed to pro-

duce any signs of activity in the muscles at T8 or T10. Conversely, although even very high pressures to the spinous processes of the latter two segments produced no activity in either of these segments, relatively slight pressures upon the spinous processes of each of them did stimulate reflex contraction at T6. Thus, excitatory impulses entering the cord at T10 "by-passed" the motoneurons of the same segment and those of a neighboring high-threshold segment, to emerge or produce effect at a more remote lesioned segment.

If T4 were moderately lesioned (as was often the case if there was a lesion at T6), it participated in exchange of excitation with T6, but usually only *received* excitation from T8 and T10.

Our conclusion from this series of experiments can be simply stated in an analogy. The anterior horn cell of the lesioned segment represents a bell easily rung from a number of push buttons, while the spinous process or push button of the lesioned segment does not easily ring bells other than its own. The hyperexcitability of the lesioned segment (that is, the relatively low reflex threshold) is demonstrable without applying pressure to the corresponding spinous process.

#### Procaine studies.

It was of interest in this connection to determine whether and how the excitability of the lesioned segment was affected by desensitization of the spinous process with procaine. Infiltration of the periosteum around the spinous process raised the local threshold to that of a normal segment, that is, it was no longer possible to produce reflex response of the muscle of that segment with slight, moderate, or even heavy pressure stimuli to the spinous process of that segment.

In contrast, however, spread of excitation to that segment from other segments remained unimpaired; although pressure to the procainized spinous process of T6 no longer elicited reflex contraction at T6, it was still possible to elicit contraction at T6 by pressure upon spines T8 and T10. Thus, the hyperexcitability of the lesioned segment was again demonstrated independently of the spinous

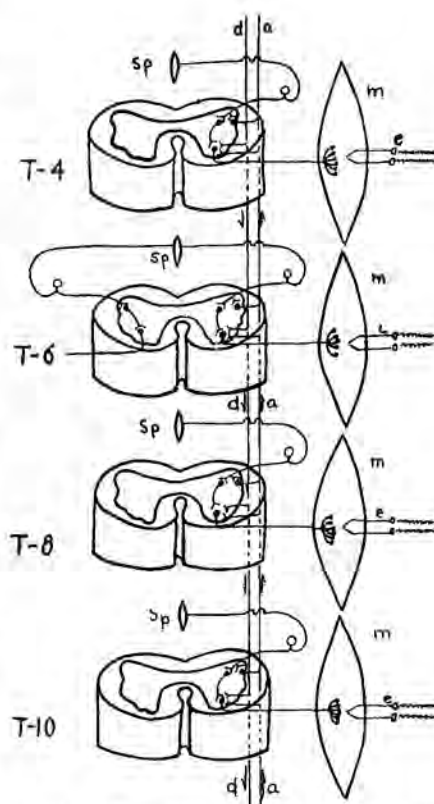


Fig. 2 — Diagram of reflex pathways involved in experimental measurement of segmental reflex thresholds and of intersegmental spread of excitation. (See text.)

sp — sensory endings in spinous process; a, d — ascending and descending intersegmental neurons; m — erector spinae mass; e — recording electrodes.

process; it exists even when the spinous process is desensitized.

#### Bilateral differences.

On a few subjects the reflex responses on both sides of the same segment were simultaneously observed (Fig. 2, T6). It was found that the spinal extensors on one side of the segment may respond reflexly to very slight pressure upon the spinous process while the other side requires much higher pressure to the same spinous process. In other words, low or high thresholds are not determined by the spinous process. The neurons in the left and right horns of the same segment may be maintained in different degrees of excitability. The left and right "bells" are rung with different degrees of facility from the same "push button."

#### Rest activity.

The differential excitability of anterior horns in lesioned and nonlesioned segments was further

and clearly shown in experiments in which the anterior horn cells were exposed, not to impulses from spinous processes but to generalized stimuli coming from within and without the body.

When a patient is prone and completely relaxed there is usually no activity in the spinal muscles; there is not even tone, as indicated by the absence of action potentials in those muscles. This is true, usually, even of segments in lesion.

Occasionally, however, it was found that muscular activity persisted in the absence of external stimulation. The subjects had to be carefully positioned and repositioned to eliminate as far as possible the afferent bombardment from the proprioceptors. It was found that when rest activity did occur, it was almost invariably in the lesioned, low threshold segments. Thus, the segment in lesion is the most sensitive to positional stress, conveyed by the proprioceptors in the muscles and tendons.

Mental factors may also be responsible for rest activity. Subjects who are apprehensive, anxious, or emotionally upset often show persistent rest activity. Such activity was always most marked in the lesioned segment; often it occurred *only* in the lesioned segments. The lesioned segment is thus hyper-responsive to impulses descending from the cerebrum.

Tactile stimuli also demonstrated the hyperexcitability of the anterior horn cells in the segment of lesion. If the back was slightly scratched or tickled with a pin, as over the shoulder or scapular area, continuing activity in the spinal extensors at the lesioned segment was often precipitated, but very rarely in the nonlesioned segment of the same subject. Thus impulses from touch and light pressure receptors in skin also find the most responsive anterior horn cells in the segments of lesion.

Occasionally we found a motor unit which fired in synchrony with inspiration or expiration; such a unit was invariably situated in the lesioned segments. Apparently such segments are hyper-responsive also to impulses from bulbar and pontine centers.

#### Interpretation of experiments.

The following general conclusions

may be drawn from these experiments as regards to motor activity in lesioned segments.

1. An osteopathic lesion is associated with a segment of the spinal cord which has a low motor reflex threshold, i.e., it represents a hyper-excitable segment of the cord. At least in the lesioned segments studied by us it may be said that the balance has been shifted too far for too long toward the excitatory side.
2. The lowered reflex thresholds are demonstrable independently of the related spinous process. Even though changes in the palpable characteristics and in pain sensitivity of the spines are important diagnostic features, they are apparently secondary to other, more fundamental alterations in the cord. This aspect will be discussed later.
3. The lesion represents an anterior root at least some of whose motoneurons are maintained in a state in which they are relatively hyperexcitable to all impulses which reach them. In a severe lesion many of the motoneurons are so close to threshold, even when the subject is at rest and reclining comfortably, that it requires very few additional impulses from the neurons which synapse with them to trigger those motoneurons into overt activity. Those additional impulses may come apparently from almost any source; the spinous process is but one such source.
4. The lesion, therefore, is to be conceived, not as a radiating center of irritation, spreading excitation to other segments, but rather as a segment upon which irritation is focused. It represents a place in the cord where barriers to motoneuron excitation have been lowered and which, therefore, channels impulses into muscles receiving motor innervation from that segment.

*Basis for segmental hyperexcitability.* What is the basis for this segmental hyperexcitability? What keeps the motoneurons of the lesioned segment "on edge," that is, at a high level of

subliminal excitation? These anterior horn cells can be maintained in this facilitated state by continuous and excessive bombardment from some untiring source or sources.

#### *The source of impulses.*

What are the untiring sources of impulses with which the anterior horn cells in the lesioned segments are continuously and excessively bombarded? First, their excessive activity is apparently associated with postural, mechanical, and articular derangements. Second, it must be recognized that they are apparently a highly stabilized and chronic source. Reflex thresholds in segments of lesion have been found to be very constant over periods of months and even years. Third, it must be recognized that they are probably highly localized, often restricting their facilitating effect to only one or two segments.

The sources which, in our opinion, most closely fulfill these qualifications are the proprioceptors, i.e., the stretch, tension, and pressure receptors in the muscles and connective tissues.

First, postural, mechanical, and articular derangements unquestionably cause increased fiber-length or tension in the muscles and tendons on at least one side of the articulation in question. The proprioceptors are highly sensitive to changes in fiber-length or tension.

Second, they are the nonadapting type of receptor. They keep firing impulses into the cord via the dorsal root fibers as long as they are under tension and at frequencies which are proportional to the tension. The higher the tension, the higher the afferent bombardment for as long as the tension is maintained.

Third, the afferents from proprioceptors not only have segmental distribution, but they specifically influence the activity of the muscles to which they are most closely related or in which they are situated. This specificity extends not only to the muscles themselves, but to specific muscle heads. It is thought that the muscle spindle cells reflexly influence only the muscle fibers in their immediate vicinity. In this way, highly localized, vicious cycles of irritation may be set up.

We, therefore, believe that these

receptors play a prominent role in maintaining segmental hyperexcitability in areas of lesion. As a result of the continuous barrage of impulses which they fire into the cord at their level, the anterior horn cells of the corresponding segment are maintained in a state of chronic facilitation — at a high level of subliminal excitation, even during rest.

#### *Effects of chronic facilitation.*

In these segments, therefore, it may be said that the normal "insulation" which keeps the efferent neurons from firing in response to every impinging impulse has become worn. Since under normal conditions of life, requiring constant adjustment to the external and internal environments, requiring motion and the maintenance of the erect posture, so many impulses from so many sources are constantly impinging on the motoneurons, in all segments of the cord, that those which are already facilitated, as in the lesioned segment, will inevitably be more active than the other. The muscle fibers to which they are connected will then be excessively high in tone. If maintained for sufficient periods of time this hypertonus would lead to textural, morphological, chemical, and metabolic changes which may, in turn, become secondary and chronic sources of irritation.

#### *Other neurons.*

We have thus far discussed only the motoneurons and alterations in motor reflex activity in areas of lesion. What of the other efferent nerve fibers and the organs and tissues which they innervate?

Our experimental studies have demonstrated that closely and quantitatively correlated with lowered motor reflex thresholds are three other features of the lesion: (1) Alteration in the texture of the tissue overlying the spinous process, (2) lowered pain threshold, and (3) increased susceptibility to trauma.

1. Tissue texture: As is well known to osteopathic physicians, there are striking changes in the texture of the tissues over the spines of lesioned segments. It was found that the degree of change in tissue texture was so closely related to the degree of lowering of motor reflex thresh-

old from the normal that Denslow, through palpation of subjects prior to each electromyographic determination of reflex threshold, was able to predict with remarkable accuracy the reflex threshold of each segment.

It is probable that these changes in texture are due to local changes in vasomotor activity, fluid balance, capillary permeability, trophic factors, and other features which are directly or indirectly under the influence of the lateral horn cells of the sympathetic nervous system.

2. Pain threshold: A direct correlation was found between motor reflex threshold and segmental sensitivity to pain. As is well known, the spines in lesioned segments are much more tender than those in normal segments. In other words, it is easier to reach the "consciousness" of the patient, i.e., the cerebral cortex, through the lesioned segment than through the nonlesioned. This, we interpret as signifying a facilitation of the spinothalamic fibers.

3. Susceptibility to trauma: It was found that if one applies equal mechanical irritation (measured impacts) to the spinous processes of lesioned and nonlesioned segments, the former may remain painful for several days, whereas the subject soon forgets which of his normal spines received the pounding.

We may conclude from these correlations with motor reflex threshold that neurons other than the anterior horn cells may also be facilitated and maintained in a state of hyperexcitability in the lesioned segment. This appears to be true, at any rate, of certain of the preganglionic fibers of the sympathetic nervous system and of the spinothalamic fibers conveying pain sensation to the higher centers.

Experiments are now in progress to establish the degree of involvement of neurons of the sympathetic nervous system. Dermatomal alterations in sweat gland activity are being determined by measuring the electrical conductivity of the skin in lesioned and nonlesioned segments. We are measuring alteration in the activity of sympathetic fibers controlling vasomotor activity by electrical measurements of skin and deep muscle temperature. Although these studies are still in a preliminary stage, it has become evident that

sympathetic activity in the skin is altered in lesioned areas and that instruments used for the measurement of these peripheral changes, and others which are contemplated, will in one form or another become valuable diagnostic aids. They are much more sensitive than fingertips and certainly easier to standardize.

There is no reason to doubt that lateral horn cells which influence specific visceral functions are fundamentally similar to those controlling the sweat glands. A project, in collaboration with Dr. D.E. Drucker of the Department of Physiology, is under way for the objective and precise determination of alterations in various visceral functions resulting from acute experimental spinal lesions in animals. The effects on visceral function, in normal unanesthetized dogs, of lesions in segments related to the viscus under examination will be compared with the effects of similar lesions elsewhere. At present, these investigations are limited to a study of renal blood flow, glomerular filtration, and tubular secretion. The kidney was selected for the first such investigation because methods for quantitative study in normal animals and humans are highly developed and because of the clinical significance of renal blood flow and renal metabolism in connection with such entities as hypertension. Similar studies upon other visceral organs are projected for the near future. It is hoped that from these studies will emerge a clearer understanding of the relations of the osteopathic lesion to visceral disease.

#### Characterization of the lesion

On the basis of the experimental studies so far, I believe we are ready to attempt a characterization of the osteopathic lesion in terms of basic neural mechanisms. Let us first summarize our general conclusions.

1. Normally, efferent neurons are kept from firing in response to every impulse that reaches them by the fact that a relatively high level of subliminal excitation — or facilitation — must be established, by other impulses converging upon them, before the firing point is reached. This requirement serves as a sort of insulation.

2. In the lesioned segment this

insulation has been weakened. A large portion of the efferent neurons are kept near the firing point (facilitated), even under conditions of rest, by chronic afferent bombardment from segmentally related structures.

3. Proprioceptors are undoubtedly an important source of this bombardment, but any segmentally related structure may be such a source. A pathological viscus, or a cutaneous trigger spot, or any other inflamed or irritated structure which concentrates its afferents in one or a few dorsal roots may be responsible for more or less tonic facilitation. (The close relation of the osteopathic lesion to referred pain mechanisms is clear, but space does not permit a discussion of this most important aspect.)

4. The firing process in the facilitated efferent neurons may be completed by any impulses impinging on those neurons, whether the source of those impulses be the cerebral cortex, postural and equilibrium centers, bulbar centers, cutaneous receptors, or others. Should this superimposed bombardment be sufficient and enduring, the facilitated neurons (and the organs they innervate) may be maintained in a continuous state of excessive activity.

5. The state of facilitation may extend to all neurons having their cell bodies in the segment of the cord related to the lesion, including the anterior horn cells, preganglionic fibers of the sympathetic nervous system, and apparently the spinothalamic fibers.

6. Because a structural defect, an osteopathic lesion, sensitizes a segment to impulses from all sources, and for reasons previously given, the lesioned segment is to be considered not a radiating center of irritation, but rather a neurological lens which focuses irritation upon that segment. Because of the lowered barriers in the lesioned segment, excitation is channeled into the nervous outflow from that segment.

7. It is a truism in neurophysiology that when something is excited, something functionally related is simultaneously inhibited. Although in our studies we have not yet directed attention to this aspect, it cannot be doubted that facilitation in the segment of lesion also extends to

neurons exerting inhibitory influences upon other neurons or organs.

It may then be concluded that: *An osteopathic lesion represents a facilitated segment of the spinal cord maintained in that state by impulses of endogenous origin entering the corresponding dorsal root. All structures, receiving efferent nerve fibers from that segment are, therefore, potentially exposed to excessive excitation or inhibition.*

### Manipulative Therapy

We come now to the last question: What, basically, does manipulative therapy do? Here, we can only guess, but at least our guesses are based on sound, experimentally established hypothesis.

Manipulative procedures applied by osteopathic physicians induce relaxation of muscle which has been maintained in a continuously contracted state and which, as a matter of fact, may not be able to relax spontaneously, even when excitation is removed (contracture). The increase in muscle-fiber length eases the tension on the proprioceptors in the muscles and tendons, bringing about at least a temporary diminution in afferent bombardment of that segment of the cord.

Since the excessive tendinous and muscular tension produced around a joint, let us say, by some bony displacement tends reflexly to produce more tension, the manipulative easing of tension breaks a vicious cycle.

Still another type of vicious cycle may be in operation and be broken by manipulative therapy (Fig. 1). Through overexcitation of sympathetic fibers in the segment of lesion, visceral pathology may be established. The anterior horn cells may then be subjected to additional bombardment with impulses conveyed by visceral afferents, thus causing exaggeration of the somatic lesion which, in turn, further irritates the viscus. Manipulative relaxation of the muscles may break this cycle, too, through diminution of proprioceptor discharge into the cord. Even a brief respite from this irritation allows better opportunity for the natural healing processes to operate.

By manipulative rearrangement of the skeleton and through postural adjustments, the original cause of the strain, that is the excessive tension on

muscles, tendons, and ligaments, may be eliminated and the beneficial results made more lasting.

This is unquestionably an oversimplified version of the basic effects of manipulation, but it certainly will serve as a working hypothesis, as a guide to further experimental investigation.

### Speculations

Assuming the importance of the proprioceptors in the lesion mechanism, it must be kept in mind that any segmentally related structure which sends afferents to the spinal cord may be an important participant in the establishment or maintenance of the lesion. In fact, through the network of interneurons, practically any afferent, segmentally related or not, may exert some influence.

To all these sources of impulses must be added the suprasegmental sources — all the higher centers, from medulla to cerebral cortex — which contribute to the descending spinal tracts. Many of these are continuous and highly variable sources of impulses. They exert their influence — excitatory or inhibitory — upon efferent neurons at every level of the spinal cord.

It is, indeed, most important to keep in mind that the efferent neurons do represent final common paths shared by a host of impulse sources, in addition to those associated with joint and supporting tissues. In this light, it is apparent that the articular derangement or the osteopathic lesion cannot be conceived as the *cause* of disease; rather it is one of many factors simultaneously operating.† The lesion is a most important factor — it is a sensitizing factor, a predisposing factor, a localizing factor, a channelizing factor. The lesion sensitizes a segment of the cord, lowers the barrier, facilitates — without necessarily producing symptoms, although signs of its presence may be demonstrated by the osteopathic physician. Sufficient additional

†In fact, it is doubtful whether there is ever a single cause of any effect, whether there is ever an isolated etiological factor in any clinical entity. Each factor operates in the context of many factors and produces certain effects only in a certain combination of factors.

excitation has to be superimposed upon that from articular and peri-articular origins. This is not to minimize the importance of the osteopathic lesion. On the contrary it is to widen the concept. For one thing, it certainly points up the tremendous contribution that osteopathic diagnosis and therapy can make to preventive medicine.

To osteopathic physicians there is, of course, nothing unfamiliar in the practical aspects of this concept. One patient has relatively severe lesions, yet is symptom-free, pain-free, and not readily subject to fatigue, etc; another patient with very similar lesions, on the other hand, may be subject to serious disturbances directly related to those lesions. Further, the lesions of the first patient may "act up" under certain circumstances, and then subside into "quiescence" again. Why? What accounts for the difference between such patients, and between the "acting-up" and "quiescent" periods in the same patient? In our opinion and, I believe, implicit in the osteopathic concept, one important basis for the difference lies in differences in the amount of nervous excitation continuously impinging on the efferent neurons of the lesioned segments, over and above that from the muscles and joints. The lesion operates in different contexts with different effects.

Given an articular disturbance which, through the mechanisms discussed above, determines the *location* of the low threshold segments, then the severity of the lesion, the associated pathology, and the response to treatment will be to a great extent, often to a decisive extent, determined by how much additional neuron pressure from other sources is chronically present. Such pressure may be present upon all the segments, but because of lowered synaptic barriers, the effects will be exaggerated at the lesioned segment. The lesion not only focuses; it magnifies.

This superimposed excitation may come from any of the sources previously enumerated, and others, which converge upon the anterior horn cells and the other efferent neurons: the cortex, the basal ganglia, cerebellum, vestibular nuclei, bulbar center, the eyes (via the

tectospinal tracts), or any steady, tonic source of impulses.

Since all these sources may directly affect, favorably or unfavorably, the lesion and its associated phenomena, they are all properly within the province of the osteopathic physician. All of them may contribute to the lesion and to its effects on total body economy. Important as is the structural factor, treatment of it alone is not to treat the patient as a whole and would be, if I interpret it correctly, a corruption of the osteopathic concept.

I shall try to illustrate with one source of bombardment which is of very general significance, namely, the cerebral cortex. As previously indicated, the words "tense," "high-strung," "jumpy," "keyed-up," "on edge" are more than figures of speech. They bespeak the well-recognized fact that psychic stress, emotional imbalance, environmental strains, etc., influence and are reflected in motor activity — an increased muscular tone and hyper-responsiveness, in generally lowered reflex thresholds. A familiar illustration is the exaggerated knee jerk of a tense individual. (Other types of imbalance may, of course, have depressing or inhibitory effects, resulting in fatigue, hyperreflexia, inertia and other symptoms.)

These are obviously due to impulses passing down the descending spinal tracts and impinging, directly or through interneurons, on the anterior horn cells and increasing their excitability and activity.

In a segment already sensitized by an osteopathic lesion the effects will be especially severe. Just as important is the fact that descending impulses may exacerbate the lesion and produce increased effects on segmentally related organs, may cause or intensify pain, and make the lesion less responsive to manipulative therapy. To treat only the structural source of bombardment is only to half-treat and to neglect a most important part of the lesion mechanism, and to take the lesion out of context. This does not mean, of course, that every osteopathic physician should become a psychiatrist, but he certainly must take into consideration the home factors, environmental factors, family relations, emotional adjustments, tensions, etc.

In this light the as yet unexplored relations of osteopathy to psychosomatic medicine become obvious. It is now well established that many organic ills, including angina pectoris, gastric and duodenal ulcer, gallbladder disease, mucous colitis, asthma and others, may be directly related to psychoneuroses, emotional imbalances, and anxieties. What factors determine the organic manifestation of the neuroses? The autonomic nervous system, of course, has regional representation in the cerebral cortex and the hypothalamus is under cortical influence. It has been thought that the unconscious may select the organ or organs to be affected. Without prejudging these and other theories, it would seem most profitable, clinically and experimentally, to explore the probability that the incidence and location of osteopathic lesions may be an important factor in determining the incidence and nature of psychosomatic ills. Certain aspects of this hypothesis are under experimental investigation in the Kirksville laboratories.

### Summary

1. Some of the neural mechanisms involved in the osteopathic lesion, in its local and distant effects, and in manipulative therapy are examined.

2. The results of experimental investigations are presented which indicate that the lesion is associated with a segment of the spinal cord which is hyper-excitable to all impulses which reach it, and that the hyperexcitability may extend to any neurons having their cell bodies in that segment.

3. It is concluded that osteopathic lesion represents a facilitated segment of the spinal cord maintained in that state by impulses of endogenous origin entering the corresponding dorsal root. All structures receiving efferent nerve fibers from that segment are, therefore, potentially exposed to excessive excitation or inhibition.

4. Evidence is presented that the stretch and tension end-organs (proprioceptors) in the muscles and tendons are the most important source of afferent impulses which produce the changes in the cord that are associated with the osteopathic lesion.

5. The effect of the lesion as a predisposing and localizing factor is emphasized and discussed in relation to certain aspects of osteopathic practice.

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**Rajiv L. Yadava, DO**  
Program Chair



## **Dr. Robert C. Fulford's Basic Percussion Course**

**April 20-22, 2012 at TCOM**



**Richard Koss, DO**  
Faculty

### **Course Description and Background:**

At Dr. Fulford's last course in May of 1997, he expressed his desire to leave his ailing body after his scheduled presentation to the Cranial Academy in June. After demonstrating what he was going to present to the Cranial Academy, he asked Dr. Koss and Dr. Yadava to continue teaching his work to the Osteopathic profession. Dr. Fulford passed away four days after the Cranial Academy presentation.

This course has been restructured to provide the participant a more complete understanding and experience of Dr. Fulford's contributions to Osteopathy. Although hand and percussion techniques are included, the emphasis will be on increasing the clarity of one's working knowledge. Based on the participant's inclinations, there is freedom within the curriculum to change the direction of what information is relayed. Time needed to assimilate what is taught will also be respected.

### **Prerequisites:**

This Level III course is for DOs, MDs, dentists and students with a 40-hour approved Cranial course and/or prior training and experience in Cranial Osteopathy or permission from the program chair.

### **Course Objectives:**

- One will recognize that many of Dr. Fulford's ideas are rooted in Dr. Still's and Dr. Sutherland's teachings;
- One will begin to see that the results realized from the use of the percussor is directly dependent on the Osteopath's understanding;
- One will see that the use of the percussor will save the physician time and energy; and
- One will appreciate that Dr. Fulford gave more to Osteopathy than a new technique.

### **CME:**

21 hours of AOA Category 1-A credit is anticipated

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Fort Worth, TX 76107  
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### **Travel Arrangements:**

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## THE ROLE OF THE FASCAE IN THE MAINTENANCE OF STRUCTURAL INTEGRITY

LEON E. PAGE, D.O.

IF IT were possible to remove all of the tissue elements of the body with the exception of connective tissue, the superficial appearance of the body would not be greatly altered. The skeleton would remain intact. The form of the musculature would be preserved by the connective tissue sheaths of the muscle fibers and the intermuscular septa. The blood vessels would be deprived of their inner linings and intrinsic musculature but their form would remain even to the capillaries. Organs such as the liver and spleen would retain their duct systems and general conformation and would still be supported by peritoneal attachments. Even the central nervous system with its pervading supporting structures of neuroglia would retain its form.

Aside from the bony skeletal structure most of this connective tissue is arranged in the form of fascia. The soft tissues of the body are supported by layers of connective tissue which extend to all parts of the anatomical structure forming muscular attachments, supporting membranes, intermuscular septa, visceral ligamentous attachments, and investing sheaths for blood vessels and nerves. This extensive and intricate connective tissue system is, in turn, supported by its attachments to bone so that the integrity of the bony framework determines the tensions which exist in the various connective tissue planes. Disturbances in bony articulation will be reflected in variations in connective tissue tensions which account for many of the manifestations of disease.

Connective tissue is found in the interstitial tissues of all organs and forms the membranes through which the osmotic processes of nutrition and elimination take place. It is important to note that pressure and tissue tensions have a marked influence upon the osmotic exchange of fluids. Excretion depends upon the delivery of metabolites into the filtering capillaries. The osmotic balance which must exist between the blood stream and the tissue fluids must be maintained to preserve physiological balance. Structural lesions involving the fascia and tissue tensions in localized areas may seriously interfere with the proper disposition of body fluids, and the removal of such lesions is an important part of the structural therapy employed in disturbances of metabolism and excretion.

The quality and disposition of the body fluids is the most important factor in the maintenance or restoration of physiological balance. This fact was recognized by Still in the statement, "The rule of the

artery is supreme." The distribution of arterial blood to any portion of the body requires adequate blood pressure and unobstructed arterial channels. The initial impulse to circulation is supplied by the heart. The heart muscle must contract with maximum efficiency. The valvular mechanism must be intact. As with any other functioning organ, the heart itself must receive an adequate blood supply through the coronary circulation. The heart as a contracting organ must have freedom from external pressure which may result from an inelastic thoracic cage or from the presence of exudates and fascial tensions. The nerve supply to the intrinsic cardiac mechanism must be free from mechanical irritation throughout the length of its remotely derived nerve channels.

It is not only necessary that an adequate supply of blood be made available to the tissues, but also that provision for venous return be considered. The return flow of blood to the heart depends largely upon physical factors which accelerate its flow. These factors are particularly amenable to structural therapeutic measures. Manipulation of soft tissues and corrective postural technics are of the utmost importance in maintaining adequate venous drainage. The chest wall must be mobilized to maintain negative intrathoracic pressure.

Effective technic for the removal of fascial tensions depends upon precise knowledge of the important fascial planes and the manner of their attachments to bones and soft structures.

Among the heavy layers of fascia which are of importance in structural therapy are those which unite the bones as ligaments, those which attach muscle to bones as tendons, and those which form visceral supports.

Alterations in ligamentous tension are important in lesion pathology. Ligaments are composed of organized fibrous connective tissue arranged in interwoven collagenous bundles. They are pliable but relatively inelastic and are able to withstand tensional stress. Sudden stretching of ligaments may produce laxity in the tissue permitting hypermobility of joints. In other cases continued or repeated strain upon ligamentous fibers may produce thickening with decreased elasticity which limits joint movement. Correction of articular lesions may be complicated by ligamentous flaccidity allowing hypermobility of the involved joint or by ligamentous thickening which makes restoration of normal mobility difficult.

Tendons are composed of parallel bundles of collagenous fibers designed to withstand stress in a

particular direction. Tendon stress may result from active or reflex muscular contraction producing tension upon a bone with its associated articulations. Conversely, dislocation of a bone may produce tension upon attached tendons. Such tension is transmitted to associated muscle fibers producing compensatory contractures. These mechanical factors determine the type of corrective technic which must be used in the manipulative correction of structural lesions. Mobilization of a lesioned articulation must be carried out with due regard to the direction of the articular plane and also the ligamentous and tendinous attachments to the involved bone.

Prolongations of the deep fascia are found in relation to viscera which depend upon them for support. Many of these layers of visceral fascia are covered or lined by endothelial cells forming serous membranes which are secretory in function. Among such secretory membranes are the peritoneum, pericardium, pleura, and synovial sacs. In all cases visceral layers are continuous with the central investing fascia which envelops the body and also with the loose fibrous and reticular tissues which surround individual cells, muscle fibers, acini of glands and which form the boundaries of the intercellular spaces throughout the body. The intimate relationship between the fascial continuity and functioning units of specialized tissue emphasizes the importance of structural integrity and its relation to function. Alterations in tension due to postural imbalance, gravitational pull, trauma, or inflammatory processes are fundamental factors in perverted physiology and are the initial factors which must be considered in the etiology of disease.

In many parts of the body layers of fascia are organized into distinct structures which serve as visceral supports. Within the skull the dura mater with its prolongations forms a support for the brain. The subarachnoid and pial membranes form the cisternae and an investment of the blood vessels which supply the brain. At the various foramina at the base of the skull the dura becomes continuous with the extracranial fascia and may thus become involved in tensions arising from without the skull.

The role of fascial tension in the production of intracranial headache was pointed out by Wolff (1). By stimulation with the faradic current, it was determined that certain intracranial structures are sensitive to pain. Among these are the venous sinuses, basal dura, cerebral arteries, fifth, ninth, and tenth cranial nerves and communications with the upper three cervical nerves. Among the structures which are relatively non-sensitive to pain are the body cranium itself, most of the dura, the ependymal lining of the ventricles, and the choroid plexus.

Pain is produced by traction upon pain sensitive structures such as the venous sinuses and tributaries, middle meningeal artery, large basal arteries, and the basal dura at the foramina. Traction may be

produced by alterations in intravascular blood pressure, alterations in cerebrospinal fluid pressure, and tensions upon the sheaths surrounding the blood vessels and nerves as they leave or enter the skull. Tension of the latter variety may be produced by abnormal pull upon muscles attached to the base of the skull, postural distortion, and maladjustment of movable portions of the skull.

The cervical visceral fascia extends from the base of the skull to the mediastinum and forms compartments enclosing the esophagus, trachea, carotid vessels and provides support for the pharynx, larynx, and thyroid gland. There is a direct continuity of fascia from the apex of the diaphragm to the base of the skull. Extending through the fibrous pericardium upward through the deep cervical fascia the continuity extends not only to the outer surface of the sphenoid, occipital, and temporal bones but proceeds further through the foramina in the base of the skull around the vessels and nerves to join the dura. The possible influence of respiratory movements upon the tension of intracranial membranes thus becomes apparent. It has been observed that traction upon intracranial structures may be influenced by the position of the head in flexion and extension (2).

Within the chest cavity the fibrous pericardium extends upward over the roots of the great vessels and becomes continuous with the pretracheal layer of the deep cervical fascia. Below, the fibrous pericardium is attached to the diaphragm in the region of the central tendon. By this arrangement the heart may be regarded as suspended in the chest by the attachments of the pericardium and related fascia. Because of these attachments the fibrous pericardium is fairly constant in position, taking part in neither the movements of respiration nor in the beat of the heart to an appreciable degree.

On either side the pericardium is in contact with the mediastinal pleura. Posterior to the pericardium is the bifurcation of the trachea, the descending aorta, and the esophagus, these structures being connected by the mediastinal fascia. In front, the pericardium is covered by lung and pleura, except over the cardiac notch. More of the pericardium is covered by pleura than by lung, since the pleura extends farther toward the midline from the fourth to the sixth ribs on the left.

The relations and attachments of the pericardium are significant from the standpoint of structural therapy, since the action of the heart may be hampered by pulmonary congestion, fixation of the diaphragm, contractures of the paravertebral musculature and tensions upon the fascia. In such cases technic should be employed to secure the upmost freedom of the costal walls and the diaphragm. Passive elevation of the arms and gentle lifting of the costal margin may greatly facilitate the expansion of the physically embarrassed heart (3).

In the abdomen fascial expansions form the mesentery, omentum, and numerous ligaments which provide

support for the abdominal viscera. The mesentery arises from an oblique origin on the posterior abdominal wall and encloses the small intestine in its free fold. Between its layers pass the blood vessels and lymphatics which supply the small intestine. The omentum consists of a dependent fold of peritoneum which hangs free in the peritoneal cavity. At its upper portion it affords support for the transverse colon.

Folds of peritoneum are attached to various portions of the abdominal wall and form ligaments which maintain the position of the solid viscera. The liver is supported by the falciform, triangular, and coronary ligaments which attach it firmly to the underside of the diaphragm and the posterior abdominal wall. The liver is also supported by fascial attachments to the inferior vena cava which grooves its surface. The spleen is supported by the lienorenal and gastrosplenic ligaments and is also in contact with the under surface of the diaphragm. The bladder is attached to the endopelvic fascia and the abdominal wall by the sacrogenital folds and the medial and lateral umbilical folds. Support for the uterus is provided by the broad ligaments and the attachments of the peritoneum to the endopelvic fascia which covers the levator ani muscle and perineal body.

Congenital variations in the distribution of peritoneum and associated connective tissue membranes are found as in Jackson's membrane associated with the ascending colon or in the ligament of Trietz in the region of the duodenum. Variations in the length of the mesosigmoid and mesocolon predispose to ptosis or abnormal flexures in the intestinal tract. Incomplete rotation of the intestinal tract late in embryonic life may leave the cecum and appendix high in the right side or even in the left side of the abdominal cavity. The position of many of the abdominal viscera is determined by the extent of their connective tissue attachments. The liver is held firmly in its position beneath the diaphragm. Although the liver necessarily moves with the diaphragmatic excursion, it can undergo little actual ptosis, even in cases of great enlargement. The cardiac and pyloric ends of the stomach are firmly fixed as the esophagus enters the abdomen through the diaphragm and at the pyloric attachments to the posterior abdominal wall. The fundus and greater curvature may descend below the pelvic brim in certain cases with normal function. The transverse colon may be more than average length and dip into the pelvic cavity in its central portion. The sigmoid is frequently redundant with its loop extending far to the right.

In addition to the support provided by ligamentous attachments the abdominal viscera are maintained in position by accumulations of

intra-abdominal fat and also by intra-abdominal pressure maintained by the tonicity of the musculature of the abdominal wall. Loss of intra-abdominal fat and flaccidity of the musculature of the abdominal wall results in ptosis of the movable abdominal viscera with tension upon peritoneal and fascial attachments. The visceral fascial supports were originally developed with the spinal axis in the horizontal position. Adaptation to the erect position is, in many cases, faulty so that postural tensions are frequently encountered. In the female particularly, lacerations incident to childbirth may destroy the integrity of the pelvic floor formed by the levator ani muscles and associated fascial layers.

Abnormalities in posture, especially those which produce varying degrees of scoliosis, lordosis, and kyphosis produce fascial tensions which may interfere with visceral functions. Traction upon sensory nerve elements may produce pain. Irritation to secretory mechanisms may interfere with glandular functions and lead to such symptoms as constipation, diarrhea, and flatulence. Motor disfunction may result in spasm of the intestinal tract and excretory ducts with colic-like pain. In other instances, lack of motor impulses may lead to atonic intestinal musculature with distention and some degree of ileus. Many of these physiological perversions decrease the resistance of tissues to bacterial invasion and thus may become true etiological factors in infectious processes. The degree and persistence of connective tissue traction determines the extent of physiological malfunction. The important clinical consideration in ptosis of abdominal viscera is fascial tension rather than the position of an organ in relation to the average. Redundant fascial supports may allow normal function in an organ which occupies an unusual position in the abdominal cavity as shown by palpation or x-ray.

From the standpoint of structural therapeutics the most important part of the entire connective tissue system is that which forms the delicate supports for the capillary and lymphatic systems. The ultimate processes of metabolism which maintain life occur in the exchange of body fluids with their formed elements, electrolytes, metabolites, crystalloids, colloids, and other chemical constituents through connective tissue barriers (4). These osmotic membranes are an integral part of the general connective tissue structure of the body and are, therefore, subject to tensions which arise from muscular pull, gravity, and pressure. These factors must necessarily play an important part in the clinical analysis of visceral symptoms and in the technic of structural therapy (5).

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## OSTEOPATHIC RHYTHMIC RESISTIVE DUCATION THERAPY

T. J. RUDDY, M.D., D.O., D.Sc. (HON.), F.O.C.O., F.A.C.O.S.  
Los Angeles, California

For a good number of years there has been a demand for some written material on the resistive duction exercises and treatment that have been dramatically demonstrated by Dr. T. J. Ruddy at various local and national meetings of the Academy of Applied Osteopathy. In Kansas City last July a detailed outline of the work was given to those who attended the special teaching session at which Dr. Ruddy lectured and demonstrated his work. The article here contains an introduction and description with diagrammatic drawings of some of the movements which Dr. Ruddy uses in his most effective manipulative treatment. He expects to have continuations of these treatment exercises in subsequent Year Books.

The subject introduces a new approach to some of the problems of structural adjustment in the physiological performance of the body tissues. The how of the physiology of motion in locomotion is not too obscure. The skeleton of the extremities is a series of bones and their articulations, limited to movements determined by the anatomical structure of the articulating surfaces forming a given joint plus the adaptation of ligamentous volume and tension to the degree of movement.

A striated muscle attached to two or more bones by its tendinous extremities, origin and insertion, by contraction, moves the less fixed part over a greater range than it moves the more fixed bone or parts. However, to possess a clear concept of the values of striated muscle contraction, one must assume that the muscle contracts toward a midpoint in the muscle and obviously away from its origin and insertion.

Locomotion is only one of the many ways man adapts himself to his environment through

the medium of skeletal muscle contraction. The contraction of the skeletal muscles and their resultant movements explain the basic factors in every reaction to intrinsic and extrinsic influences whether smile, speech, pupillary contraction and dilation, gastrointestinal peristalsis or the tiny waves that move the lymph movements in respiration, voiding and natality to mention a few.

All living organisms follow a pattern to maintain life and health at the highest level of structural and functional normalcy. Motion through muscular action is the one outstanding expression of energy responsible for continuous activation. This implies a normal circulation of blood, fluids and removal of waste.

The heart, the muscle-in-chief of major functions of the body moves the blood to the cell. Pressure to overcome many normal obstructions is required. Blood must be forced through heavy coats of the eye-ball to create the aqueous and vitreous humors; pressure

against the resistance of the renal glomeruli to remove wastes; pressure to overcome the osmotic resistance of the protein molecule in the plasma to effect its passage or osmosis to the tissue fluid spaces, and to impel the oxygen and other nutrient substances through the cell membrane. This responsibility belongs to the heart, but the responsibility of the muscles is to return the blood in the veins to the heart. The "respiratory pump" activated by the respiratory muscles aids in the venous flow from the lungs to the heart. The diaphragm contraction overcomes the resistance of the uphill flow in the valveless veins of the abdomen to raise the blood to the thoracic level to the heart.

Osteopathic spinal lesions with their contractured, thickened, dense, fixed fascia, ligaments and membranes constitute one of the abnormal resistances added to the work of the heart and to the skeletal muscles. Concurrently in the thoracic cage, secondary (or primary) lesions limiting rib movements exist, their fixations restricting their movements in the position of inspiration or expiration, engendering a vicious circle with the spinal abnormal condition.

Each muscle involved in the restricted movements of a single vertebra becomes weakened through lack of motion, essential to its own blood supply. Tone diminishes and though manipulation to mobilize the vertebra and its embedding soft tissue is administered, until the muscle is reconditioned to normal tone and contraction the freedom of fluid flow is obstructed, and in turn the affected lesioned rib movements tend toward chronicity.

Compensatory changes in the normal lung acini resulting from the partial local or/and general atelectasis secondary to the diminished respiratory excursion of the thoracic cage tend to partial normalcy. Nevertheless, all muscles of respiration have lost their part in a balanced muscular homeostasis with frequent dire results in the tone of the pectoralis major, minor, scaleni, serratus anterior, posterior (superior and inferior) and the intercostals, etc. Costoclavicular syndrome, scaleni syndrome, shoulder joint syndrome, infraspinatus syndrome and other secondary abnormalcies are readily visualized as a possible sequel.

It is not within the scope of this treatise to detail the structure of muscle, its excitation, changes in a contracting muscle, mechanical, chemical or electrical. Suffice to record a trite review, citing the practical assumption that the source of energy for contraction is nutrition, that is, food, water, minerals, vitamins and

oxygen. Among required food biologicals are the amino acids. The absence of sufficient amino acids results in atony and may lead to atrophy and a sequel of weakness in standing, walking and lifting, diminished respiration, heart action slowing of the return of venous blood to the heart, a stasis of tissue fluids and low metabolic rate. The retention of wastes, urea,  $C O_2$ , creatinine, uric acid ensues with a gradual increase of fatigue.

Stimulation of a motor nerve at its nucleus in the anterior-horn gray matter or its axone by mechanical means, as undue pressure and tension of embedding tissue, or other trauma will cause contraction of the muscle. Normal muscle contractions are tetanoid, that is, the contractions are rapid, rhythmic movements in response to nerve impulses originating in the pre motor cortex, varying from 5 to 50 per second to maintain tone. Increased demand on a muscle may increase the frequency of the tonal impulses into thousands. When there is interference with movement of a rib, vertebra, scapula, abdominal muscle, a muscle of the spine, or upper or lower extremity, disuse influences are unfavorable to normal function in spinal, bulbar, pontal, midbrain, and cortical cells; hence the body endeavors through muscle contraction to overcome those interferences by paroxysmal movements, (cramps) with resulting pains, aching, tenderness, systemic dysfunction and disease.

The natural deduction follows, that the osteopathic physician's responsibility is to restore normative performance in not only the site of primary lesions, but throughout the body where the links of the chain of dysfunction after dysfunction require repair.

Sixty years ago addressing a faculty group of which I was a member, Dr. Still explained how he gave a treatment to a patient who had primary and many secondary local and systemic structural conditions requiring correction. After describing and demonstrating pressure to the several regions of the spine, traction, passive and against resistance, to the extremities; pressing each rib upwards in the inspiratory position, downwards in the expiratory position; forced the sacrum forward with the knee, then the 5th lumbar upward by the same process, moved each cervical vertebra in extension and rotation while using traction, Dr. Still stated "My philosophy of manipulation is based on an absolute knowledge of each and every bone in the body, their several parts in articulation, and their normal movements. Without this knowledge this purpose and the completeness of this treatment, osteopathy will be a failure".

No one who has a modicum of understanding how the normal body structure functions at its highest level of efficiency will take exception to Dr. Still's analysis of osteopathic structural therapy. By carrying this study one step further we realize fully that the motion Dr. Still's technic attempted to restore is the one outstanding force-motion that maintains normalcy in all movable parts particularly the fascia and the tissue, and this motion is the result of muscle contraction.

### Summary

Muscles form 50% of the body weight.

Striated muscles are organs of protoplasmic cells elongated to form fibres attached by both ends, origin and insertion, to the bones.

Each muscle is covered by a membrane (fascia) the perimysium which separates it into fasciculi.

Each fibre (cell) has a "limiting membrane" the sarcolemma, through which must pass nutrients and waste.

The structure of a muscle cell (fibre) is composed of thousands of microscopic hairlike fibrils grouped in bundles, the sarcostyles, each fibril encased in a gelatinous substance the sarcoplasm -- source of nutrition. These fibrils are the contracting elements that move the skeleton and tissue fluids.

A stimulus to the cell in the central nervous system or to its motor neuron originates an impulse resulting in tone waves and work contraction.

Muscle has excitability, contracting when stimulated direct -- mechanically and otherwise.

Muscles require a stimulus to contract and a stimulus to relax.

Contracture is the condition when relaxing stimuli fail.

"Motion is the first and only evidence of life" -- A.T. Still

"Normal movement of the body fluids implies that no abnormal substance is detained long enough to produce disease" -- A.T. Still

"When perfect harmony is not found in form and function, lack of speed in motion exists" -- A.T. Still

"Movement is the most wide-spread of all vital activities. There is no life without it. Where there is diminished movement there is disease; where there is no movement, there is death" -- Houssay.

Human Physiology, p. 787

Normal motion is the most vital expression

of structural function.

All movements of the body, skeletal and visceral, as well as of blood and tissue fluid are effected through muscle contraction.

Muscle contraction is initiated by creatine derived from amino acids. Where there is protein there is life.

A resting muscle contracts 5 to 50 times per second. Active muscle may reach 3000 contractions per second -- tonal waves.

The pre motor area of the brain originates the nerve impulses primary or/and in response to afferent impulses from muscles for tonal maintenance and control.

All fixations or restrictions of muscular movement or primary atony of a muscle presupposes various locations of the lesion -- premotor cortex to the restriction.

The heart-muscle contraction -- moves the blood from the heart to the cells; the skeletal muscles return the venous blood to the heart. Muscle contraction is necessary for its own blood circulation.

Fixation of ribs, vertebrae and other movable bones result in atony of certain fasciculi of the muscle attached, to be followed by loss of volume and weakness through disuse.

When liberation of the restriction is effected the atony and atrophy require that reconditioning of the muscle must follow or the lesion may become chronic.

"The lesion which we recognize is a partial fixation, hence it is not the position which constitutes the lesion, but the loss of motion" -- Dain L. Tasker, D.O. Principles of Osteopathy.

Limited motion in the thoracic spine implies limited motion in the thoracic cage. Correction of both through rapid rhythmic resistive contractions of the involved muscles, is obvious.

Diminished movement of the thoracic cage units suggests diminished "minute volume" of oxygen in respiration. Arterial oxygen gradually decreases to a subnormal (20%, if respiration reduced one-half).

The technic of employment of rapid rhythmic resistive muscle contraction is simple:

1. Resist the levers to which the correcting muscle is attached.
2. Patient contracts the muscle repeatedly, synchronous with the pulse rate and faster to double the pulse rate or higher, counting one-two, two-two, three-two, up to ten-two, the frequency at the close to be five-two in five seconds, if not an acute painful move-

ment.

3. Press the part to be moved aiding the contracting muscle.
4. Counter pressure on the part articulating with the restricted unit.
5. Employ skeletal muscle contraction to pump visceral circulation.

The purpose of rapid rhythmic resistive duction is 1) to increase the speed and strength of blood and tissue fluid flow, in skeletal, vis-

ceral and nerve structure insuring nutrient substances to each cell, and the removal of extrinsic toxins and wastes from the tissues, 2) to create an homeostasis between the fasciculi of all muscles by correcting fixations, and reconditioning through muscle contraction, 3) to engender normal afferent impulses to all nerve centers particularly the pre-motor cortical area for reestablishing normal tone.

#### EXAMPLES OF RESISTIVE DUCATION

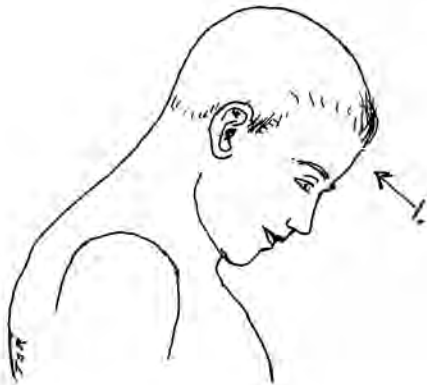


Fig 1. FLEXION OF CERVICAL SPINE

Thenar eminence on frontal eminence, resisting as patient contracts the following muscles rapidly and rhythmically, synchronous with pulse, and faster, counting one-two, two-two to ten-two, or twenty contractions in ten seconds. If painful, use the same frequency but with less resistance.

Sternocleidomastoid 2, scaleni 6, sterno hyoid and thyroid 4, omo-hyoid 2, longus colli 2, longus capitis 2, rectus anterior and lateralis 4. Total 22.



Fig 2. EXTENSION OF CERVICAL SPINE

Neck 45° extended, resist with thenar eminence at most prominent point on occiput, as patient contracts muscles synchronous with pulse rate, and faster, counting one-two up to ten-two. Muscles involved:

Trapezius 2, levator scapulae 2, splenius capitis 2, splenius cervicis 2, iliocostalis cervicis 2, longissimus cervicis and capitis 4, spinalis cervicis and capitis 4, multifidus 32, interspinales 6, intertransversarii anterior and posterior 20, rectus major and minor 4, obliquus superior and inferior 4, sternocleidomastoid 2. Total 86.



Fig 3. CERVICAL SIDE-BENDING

Resist with thenar eminence above and behind ear; patient contracts muscles bending neck to side and slightly backwards. This is difficult; slow frequency practiced at home will early acquire movements as rapidly as pulse, and faster.

Patients who are athletic will not develop lameness even when the contractions and resistance are markedly strong. The greater the effort the more rapid the circulation.

Muscle lists are given above as an inspiration that you may acquire a knowledge of all muscles employed in a given corrective technic.

Fig 4. RIGHT CERVICAL ROTATION

Thenar resistance right temple region, patient's neck flexed 45 degrees, patient contracting muscles rapidly and rhythmically synchronous with pulse and faster. These movements are not a "wiggle" but a definite short, sharp thrust. If physician's finger is placed on the opposite temple area following with each head move, the patient will learn the rhythm more quickly.

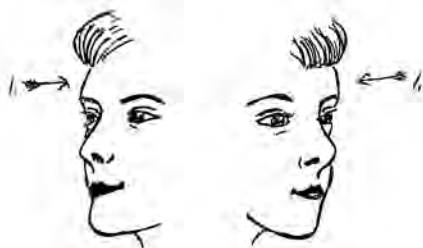


Fig 5. LEFT CERVICAL ROTATION

Carry out the technic as above, except to the left in lieu of to the right. Right handed persons are slow in learning left rapid rhythmic movements.

Fig 6. CERVICAL EXTENSION AND ROTATION INCLUDING TORSO

Resistance at temple and shoulder point as patient turns body in semi-extension. Avoid movement of shoulder only. Patient must move the torso.

The shoulder alone may be retracted (moved backward), resistance forward at base of spine of scapula to use rhomboids and middle trapezius in correcting second, third, and fourth dorsal vertebrae, or/and to relieve referred pains to these points.



Fig 7. RIGHT BENDING WITH CERVICAL AND TORSO ROTATION

Physician standing behind table, reaching in front to grasp elbow; other hand thenar at opposite temple area; patient thrusts rapidly and rhythmically toward temple and olecranon resistances.

Patient is in almost total rotation before beginning rhythmic contractions.

Maintain side-bending during rotation to unlock convexity of spine.

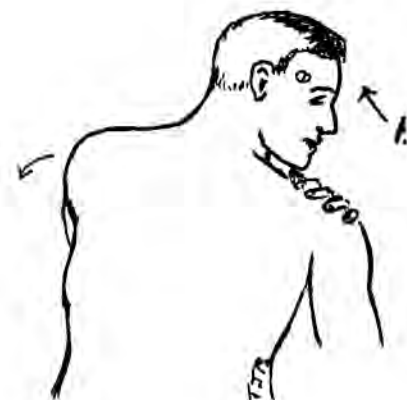


Fig 8. DIRECT SIDE-BENDING OF SPINE

Resistance at shoulder point and at point above ear.

This movement may be resisted in flexion or/and extension with degrees of rotation to effect stretching of entire periphery of intervertebral capsule, when side-bending is employed on both sides.

Repeat on both sides for full correction of individual or mass lesions in spine and thorax.





Fig 9. SIDE-BENDING WITH SPINAL COUNTER PRESSURE (RESISTANCE)

Apply thumb resistance at each spinous process, followed by counter pressure on opposite or convex side. Resisting muscle action should be followed or preceded by assisting muscle action if muscles have suffered atony by long term lesions. There is always fasciculus weakening at points of restriction or fixation.

Repeat side-bending and resistance on opposite side.

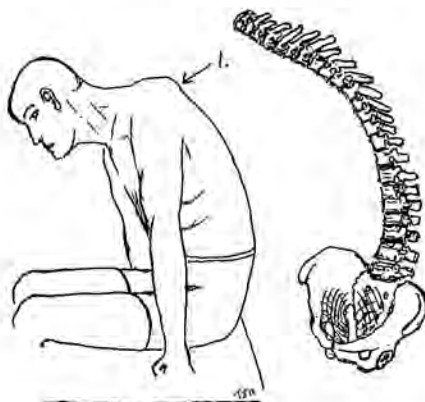


Fig 10. SPINAL FLEXION WITH EXTENSION RESISTANCE

Resist extension with ulnar (upper) sides of thumbs at each transverse process as patient makes short extension thrusts backwards.

Thumbs may be opposite or/and one above the other to effect direct movement forward or rotation forward on alternate sides. This movement is very effective in the individual lesion.

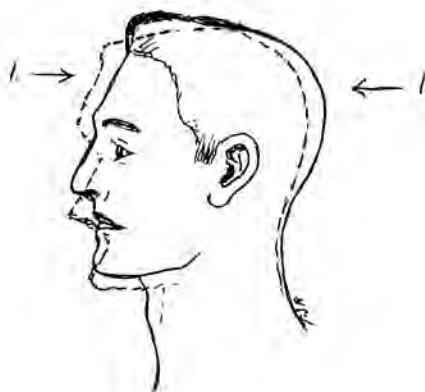


Fig 11. FLEXION AND EXTENSION OF OCCIPUT ON ATLAS

Thenar eminence at frontal center, thumb and index finger against lateral masses of atlas. Patient makes very short, rapid movements of flexion.

Thenar eminence at occipital protuberance, thumb and index finger on lateral masses of atlas, patient making very short extension contractions. These movements to stretch occipito-atlantal ligaments. One thumb on atlas, the other on transverse process of axis, patient doing short rotations.

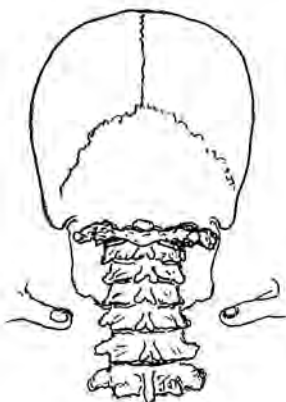


Fig 12. CERVICAL EXTENSION WITH VERTEBRAL RESISTANCE

Employing one or both thumbs on transverse processes as patient extends neck will extend each vertebra or rotate it on its fellows. All cervical lesions can be corrected with these resistive movements.

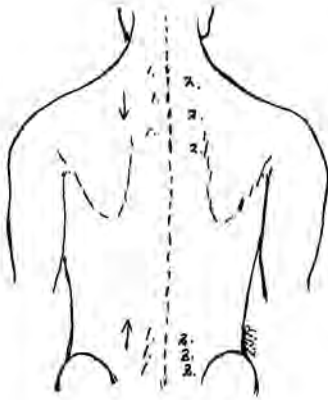


Fig 13. THORACIC AND LUMBAR EXTENSION WITH VERTEBRAL RESISTANCE

Resistance with thumbs parallel or alternating above and below entire length of thoracic and lumbar regions and sacrum. For stiff spine or local lesions.

One may parallel the resistance downward and alternate upward, or both.

When there is no reason for increasing the general circulation, as many as 50 one-two's may be employed.



Fig 14. SIDE-BENDING WITH SEMI-FLEXION AND ROTATION

Several counter movements are employed using one hand to resist head and shoulder in lateral bending or in rotation, the thumb of the other hand resisting the concave or/and the convex sides of the spinous processes. This results in a correction towards an homeostasis of the soft tissues.

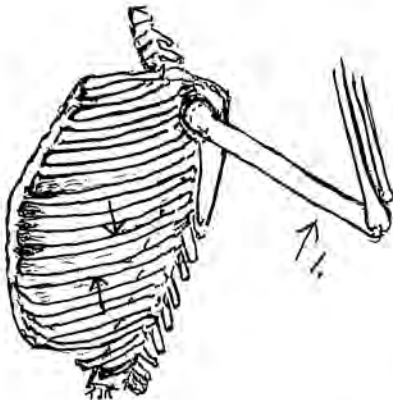


Fig 15. CORRECTION OF RIB RESTRICTIONS -- 7th to 11th

Patient's arm slightly below horizontal. Resistance to rapid rhythmic downward movements. Place arched index finger beneath any one, or lesioned rib, employing assisting upward pressure.

Place arched thumb above rib employing resisting pressure.

All ribs, including first and second ribs may be corrected. The higher ribs are corrected through the contractions of the pectoralis major and the serratus anterior muscles.

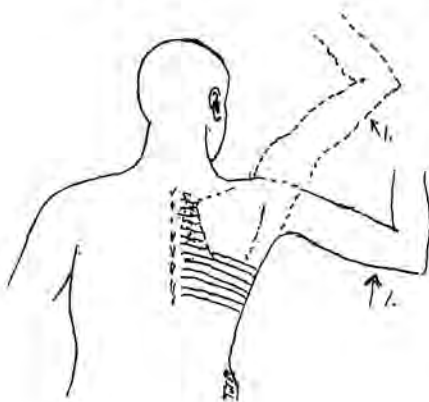


Fig 16. CORRECTION OF RESTRICTED UPPER RIBS AT ANGLES

The scapula is rotated and shifted away from spine by elevation of the arm, exposing upper ribs to palpation.

Physician resists rapid short downward movements of the arm, the arm being moved to higher levels as the side of the finger or thumb elevates, or depresses, each rib.

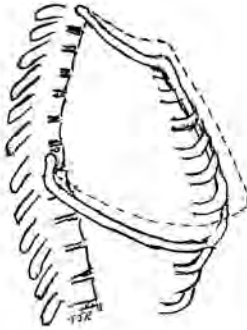


Fig 17. COMPRESSION AND ELEVATION OF THE THORACIC CAGE

Standing behind patient place interlaced fingers upon upper sternum, at end of expiration. Hold firmly as patient endeavors to inhale by using short, rapid contractions of inspiratory muscles. Repeat until ribs free.

Repeat position using ulnar sides of both hands under 7th, 8th, and 9th ribs of both sides at end of inspiration. Hold firmly as patient endeavors to exhale in short, rapid contractions of internal intercostal muscles.



Fig 18. ACROMIO- AND STERNO-CLAVICULAR LESIONS

The trapezius and levator scapulae approximate the shoulder and head.

Resistance at indicating arrows, with shoulder elevated and neck flexed backward and to the side, patient contracting muscles rapidly and rhythmically.

Repeat resistive movements with shoulder at low and higher levels, shifting shoulder from extreme forward to backward positions. Release of brachial nerves and vessels is effected.

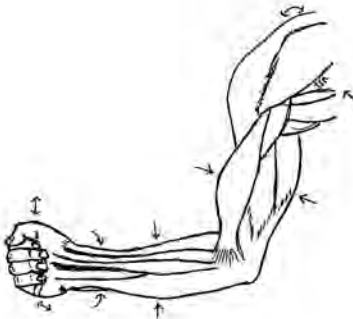


Fig 19. SHOULDER-ARM CORRECTION

The indicating arrows reveal the points and direction of resistance.

1. Adduction, abduction of wrist,
2. Flexion, extension and rotation of forearm, and arm,
3. All movements of scapulo-humeral articulation.

Note: If a movement is painful the usual rapid, rhythmic movements may be extended to as many as 20x2, but with mild resistance.



Fig 20. ABDUCTION OF FINGERS

The middle finger line is the center of abduction.

All fingers abduct from this line.

The fingers may be flexed, extended and rotated, developing rapid rhythmic movements.



Fig 21. ADDUCTION OF FINGERS AND THUMB

Middle finger is also the center of adduction.

Resistance against the "middle finger side" of the other fingers and thumb is employed to correct restriction to adduction.

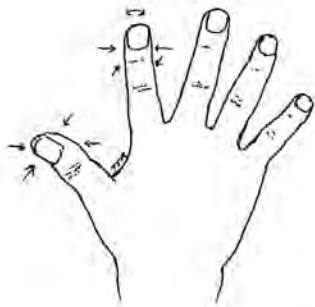


Fig 22. FINGERS AND THUMB MOVEMENTS

In arthritis, shoulder-arm-hand syndrome, and in all forms of paretic and paralytic conditions of the hand and fingers, and in certain traumata, the main recourse is manipulation, with resistance of the rapid rhythmic type.

Many soft tissue fixations respond favorably.

Interpreting the arrows as points of resistance, it is possible to correct not only the freedom of soft tissues but to condition the many muscles moving the thumb and fingers.



Fig 23. LATISSIMUS DORSI AND THE SACROILIAC LIGAMENTS

The attachments of the latissimus dorsi to the posterior one-third of the crest of the ilium and to the humerus enables the osteopathic physician with resistance at the arrow points to rock the ilium on the sacrum, thus correcting the average painful lesion in that articulation.

Downward movement of the arm against resistance, the arm varied in position from forward extreme to backward limit varies the degree of stretch on the lower spinal fascia.



Fig 24. ILIACUS, ERECTOR FEMORIS CORRECTION OF POSTERIOR ILIUM

The attachments of these two muscles, the iliacus with its origin on the inner basin of the ilium from the anterior spines to the sacral ligaments; the erector from the anterior inferior spine and a line above the acetabulum; and their insertions, the iliacus at the lesser trochanter, and the erector indirectly to the femur via the knee-cap, move the thigh in flexion or/and the ilium anteriorly. Resist flexion of femur, assisting by rocking ilium forward rhythmically and rapidly.



Fig 25. SACROILIAC ARTICULATION, MOVEMENTS AND CORRECTION

In addition to the iliacus and the erector femoris and latissimus muscles which are attached to the ilium and to the humerus or/and the femur, all of which move the ilium either anteriorly or posteriorly on the sacrum, the semitendinosus, membranosis and biceps, which have their origins on the tuberosity of the ischium and their insertions into the tibia and fibula, become a part of the correction.

With the leg in extension and the thigh flexed  $30^{\circ}$  on the abdomen, these muscles, when resisted, will pull forward on the tuberosity correcting an anterior ilium. The sacroiliac motion is simple sliding and rocking.

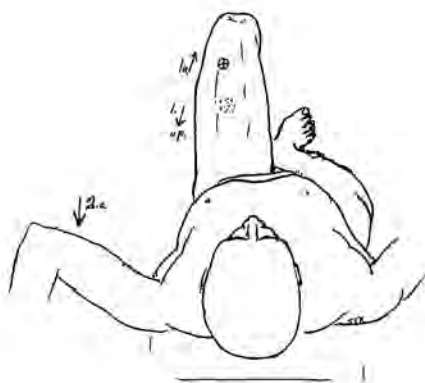


Fig 26. SACROILIAC LESIONS TECHNIC ILLUSTRATED

Patient supine on table, thigh flexed; resistance at points 1a, and 2a. Patient contracts erector and latissimus, approximating the thigh and arm in rhythmic rapid movements. This is combining the iliacus, erector and latissimus to move the ilium anteriorly.

Apply resistance on under surface of thigh opposite dotted circle seen at 1-up as patient contracts semitendinosus, membranosis and biceps in rapid, rhythmic movements. Unoccupied hand may move crest of ilium in assistance.



Fig 27. EXTERNAL ROTATION OF THE FEMUR

The muscles gluteus medius, piriformis, gemellis superior and inferior, obturator internus and externus and quadratus femoris are resisted most favorably, patient prone.

Flex leg 15 degrees; place hand under knee; apply resistance lateral surface of ankle as patient contracts rapidly and rhythmically to sufficient count, or patient supine, let extended, apply resistance outer side of foot.

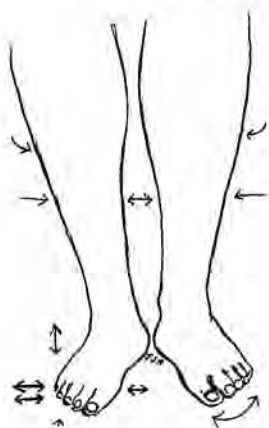


Fig 28. THE FOOT AND LEG

The arrows indicate points of resistance for dorsal and plantar flexion, internal and external rotation (varus and valgus), movements of toes, similar to fingers, adduction and abduction and rotation of leg on knee and hip joints.

A study of individual muscle action will enable the osteopathic physician to correct tarsal, metatarsal and phalangeal restrictions. Example: resistance to peroneus longus and tibialis anterior rotates internal cuneiform. Tibialis posterior rotates and plantar flexes navicular.

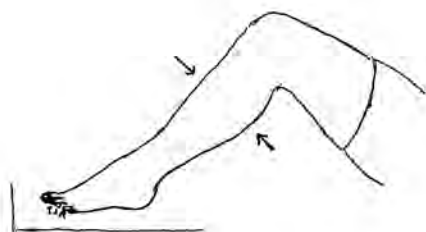


Fig 29. THE LEG AND ITS VESSELS

Rapid, rhythmic resistive flexion and extension is a most effective method of treatment in venous failure, endoarterial stenosis, cramps, atonic, weak muscles, standing and walking fatigue and thrombotic ulcers. Rhythm is slow and irregular, thus patience and persistence until rapid and rhythmic movements insure desired results.

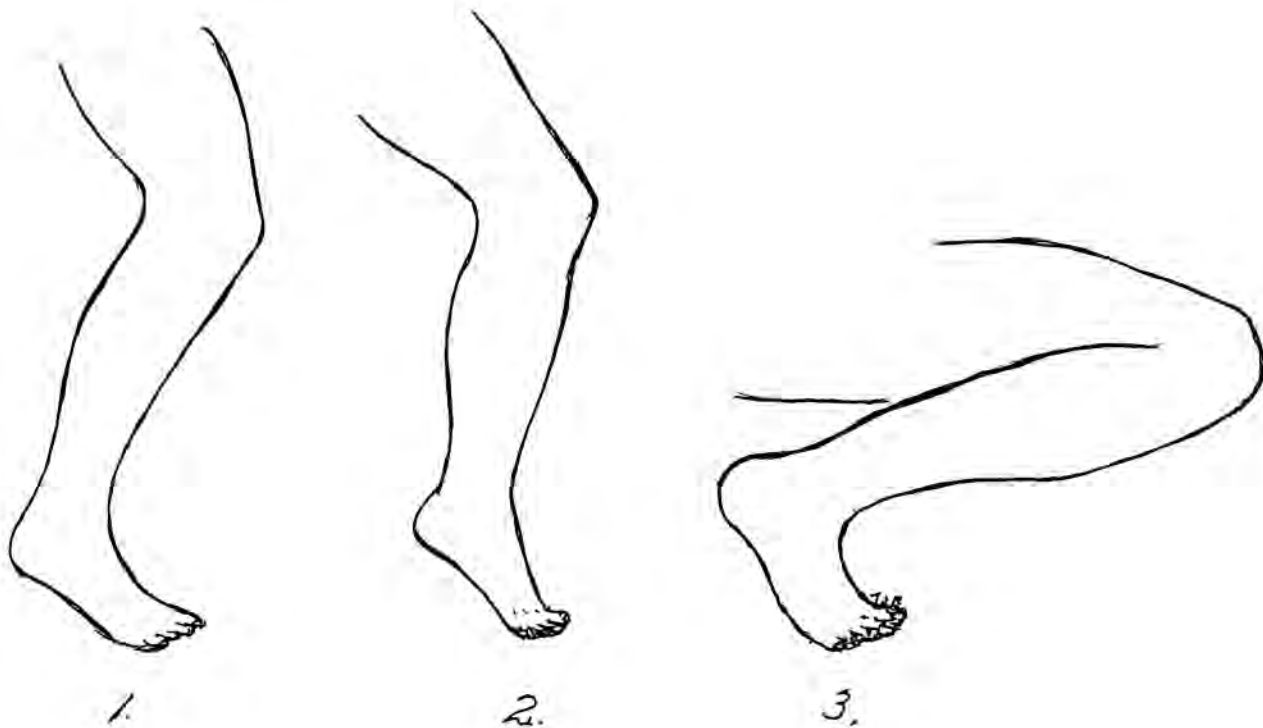


Fig 30. RECONDITIONING MUSCLES AND REDUCING CHOLESTEROL PLAQUES.

Patient standing with hands on backs of two sturdy chairs, approaches a semi-sitting stance, resting entire weight on toes, not the balls of the feet. Patient rises and falls in short, rapid rhythmic movements counting one-two up to ten-two, i.e. 20 contractions. Assuming a lower position, repeat the movements. Continue approaching the sitting position until sitting on the heels is reached, or 50x2; 100 contractions are done three times daily. A few weeks will be required, even with the osteopathic physician's help.

To condition shoulder, arm and hand muscles: Hands on chairs as before, rest weight on hands, elbows flexed. Lift weight of body by extension of forearms, employing rhythmic medium-rapid movements. Do this a minimum of 5 two's, until muscles are stronger.

Notwithstanding there exists more cholesterol deposits in the lower extremities, the shoulders, bust and abdomen hold a large share, hence the movements carrying the weight on the upper extremities is of great value.

These movements are not exercises, unless we decide to define heart action, breathing, voiding, giving birth, as exercises. These movements are work-movements, or treatment work-movements supplementing the physician's resistive treatment.



## **OSTEOPATHIC MANIPULATIVE MEDICINE**

Come see us at the AAO Convocation in March – we will be exhibiting on Wednesday and Thursday!

Mayo Clinic Health System – Franciscan Healthcare is seeking an experienced physician to provide Osteopathic Manipulative Medicine services at our multi-specialty clinic in Onalaska, WI. Qualified candidates will be residency trained and board certified/eligible in their respective specialty. Additional training and certification in Neuromusculoskeletal Medicine/Osteopathic Medicine or Integrative Medicine/Integrative Therapies is welcomed. Candidates will have the opportunity to include primary care in their practice.

This is a full-time, outpatient position in a multi-disciplinary team environment so candidates should have excellent communication skills. We have a rapidly growing practice and welcome physicians who expect to play an active role in this continued growth and development.

Mayo Clinic Health System-Franciscan Healthcare is a multispecialty group/healthcare network with more than 250 physicians and associate providers, serving a primary care population base of 240,000. The medical center in La Crosse has 250 beds and the full range of special care units and high-tech services you would expect.

Onalaska/La Crosse, WI: Onalaska has a population of 18,000 and is one of the fastest growing communities in west-central Wisconsin. Located in the scenic Upper Mississippi River Valley contiguous to the city of La Crosse, Onalaska offers an ideal small city family environment with convenient access to activities available in La Crosse. The area's metro population is 120,000. The region offers unlimited, four-season recreational opportunities including water sports, hiking the bluffs, golf, biking the many trails and downhill/cross-country skiing. Area public and private schools are high-quality and safe. There is a local symphony orchestra, community and college theaters, children's museum and a civic center. This is a favorite region for numerous festivals and annual community events. The presence of the University of Wisconsin-La Crosse, Viterbo University and Western Technical College enhances the educational and cultural opportunities and also provides many sport events.

If you won't be at the Convocation, send your CV directly to Mike Malone – [malone.michael@mayo.edu](mailto:malone.michael@mayo.edu)



# Reflex relationships of paravertebral muscles<sup>1</sup>

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EBLE, JOHN NELSON. *Reflex relationships of paravertebral muscles*. Am. J. Physiol. 200(5): 939-943. 1961.—The muscles of the back are shown to function reflexly in various antagonistic and synergistic pairs. Intertransversales muscles of opposite sides can act synergistically for ventral flexion or antagonistically for lateral flexion. Multifidus muscles of opposite sides act independently or synergistically only. There is a stronger reciprocal relationship between the multifidus on one side and the intertransversales of the other side than between multifidus and intertransversales of the same side. Inhibition of antagonists occurs with stimuli too weak to excite the agonists. The patterns of the spinal reflex responses of the paravertebral musculature to cutaneous stimulation change with regard to segmented level and to area of skin stimulated. Stimulation of dorsal skin provokes reflex contraction of the multifidus muscles. Stimulation of ventral skin provokes reflex contraction of the intertransversales muscles. A stimulus applied to a lateral skin area elicits a response in both members of this antagonistic pair. Moving the dorsal stimulus caudally from L-5 to L-6 results in a change of the reflex pattern from multifidus activity to intertransversales activity.

HISTORICALLY THERE HAS BEEN considerable controversy as to the role of reciprocal innervation of antagonistic muscles. Tilney and Pike (1) in a scholarly introduction distinguished between the English or reciprocal innervation school and the French or cocontraction school. Later experiments (2-5) have shown that both phenomena do occur and indeed are necessary for the variety of motions that the organism makes. Such early work had to do with the action of limb muscles but recently Kugelberg and Hagbarth (6) examined the "spinal mechanism of the abdominal and erector spinae skin reflexes." A more detailed analysis of these reflexes, particularly a separation of the components of the erector spinae mass, was made possible by methods we devised for a study of visceral-somatic reflexes (7). The present paper is a detailed study of reflex patterns of the abdominal and paravertebral muscles in the lumbar region as evoked by various somatic stimuli. We have

recorded electromyographically the reflex excitation and inhibition of the following muscles: multifidus, intertransversales, longissimus dorsi, psoas and rectus abdomini.

## METHODS

Acute spinal rabbits for these experiments were prepared by section of the cord in the T-2 region as previously described (7). These rabbits remained useful for experimental purposes for 3-4 days and longer.

*Electromyographic recording.* Electromyograms were obtained on a Grass 8-channel electroencephalograph. The recording electrodes were simple insulated copper wires (32 PE), with tips scraped free of insulation. Each electrode was passed through a 20-gauge hypodermic needle and bent back to form a hook. The needle was inserted into the muscle to the desired depth and then withdrawn, leaving the hooked electrode in place. We found it convenient to solder two needles together so as to maintain the interelectrode distance constant at approximately 4 mm.

To permit easier placement of the electrodes into the posterior paravertebral muscles, a long skin incision was made in the mid-line of the back; for the accurate placement of electrodes into the psoas muscles a long abdominal incision was necessary. Electrodes were placed into the intertransversales muscles by either an abdominal or a dorsal approach.

These flexible paired electrodes were found to have several advantages. They did not impede the movements of the rabbits, nor did such movements cause any displacement of the electrodes from their position in the muscle tissue. Their range of pick-up would be expected to be between that of concentric needle electrodes and surface electrodes. Concentric needle electrodes were not found to have the necessary flexibility to remain precisely in place for a period of days or even hours. Surface electrodes, on the other hand, have too wide a range of pick-up for localization of the potentials necessary to distinguish activity in juxtaposed muscle groups.

It has been determined by careful checking of the placement of our electrodes by dissection at autopsy, that when two pairs of electrodes are in different muscle groups, for example the multifidus and longissimus, or intertransversales and psoas, the distance between them

Received for publication November 21, 1960.

<sup>1</sup> This investigation was supported in part by research grants from the American Osteopathic Association.

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can be as little as 5 mm, and yet each will have a mutually exclusive range of pickup. This range approximates that found for concentric needle electrodes by Weddell *et al.* (8) but is considerably smaller than found for concentric needle electrodes by Basmajian and Latif (9).

## RESULTS

*Patterns of response of paravertebral musculature to cutaneous stimuli.* Pinching the skin of the left leg of these spinal preparations results in a withdrawal motion of the leg and frequently a hunching of the back of the animal. The record of the accompanying electrical activity in the intertransversales, psoas and rectus muscles is shown in A of figure 1. Although not shown in the figure, the trunk reflexes to stimulation of the skin of a leg are always bilateral (but not symmetrical rather occurring predominantly on the homolateral side). The probable explanation for this deviation from the classic concept of crossed extension and ipsilateral flexion is the fact that the rabbit is a hopping and not a stepping animal, rather than changes in internuncial pathways induced by cord transection as suggested by Perl (10) for other species.

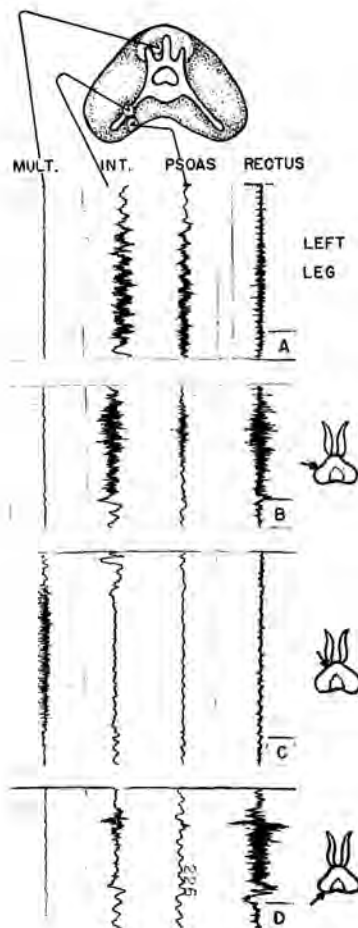


FIG. 1

Electromyographic recording of activity in paravertebral muscles as elicited reflexly by pinching skin of left leg, A, and of trunk areas indicated by small arrows. Stimulus to the leg resulted in withdrawal of leg, but the stimuli to skin of the trunk did not evoke a visible movement of the spinal animal.

The cutaneomotor reflexes of the trunk appear to be highly organized, and show a variety of patterns which depend upon the site of stimulation. The stimulus in these experiments was simply the application of pressure to a fold of skin grasped between the thumb and forefinger. B, C and D of figure 1 show that, as the point of stimulation is moved dorsad or ventrad within a given dermatome, there is a change in the pattern of muscles responding. This change was observed in all of the rabbits tested; in each case the muscular response would seem to be appropriate for the withdrawal of the trunk from the noxious stimulus. Adequate increase of the intensity of the lateral and ventral stimulus (*sites B and D*) resulted in visible lateral and ventral flexion, whereas no such visible degree of dorsi-flexion was observed from the dorsal stimulus (*site C*).

Another example of the changes in pattern of paravertebral muscular response with changes of site of stimulus is shown in figure 2. As the locus of stimulus is moved caudad along a line slightly to the left of the mid-point of the dorsum the muscles responding change from multifidus to intertransversales. This change in the character of response is the result of a shift in the point of stimulus of just a few millimeters. Between these two points that give quite different responses, there is an area in which stimulation elicits a mixed response. This area of overlap of receptor fields extends for approximately two segments. At other times in the same animal a mixed response could be obtained by applying the stimulus at L-4 and at levels midway between L-5 and L-6. The kind of response to stimulation in this small critical area is dependent on factors other than the point of stimulation; visceral and proprioceptor afferent impulses, for example.

*Patterns of response of paravertebral musculature to proprioceptive stimuli.* For the application of the stimuli, the entire loin of the animal was gently grasped between the thumb and forefinger at approximately the level of L-3. When pressure was applied to one side or the other there was a lateral or side-bending of the animal with a stretching of the intertransversales muscles on the opposite side. As shown in figure 3, this was accompanied by a pronounced electrical activity in the intertransversales on the side contralateral to the pressure. (In contrast, pinching the skin at the same site elicited homolateral intertransversales activity, fig. 1). It should be

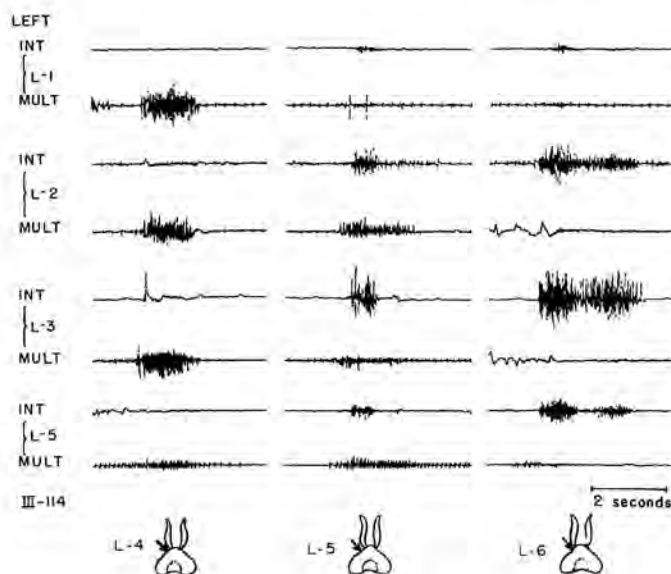


FIG. 2

Electromyographic record of activity in paravertebral muscles reflexly induced by dorsal cutaneous pinches at different segmental levels (segmental designations correspond to levels of spinous processes). As site of stimulation is moved caudad, the focus of reflex response also moves caudad but, in addition there is a change in the character of response, from dorsi-flexion to ventral flexion. Stimulation at intermediate points results in a mixture of the two kinds of reflexes.

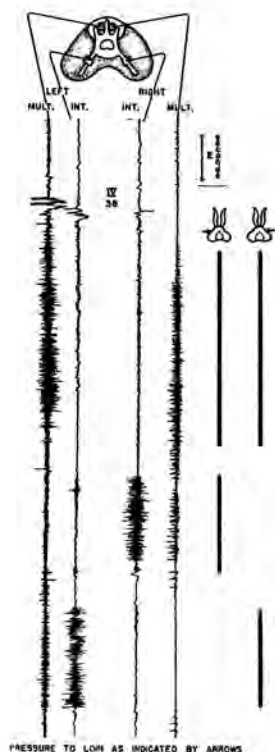


FIG. 3

Reflex response of paravertebral muscles to pressure (indicated at right of fig.) and stretch stimuli. When the fingers press bilaterally, stimulus is that of pressure to underlying skin and musculature, but when force is applied to one side only there is, in addition, stretching of muscles of opposite side.

noted that this reflex response to stretch in the spinal animal would not be expected in intact man. In the latter case proprioceptive impulses from such a mild and slow stretch of limb muscles have been shown not to produce a reflex discharge of the motor neurones to the muscle that is stretched (14, 15).

When the pressure was applied bilaterally, a different pattern of response resulted. In this case there was no side bending and consequently no stretching of the underlying tissues. The predominant response was activity in the multifidus muscles of both sides as shown in figure 3.

*Reciprocal relationship of intertransversales and multifidus muscles.* Since, as shown in figure 3, bilateral pressure elicited bilateral activity in the multifidus muscles we questioned why the unilateral pressure applied to the same area did not produce homolateral activity. An answer to this question was sought through examination of the interrelationships of multifidus and intertransversales muscles in the next 11 rabbit preparations studied.

For the demonstration of reciprocal relationships it is necessary that tone exist in the antagonistic muscles. Therefore, since the loin muscles of these spinal rabbits were normally electrically quiet, it was necessary to elicit the necessary tonus by a sustained stimulus. An appropriate cutaneous stimulus was used for this purpose.

Figure 4 shows how a skin stimulus which elicits multifidus activity on one side inhibits pre-existing intertransversales activity on the opposite side. This occurs even when the stimulus is of insufficient intensity to excite the underlying multifidus as shown in the latter part of the inhibitory period. The absence of electrical activity in the multifidus during this period suggests that the inhibition of intertransversales is the direct result of the stimulus and not due to afferent impulses

arising from the shortening or the increase in tension of the multifidus muscles.

This reciprocity can be demonstrated in both directions as shown in figure 5. Inhibition of tonic multifidus activity can be achieved with stimuli which elicit activity in intertransversales muscle groups.

In the light of these demonstrated reciprocal relationships between the intertransversales and multifidus muscles, the results shown in figure 3 are clarified. The

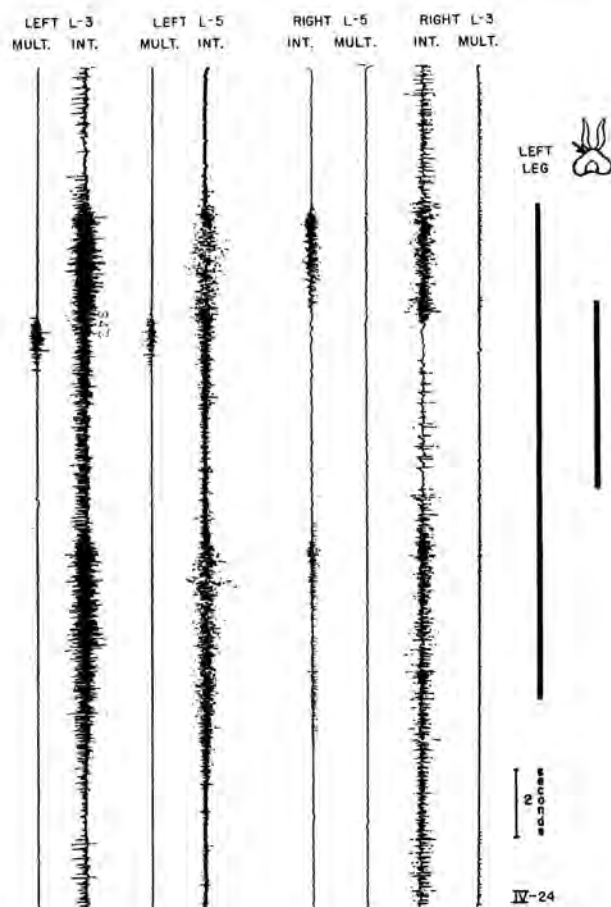


FIG. 4

Interaction of reflex responses of paravertebral muscles to pinching of skin at 2 sites, as indicated on right of fig. Inhibition of tonic intertransversales activity by pinching skin of dorsum is greater on contralateral side. In the early part of inhibitory period, pinching of skin of the dorsum is of such intensity as to elicit multifidus activity. Such intensity of stimulus is not necessary to produce inhibition as is shown in latter part of inhibitory period.

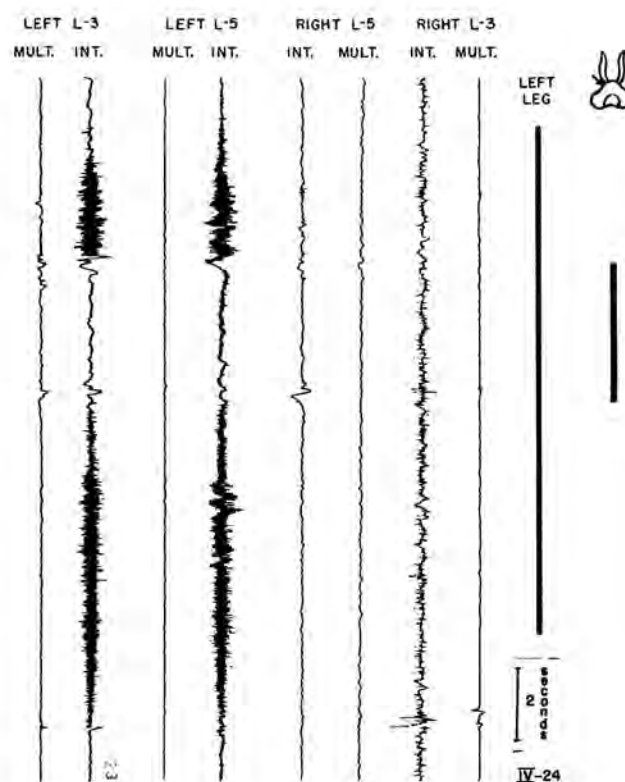


FIG. 5

Interaction of reflex responses of paravertebral muscles to pinching of skin. Inhibition of tonic activity of multifidus by pinching skin of left leg is, in a sense, the reverse of pattern shown in fig. 4.

unilateral pressure in fact involves two opposing stimuli. The first (pressure) causes reflex excitation of the underlying multifidus. The second (side bending and stretch) causes reflex excitation of the contralateral intertransversales which, by the reciprocal relationships shown in figures 4 and 5, reflexly inhibits the multifidus. The reciprocal inhibition predominates over the direct excitation of the multifidus. The reflex stimulating action of pressure on the multifidus is evident only when pressure is applied bilaterally and there is no movement of the animal to initiate the inhibitory reflexes.

*Interrelationships of paired intertransversales muscles and paired multifidus muscles.* In 5-10 trials in each of 15 rabbits we were unable to find a combination of stimuli to the skin of the dorsum of both sides which would show reciprocal relationships of the multifidus muscles of

opposite sides. All combinations of bilateral stimuli to the skin of the dorsum resulted in simultaneous activity of the multifidus muscles on both sides (cocontraction).

With the intertransversales muscles, however, both cocontraction and reciprocal innervation were observed. As shown in figures 1 and 6, pinching the skin on the left evokes a reflex response in the intertransversales on the ipsilateral side. If, during a period of maintained stimulus to one side and a resulting tonic activity in the intertransversales on that side, a stimulus is applied to the skin of the opposite side inhibition of the tonic activity results (fig. 6 only). In 70 trials in five rabbits we have been unable to find a combination of stimuli which would result in neutralization, that is absence of activity on both sides. Only inhibition of tonic activity on one side by alteration of the relative intensity of the two stimuli or, simultaneous but decreased activity on both sides have been observed. The simultaneous activity is elicited by stimuli such as pinching the tail or the skin overlying the midline of the abdomen. It is symmetrical in these instances, but is greater on the homolateral side if the stimulus is moved laterally on the abdomen or from the tail to the skin of the leg. These different patterns of response to various stimuli were so reproducible that they served as a check on the correct placement of the electrodes, thus permitting their withdrawal and replacement early in the experiment, if necessary.

#### DISCUSSION

Though undertaken independently, this work is in part an extension of the studies made in intact man by Kugelberg and Hagbarth (6). We have divided the erector spinae mass into its component parts and have shown that the abdominal and erector spinae skin reflexes are even more complex than was evident from the experiments of Kugelberg and Hagbarth. We, by using spinal preparations, and they, by accurate measurement of latent periods, have shown that these complex reflex reactions are mediated by the spinal cord. In the spinal preparations, however, it was possible to use more prolonged stimulation than could be used in studies with human beings. Continuous stimulation in spinal preparations is a better approximation of many pathological conditions, such as those that produce abdominal rigidity. The complex patterns of muscular response to various cutaneous, visceral and somatic stimuli which occur at the spinal cord level are integrated with the pre-existing posture of the animal and with other contemporaneous stimuli.

We have shown examples of three kinds of muscle activity integration at the spinal level: relatively independent activity of muscle groups (fig. 1); cocontraction of antagonistic muscle groups (the intertransversales muscles of both sides, fig. 4), and reciprocal relationships between agonists and antagonists (fig. 3-6). Cooperation between anatomically antagonistic muscles in regard to time and magnitude of response was adjusted with great variation in our preparation by strictly spinal

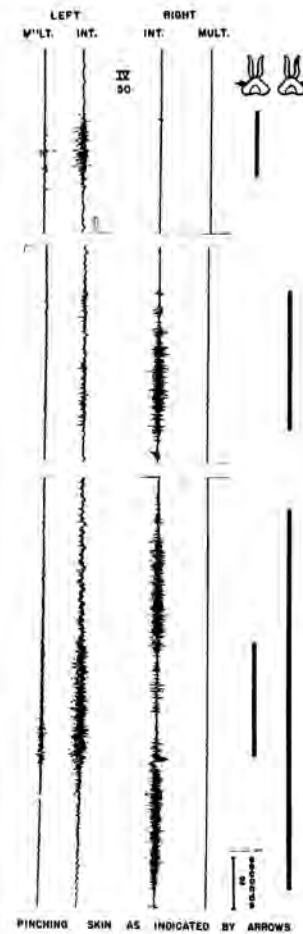


FIG. 6

Interaction of reflex responses to skin pinches on opposite sides. Response of intertransversales to pinching skin of side is homolateral, but contralateral when the stimulus is pressure, as shown in fig. 3. When stimuli are applied to opposite sides simultaneously their intensities can be adjusted so as to result in inhibition of one side or the other, or in simultaneous contraction of both sides, but not in total inhibition of both sides (as shown for multifidus and intertransversales of opposite sides in fig. 4).

mechanisms. Cocontraction of the intertransversales of opposite sides results in splinting with regard to lateral movement of the trunk, but is an effective force for ventral flexion.

With reference to the activity of antagonistic muscles during voluntary movement, Barnett and Harding (11)

emphasized that their findings "may represent the resultant of two opposing effects—the central inhibition of the antagonist muscle and a reflex contraction due to stretching." The cutaneous stimuli that we applied were not of adequate intensity to produce motion which would cause stretch and, therefore, produced only one of the two effects. Our experiments then, are analogous to those of Sherrington (12) in whose experiments the tendons of the muscles tested had been detached from their insertions, so that no stretching of the antagonist was produced when the prime mover contracted. The same conditions obtained in our experiments because the electromyographic detection permitted recording of muscular activity of such small magnitude.

Kugelberg and Hagbarth (6) observed reflex responses at distant segments which alternated with bursts of response in the optimal area. We did not observe this seemingly reciprocal relationship between adjacent segments, but rather a radiation of reflex response to adjacent segments without any discernible period of inhibition. This difference is probably attributable to the differences in mode of stimulation—short bursts of electrical stimulation as opposed to prolonged mechanical stimulation. The diminution of activity in both antagonists and agonists when two opposing stimuli are applied that was reported by Kugelberg and Hagbarth (6) was also observed by us. Complete nullification was observed when the antagonistic muscle groups were

intertransversales of one side and multifidus of the opposite side (fig. 4). Reduced activity only was observed when the antagonistic muscle groups were the intertransversales of opposite sides.

The muscles of our preparation are electrically quiet in the resting state as has also been shown in other instances (12–14). Consequently, to demonstrate reciprocal relationships it was necessary to induce tonic activity by stimulation. This fact would indicate that the normal role of reciprocal innervation is to modify the excitability levels of appropriate neurons rather than to diminish activity in antagonist muscles which experimentation shows to be normally nonexistent.

It is quite likely that reciprocal inhibition of muscles is as important in the production of postural abnormalities by pain in abdominal and/or spinal structures as is reflex excitation. The use of such reflex inhibitory phenomena is well established. As long as 70 years ago Beevor (16) reported a method of relaxing knee extensors by making the patient violently flex the knee against resistance. It is hoped that the more precise information on the relationship of the paravertebral muscles shown in these experiments may be helpful in extending this kind of treatment and examination to the muscles of the back.

The author expresses his indebtedness to Dr. I. M. Korr for valuable advice and guidance.

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# Spontaneous Release by Positioning

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Discovery of what appears to be a new principle of lesion production has resulted in a simple, easy method of correction without the use of force.

Undoubtedly many osteopathic physicians have observed occasional cases of spontaneous lesion correction. Probably most of them have shrugged and wished that all lesions might be corrected so easily—but that it is a one-in-a-thousand phenomenon and not worth thinking about, just a fortunate combination of influences.

Most osteopathic physicians can remember some case that was seemingly impossible; a case that resisted all their skill, diligence, and ingenuity, and continued to defy their best efforts again and again until only stubbornness kept them from admitting they were stumped. Each visit became a maddening frustration. Suppose that after months the disorder one day spontaneously corrected completely and easily before their eyes.

This background of frustration is included because it furnished the necessary inspiration for 10 years of experimentation.

The ease and effectiveness of this technique and the revolutionary concept it entails are very difficult to believe by osteopathic physicians who have accepted as necessary the use of a certain amount of force to attain a correction on hundreds of thousands of lesions in their regular practices. Yet, demonstrations in seminars in the western states have shown most of the osteopathic physicians attending that the technique is practical for them on their first or second attempt. They are convinced only after feeling it happen under their own fingers or on their own lesions.

■ **BACKGROUND.** In the original case a fortunate combination of accidents made the correction possible. A man had had a very severe and painful second lumbar lesion with psoasitis for a long period, and I had been unable to correct it despite maximal efforts. He had complained of being awakened every few minutes during the night by his pain. I was devoting an entire treatment period to finding, if possible, a position of relative comfort which he might use to secure rest without heavy sedation.

We finally found a position which achieved a high degree of comfort, but it was astonishingly extreme. It was unbelievable that such a rigid patient could tolerate, let alone enjoy, such a position. He was nearly rolled into a ball, with the pelvis rotated about 45 degrees and laterally flexed about 30 degrees.

The patient was so well relieved that he was propped up and left in the position while I treated another patient. When I returned and restored him to a normal position, he remained comfortable! Examination revealed an excellent correction of the lesion, with marked improvement in free mobility and two-thirds reduction in pain and tenderness. To accomplish a correction so easily in a case so desperately "impossible" was hardly believable. It was too impressive to be ignored.

Experimentation was begun on other second lumbar lesions. Many were corrected in positions similar to the one that had been effective for the first man. Most of the others responded to minor modifications of the original position. Experimentation seemed relatively safe, because no force was necessary and a position which brought immediate comfort could hardly be construed as an injury. Gradually the time of support in the position of release was reduced from 20 minutes to 10 and then to 5. Success continued down to a period of 90 seconds. Below this time, success was irregular, even though we achieved an excellent position for relief of pain and tenderness in the lesioned joint. It still appears to be the minimum, though probably some skilled technicians will be able to reduce it further.

Success with second lumbar lesions encouraged attempts on other lesions. Some results were gratifying, others disappointing, but little by little it became clear to me that all osteopathic lesions will correct spontaneously in a position of release, and that a large proportion of lesions of a given joint will follow a pattern of position common to other lesions of that joint.

During this time the position of release and comfort was found in a high percentage of the cases to be simply an exaggeration of the abnormal bony relationship found upon examination. This has occurred so consistently that I have accepted it as proof of diagnosis. On the occasions where the two do not agree, I distrust my diagnosis and rely on the position of release as both diagnosis and treatment.

■ **SOME APPARENT PRINCIPLES.** Most lesions can be corrected in exaggeration of the diagnosed abnormal bony relationship. Occasionally diagnoses are not clear. We are saved from testing aimlessly by the fact that most lesions of any given joint are likely to follow a pattern. Through the years I have been able to accumulate a list of the more common lesions. In three fourths of the lesions in which the diagnosis was not clear, disorders were found to respond to positioning according to the directions on the list, with minor variations.

\*In the Classification for Indexing and Filing Osteopathic Literature (September 1963, p. 128), this article fits in Section B-3: Clinical Osteopathy: Manipulative Therapy (General).

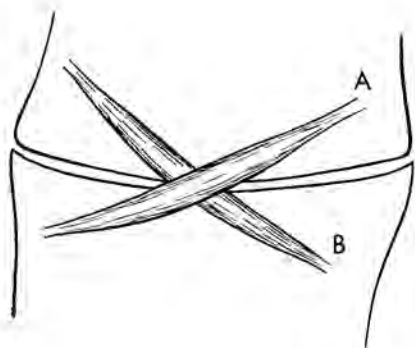


Fig. 1.

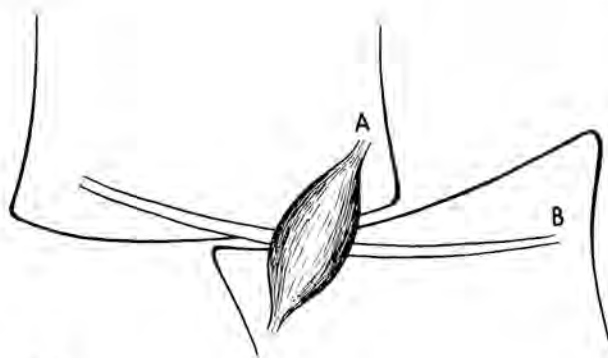


Fig. 2.

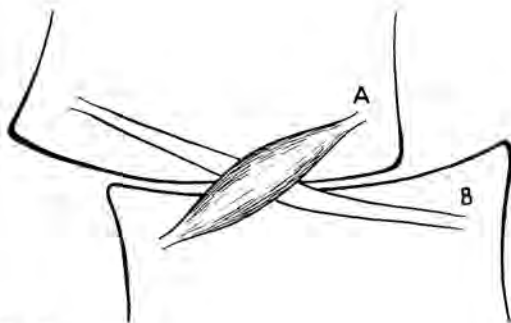


Fig. 3.

This list, which will be presented later, is offered not to be blindly imitated, but as means of saving the busy physician the time-consuming experimentation needed to develop it. He must never lose sight of the principle. The techniques are successful only if they achieve the position of relief of tenderness and pain. If unsure of his diagnosis, he tries the basic positions first. Then, if necessary, he abandons them and learns the effective position by trial and error, secure in the knowledge that there is such a position for each lesioned joint. After a few weeks of practice he will not need to delay long on any lesion.

Can this simple, easy method of correction be pos-

sible? How can it be, and yet have escaped the notice of thousands of osteopathic physicians all these years? Yet the first published reference I could find to any similar work done is a statement by Dr. Ira C. Rumney of Kirksville College of Osteopathy, in January 1963.<sup>1</sup> In a summary of forces which can be used to re-establish normal spinal motion, he lists: "Inherent corrective forces of the body—if the patient is properly positioned, his own natural forces may restore normal motion to an area."

The phenomena demonstrated in this work indicate that the lesion formation occurred in a position much more extreme than the position in which we found the lesioned vertebrae upon examination. The patient had no pain in this extreme position. He reported, "It hurt when I started to straighten up." It hurt more as he continued to straighten. Muscles which were relatively relaxed in the extreme position tensed in an effort to splint this lesioned joint from further strain.

Is the muscular tension arranged so as to splint this joint, to prevent it from moving back into its eccentric position? *No!* The muscular tension *resists any motion away from the extreme position in which the lesioning occurred.*

Even the severest lesions will readily tolerate being returned to the position in which lesion formation originally occurred, and only to this position. When the joint is returned to this position, the muscles promptly and gratefully relax. These joints do not cause distress because they are crooked; they are paining because they are being forced to be too straight. This is the mechanism of strain. This protective muscle splinting is the "bind."

The three schematic drawings of joints in Figures 1, 2, and 3 illustrate a normal joint in normal position, a normal joint in extreme position in which lesion formation occurs but not strain, and the joint as found by the physician in lesion and in strain. Muscular tension is not the result of muscle stretching or a reflex splinting to prevent return of the joint to the extreme position. It is the opposite. It is the reflex muscle splinting which *prevents further movement away from the extreme position where lesion formation occurred.*

In Figure 3, muscle "A" is splinted in chronic contraction. Muscle "B," though stretched, is not splinted or contracted. The effect is that the joint may easily move back to the extreme position which brings relief. Any movement away from the extreme position increases the strain and is resisted by increased splinting of muscle "A." To initiate a spontaneous correction, a relaxed patient is positioned so as to return the joint to the extreme position, hold it for 90 seconds, and return the still-relaxed patient to normal.

■ **DISCUSSION.** In the light of this knowledge, what happens to some of our concepts of the osteopathic

lesion? Could exaggeration of a deformity bring immediate relief to a lesion if the main factor of that lesioning were strain of ligaments or other periarticular tissues or compression of the emerging nerve? It appears likely that exaggeration of the deformity would aggravate the pain in either case because of further overstretching of ligaments or compression of nerves. Local edema begins to resorb immediately upon achieving the position of release, but it requires some time. What "released," so that it could start to resorb? I still have no satisfactory explanation. Yet this new knowledge does upset many of the accepted concepts of the mechanism of producing and maintaining factors of the osteopathic lesion.

It would be a tremendous task to check each muscle and ligament involved in an osteopathic lesion to prove this theory. However, we can reason backwards. The joint is rigid; periarticular tissues are tense. The joint seems to resist all motion. The position of greatest resistance and pain is a position opposite to that of the original abnormality. For instance, a lesion of left lateroflexion resists most violently a bend into right lateroflexion. On the other hand, even the most acute lesion will readily submit to passive movement in exaggeration of the diagnosed lesion, *and in this direction only!*

The physician palpates the tense lesioned area while moving the patient into a position of exaggeration. When he attains the optimum position, there is an almost instantaneous relaxation of tense tissues which is so marked that it is palpable by any osteopathic physician with ordinary skill. At the same time the patient if questioned will report that "you took the pressure off." Localized edema is felt to start to "melt" immediately, but it requires many seconds for the effect to be complete. This perhaps is the factor requiring the 90-second support of the joint in the position of release to effect a correction.

The concept of tissue stasis in lesions seems to be borne out, but what was the instantaneous "catch" that started it, and where? For a long time the theory of deformity of the nucleus pulposus seemed secure. Yet the principles described apply as well to all appendicular lesions as to spinal lesions. Where was the "catch" there? What have we left? Something in or around the joint is "caught."

Exactly what it is, we do not know, but it occurs in a markedly eccentric position and goes into a strain pattern when pulled away from that position. It will correct itself spontaneously if it is supported in the original eccentric position and then is returned, still relaxed, to normal. Once the physician has attained the position of release, no further effort is necessary. Happily back out of the continuous strain it has been suffering, the joint can in 90 seconds restore its own normal function again.

■ **SPECIFIC MYOFASCIAL TRIGGERS.** Many patients complain of tenderness remote from the vertebral

area. Since my philosophy has always been along the lines of specific lesion for a specific pain, I have always attempted to pin down an association between a certain pain and/or area of acute sensitivity with a specific lesion. But we find that many patients are so vague about the nature and distribution of their pains that from a practicing physician's viewpoint the areas of acute sensitivity prove to be much more reliable. These are the myofascial triggers.

These triggers are a valuable aid to diagnosis for any osteopathic physician, and there are many fairly successful tricks of counterirritation used by some physicians in treatment. In this treatment by use of the position of release they are of inestimable value in eliminating guesswork.

For instance, in lower lumbar lesions it is easy to mistake paravertebral tenderness of a fourth for that of a fifth lumbar lesion; in many instances, tenderness close to the spine may be so mild as to dissuade the operator from giving either diagnosis much credence. On the other hand, their specific trigger points are inches apart and are so sharply sensitive as to remove all doubt of which lesion is the offender. Whereas the vague tension and tenderness near the spinal joint may give a relatively inconclusive manifestation of success in finding the position of release, pain at the trigger point dissolves as if it has suffered a power failure. The sudden definite release is so complete that the uninitiated patient will doubt that you are still probing the right spot. The physician knows his treatment is correct, and the patient also immediately knows.

Some of the triggers and maybe all have been known for many years. Works by Chapman, Travell, Judovich and Bates, and Yoshio Nakatani are extensive. The triggers offered here for your convenience are easily found and are *definitely specific manifestations of specific lesions*. Relief of the trigger point is accomplished only by relieving the causative lesion in the responsible joint.

Though we use the relief of tenderness in the trigger point as evidence of the correct position of release, we are treating not myofascial triggers but spinal lesions. Tension and tenderness near the spinal lesion are relieved simultaneously with relief of the trigger.

#### ■ SPECIFIC TRIGGERS AND ASSOCIATED LESIONS.

**Right sacroiliac:** Different triggers are usually relieved by different methods (see suggested techniques). The upper trigger is 1 inch from posterior spine of ilium, at 5 o'clock. The middle trigger is near the third sacral foramen, or about 2½ inches from posterior spine, at 7 o'clock. The lower trigger is just lateral to sacral cornu (associated with coccygeal pain and tenderness). The trochanter trigger is on the posterior superior surface of greater trochanter of femur. The pubic trigger is on the superior margin of pubic bone 1½ inches lateral to

symphysis. (These last two are used in treating a supine patient.)

**Right fifth lumbar:** The upper trigger is on the medial margin of ilium near the posterior superior spine. The lower trigger is in the notch just caudad to the posterior superior spine.

**Right fourth lumbar:** This trigger is about  $\frac{1}{2}$  inch posterior to tensor fascia lata and 2 inches caudad to the rim of the ilium.

**Right third lumbar:** This trigger is 1 to  $1\frac{1}{2}$  inches caudad to the anterior superior spine of the ilium or in tensor fascial lata. The posterior third lumbar trigger is a point  $2\frac{1}{2}$  inches lateral to the posterior superior iliac spine and  $1\frac{3}{4}$  inches caudad to the iliac crest.

**Right second lumbar:** One trigger is on the lateral side of the middle of the right inguinal ligament. Another is on the anterior inferior iliac spine.

**Right first lumbar:** This trigger is  $\frac{3}{4}$  inch below and medial to the anterior superior iliac spine.

**Right twelfth thoracic:** This trigger is on the inner border of the iliac crest, about 2 inches from anterior superior iliac spine.

**Right eleventh thoracic:** This trigger is on the inner border of the crest of the ilium in the midaxillary line.

**Eighth and ninth flexion lesion:** This is associated with tenderness 2 or 3 inches below the xiphoid process, and often with epigastric pain and ileitis. Paravertebral tenderness and pain here is often so slight as to be overlooked.

**Third thoracic:** This trigger is a point  $2\frac{1}{2}$  inches caudad to the spine of the scapula and 1 inch medial to the lateral border of the scapula.

**Second thoracic:** This is a point  $\frac{1}{2}$  inch above the spine of the scapula and 2 inches medial to the acromial process.

**Second cervical:** This trigger is just beneath the superior nuchal line,  $1\frac{1}{4}$  inches lateral to the midline.

**First cervical:** The trigger is on the posterior border of the ramus of the mandible,  $\frac{3}{4}$  inch above the angle.

**Humerus:** Affections here appear to be actual lesions of the humeral joint, although different ones are often associated with upper thoracic lesions as indicated. Treatment is directed to a position of release in the humeral joint (see suggested techniques). (1) The first trigger is a point on the short head of the biceps  $1\frac{1}{2}$  inches below the coracoid process of the scapula (often associated with first thoracic lesion); second is a point about 1 inch posterior to trigger above. (2) Another trigger is at the middle of the deltoid, 1 inch beneath the acromion (usually associated with a second thoracic lesion). (3) Another is on the posterior margin of the deltoid muscle,  $1\frac{1}{2}$  inches from the acromial process of the scapula (often associated with third thoracic lesions). (4) Another is deep in the posterior fold of the shoulder

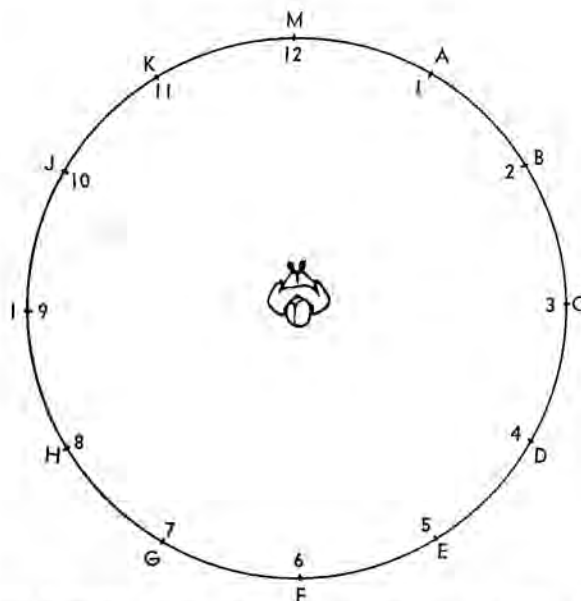


Fig. 4. Bird's-eye view of a man standing on a clock face.

near the tendon of the teres major (often associated with fourth thoracic lesions). (5) The circumflex nerve trigger is about  $1\frac{1}{4}$  inches below the spine of the scapula and 3 inches medial to the acromion.

**Elbow lesion:** Elbow tenderness is on head of the radius or in the belly of the brachioradialis muscle (tenderness on lateral epicondyle usually is a trigger from first thoracic or first rib). Tenderness on medial epicondyle usually is a trigger from the fourth thoracic or the fourth rib, or a simple extension of the ulno-humeral joint.

■ **BASIS OF SUGGESTED TECHNIQUES.** A large proportion of spinal joint lesions will be found to follow a pattern. The majority of lesions of each joint tend to be lesioned in a position common to that joint. Though there are many atypical lesions that do not conform, the busy physician may save much time by checking out probable positions first. If successful, he has verified his positional diagnosis while making his correction.

However, he will encounter enough atypical or less common lesions that he will continually find it necessary to abandon the hope of the typical lesion and rely upon his own diagnosis of the position of the lesion. After diagnosing it he will exaggerate the position to the position of release. Occasionally the diagnosis will not be clear, and he will need to search by trial and error. This will not discourage him when he becomes certain that every osteopathic spinal lesion has a position of release and that by finding it he can produce a correction.

Contemplation of the thousands of possible positions may seem overwhelming until we reduce the consideration of the possible positions to their three

basic elements. We need to consider only the direction of rotation and/or bend and how much.

1. Rotation can be only to the right (indicated by "R") or to the left (indicated by "L"). These are described according to the direction of rotation the body of the superior vertebra in relation to the body of the inferior vertebra.

2. Bending (use of such words as flexion and extension is avoided because they mean different things to different osteopathic physicians) can be toward any one of 360 degrees, but requirements for use here are only that we bend in a direction within 30 degrees of the ideal direction. Forward or backward bending is considered simultaneously with side bending as one bend, because it is one bend and not two as we are used to thinking of it.

Then, if we imagine our patient to be standing in the center of a large clock face which has been placed face up on the floor and standing so that he faces the mark of 12 o'clock (Fig. 4), he may be considered to bend in the direction of any hour on the clock face. This will be accurate enough for effective practical use, though minor modifications may increase the effectiveness. For example, rather than to describe the position of a lesioned joint as right side bending and forward bending, we can say toward 2 o'clock.

To further simplify for the purpose of record keeping, we may substitute a letter for each hour and record a bend toward 2 o'clock as "B," or a bend toward 6 o'clock as "F," and so forth.

3. The amount of bend needed is quite uniform and can easily be learned with practice.

Now, since we have indicated rotation right as "R" and rotation left as "L," we can indicate a fourth lumbar lesion bent to the left side and backward and rotated to the left as "4L-HL." (Note that "M" is used at 12 o'clock rather than "L" to avoid confusion.)

Description of specific suggested techniques will include these symbols to indicate the influence brought to bear on the lesion under discussion.

In most cases the pelvis is thought of as if each side were swinging on the sacrum on a transverse axis. This does not cover oblique bends.

■ **TECHNIQUES. High right ilium:** The posterior superior spine of right is higher cephalad than the left. The patient is prone on the table. Find the trigger point (probably the middle or upper trigger; see section on trigger points). Raise the right thigh, extending the hip; start a little abduction of the thigh, for midtrigger relief (E). The upper trigger needs no abduction (F); the lower trigger requires a little adduction (G).

**Low right ilium:** The posterior superior spine is lower on the right. Treat the patient in a supine position, using the trochanter or pubic trigger. The thigh



Fig. 5. A demonstration of the technique used for the upper trigger of the fifth right lumbar vertebra (J).

is flexed about 135 degrees on the hip; usually about a 20-degree abduction of the thigh is required, and slight medial turning in of the leg on the thigh.

**Right oblique, sacroiliac:** The trigger here is on right side of posterior surface of sacrum. (1) Heavy pressure (40 pounds) is applied over the base of sacrum on the left side. (2) Heavy pressure is applied near the apex of the sacrum. (3) Apply pressure as in (1), but over the right side of the base.

**Right fifth lumbar:** (1) This technique is for the lower trigger. The patient is prone. Find the trigger under posterior superior spine. Hang the patient's right thigh vertically off the side of the table; the doctor holds the leg a few inches below the knee

Fig. 6. A demonstration of a technique for right twelfth thoracic correction (KR).



and abducts leg on thigh moderately (B). (2) For the upper fifth lumbar trigger, the technique is the same except that the pull is on the other leg and side bending is in the opposite direction (J). (See Figure 5.) (3) This technique involves simple rotation, as in fourth lumbar, R or L. (4) This technique is used in lordotic spines. The patient is prone; the doctor stands at the left and places his right foot on the near edge of the table, reaches across, and lifts the patient's right leg onto the doctor's thigh just below patient's knee (GL).

*Right fourth lumbar:* (1) This is similar to the fifth lumbar upper trigger technique. (2) The patient is prone; the doctor stands at the left side and reaches across to grasp the patient's anterior ilium. He rotates the patient's pelvis about 45 degrees, and leans back so that his body weight does the work (L). (3) This technique is like (4) in fifth lumbar correction.

*Third lumbar:* (1) This is opposite of (2) for fourth lumbar (R) correction. (2) This is like (4) for fifth lumbar correction.

*Third, fourth, or fifth lumbar with lordosis or definite spondylolisthesis:* (1) The patient is in a prone position with the doctor at his left side. The doctor puts his right foot on the table and raises the patient's right leg up about 30 degrees and toward him, until the pelvis is rotated about 30 degrees (GL). For spondylolisthesis, repeat from the opposite side (ER).

*Right second lumbar:* The patient is in a supine position. Find the trigger point in front of the right ilium near middle of inguinal ligament to the lower end. Bend thighs to a little above vertical, with knees bent. Rotate the pelvis toward the left side of the patient's body, and side bend toward the left to the point of trigger relief (JR). Support the top ilium against excess adduction of the flexed thigh by a forward pull on the top of the ilium.

*Right first lumbar, and eleventh and twelfth thoracic:* The patient is supine, with a folded pillow beneath the lower lumbar area. In marked antexion, thighs are flexed to about a 45-degree angle with the body. Then the knees are brought slightly to the patient's right and feet slightly towards the patient's left (KL). A variation would be opposite rotation (KR) (Fig. 6).

*Right tenth and eleventh thoracic:* (1) With the patient prone, the doctor, at the patient's right, grasps the left anterior superior spine by reaching over the right side. He rotates the pelvis to a point of trigger release (about 45 degrees) (R). The



Fig. 7. A demonstration of forward bending for right eighth and ninth thoracic correction (JL).

trigger here is paravertebral. (2) This technique is like that used for correction of the seventh, eighth, and ninth thoracic, right.

*Right seventh, eighth, and ninth thoracic:* The patient is prone, arms hanging off the table, and the doctor is at the left side. He raises the patient's right arm up beside his head, holds the arm near the axilla, rotates the upper chest to the right, and side bends to left (RI).

*Eighth and ninth flexion lesions:* The patient is prone, with a large pillow folded under the lower half of the sternum. The doctor lifts up on either shoulder and rotates (BR or JL) (Fig. 7).

*Right fifth and sixth thoracic:* (1) This technique is as in seventh, eighth, and ninth thoracic correction. (2) The doctor is on the right side. He reaches across to left shoulder; the patient's right arm is up beside his head, or at least hanging more cephalad, and the left arm is hanging. He pulls the left shoulder back and around the caudad (JL).

*Right fourth and second thoracic:* The patient is prone, arms hanging. The doctor's hand is placed on the patient's chin and cheek. He bends the neck backward, to the left, and rotates slightly to the right (GR). Variations include left rotation (GL), and right side bending (ER or EL).

*Right third thoracic:* Raise the patient's right arm beside the head, rotate, and side bend the head and neck toward the left, letting the head hang partly off the table in flexion of the upper thoracic area. Elevate the right shoulder in posterior direction, with the doctor's arm under the patient's axilla (JL).



Fig. 8. A demonstration of technique for correction of a right first cervical lesion (EL).

*Right first thoracic:* Extend, side bend, and rotate to the right (DR). This is irregular; it may be necessary to side bend left (HR).

*Right eighth cervical:* The patient is in a supine position. Mild forward bending, rotation, and side bending away from lesioned side are applied. (Palpate the transverse process in the side of the neck) (JL).

*Sixth and seventh cervical:* The patient is in a supine position, head off the end of the table. Back bending, side bend away and rotate toward the side of lesion or as indicated by the position of spinous process (GR). For seventh cervical lesions, rotate left (GL).

*Fifth cervical:* This technique is similar to that for eighth cervical correction except that more forward bending is used; it may be necessary to reverse sides (KL).

*Fourth cervical:* (1) This area frequently is in either back bending or spondylolisthesis. Lesions are corrected in marked backward bending and slight side bending as indicated. Check progress by the tender transverse process (GR). (2) Use rotation and side bending to the same side without any back bending (IL). Try the opposite if the first attempt fails (CR).

*Third cervical:* (1) Use side bending and rotation toward the side of the prominent tender spinous process of the second cervical vertebra, with fairly marked forward bending (AL). (2) An alternative is the same except for opposite rotation (AR).



Fig. 9. A demonstration of the second thoracic shoulder reflex. The upper arm is at 8 o'clock, in 60-degree abduction, and under slight traction.



Fig. 10. A demonstration of correction of the right medial meniscus lesion. Internal rotation, adduction, and slight flexion are applied.

*First and second cervical:* (1) Correction usually is attained with the patient in marked backward bending and with slight side bending and mild rotation as indicated by diagnosis and comfort (ER or EL) (GR or GL) (Fig. 8). (2) An alternative is marked rotation as indicated, with no bending (L) or (R).

*Shoulder joint:* Frozen shoulder may be eased beyond aid obtained by upper thoracic and lower cervical corrections by finding an arm position which

relieves the tender spot in the shoulder (see trigger points). Shoulder stiffness with triggers 2, 3, and 4 are relieved in the prone position with the elbow behind the midline with abduction varying from 80 to 0 degrees (Fig. 9). Trigger 1 usually is relieved in a supine position with the upper arm vertical and the forearm halfway between cephalad position and across the shoulder girdle. Ten pounds of pressure are applied downward through upper arm and shoulder. Both may be further improved by traction in a caudad direction, usually with 30-degree abduction, occasionally adducted, across chest following the corrections above.

**Acromio-clavicular:** The upper arm is fully abducted and the forearm cephalad.

**Elbow, right radial head:** Usually supination is used; occasionally some abduction or adduction are necessary. (Tenderness of the lateral epicondyle indicates probably a first thoracic or first rib lesion.)

**Wrist, thumb, and other fingers:** All can be easily relieved by finding tender spots and locating the position of release. The thumb is usually bent backward and rotated. Tenderness is near the metacarpophalangeal joint or the carpometacarpal joint.

**Knee:** The medial meniscus is nearly always relieved by internal rotation of the extended leg on the thigh, usually with slight flexion and adduction (Fig. 10). The lateral meniscus usually requires external rotation.

**Feet: ankle sprain:** There is tenderness  $\frac{1}{2}$  inch below the malleolus, usually a little anteriorly. This usually is relieved by inversion of the foot with external rotation, occasionally by eversion or dorsiflexion. An ankle sprain is an osteopathic lesion and can be treated in this manner, giving much relief.

**Calcaneus:** There is tenderness beneath the proximal head; this usually is corrected in eversion or outward rotation of heel on foot.

**Cuboid:** There is tenderness beneath it. There is eversion of the lateral side of the foot with moderate dorsiflexion.

**Navicular:** Inversion and a little internal rotation of front of foot, with some dorsiflexion.

**Fibula, proximal head:** (1) One method is similar to the treatment for ankle sprain. (2) It may be held forward by thumb pressure.

**Bunion:** There is tenderness at lateral sesamoid, which is relieved by flexion, abduction, and eversion of the great toe until sesamoid tenderness is relieved.

Reprinted from THE D.O., A PUBLICATION FOR PHYSICIANS AND SURGEONS 4:109-116, January, 1964

**Right ribs:** (1) The patient sits with his back to the doctor. The doctor's left foot is on the table, with a pillow on the doctor's knee. The patient drapes his left arm over the pillow, tilts his pelvis to the left, puts his feet at the right side of his hips. The position is marked right side bending, moderate forward bending, and right rotation. It takes 1 to 2 minutes to achieve the necessary relaxation. The position is (BR), or rarely, the opposite rotation (BL). (2) The patient lies on his left side, with his thighs flexed 90 degrees and his right arm hanging behind him. The doctor stands behind and holds the patient's head forward, side bent, and rotated right, and presses caudad on the right shoulder (BR).

**Fifth, sixth, and seventh, and eighth ribs:** Use a folded pillow under left shoulder.

- GENERAL RULES. 1. Treat "hot" lesions first.
- 2. Straighten the patient out slowly enough that he can remain relaxed. He will resist and tense if rushed.
- 3. Check for relief of pain after correction, if only to demonstrate its absence to the patient.
- 4. An especially "dry" lesion will sometimes be tender after correction. A minute's traction will ease it.
- 5. Patients will try to help you. Don't let them.

■ SUMMARY. Osteopathic spinal and appendicular lesions occur in positions more eccentric than that found by the examining physician. They are in a state of strain because the natural position of the patient holds him away from the eccentric position. The strain is relieved by exaggerating the deformity found upon examination. The lesions will release and correct spontaneously if held relaxed in the exaggerated position for  $1\frac{1}{2}$  minutes. The correction itself is restful and comfortable.

*Grateful acknowledgment is given to many who have contributed techniques or ideas, in particular: Harry Davis, D.O., deceased; G. E. Holt, D.O., Pendleton, Ore.; Hugh Barr, M.D., Penticton, B.C.; Annabelle F. Thorne, D.O., San Francisco, Calif.; Margaret W. Barnes, D.O., Carmel, Calif.; Carl L. Fagan, D.O., Monterey, Calif.; James E. Spencer, D.O., Palo Alto, Calif.; Melvin Hennigson, D.D.S., Hayward, Calif.; Rollin E. Becker, D.O., Dallas, Texas; Harold V. Hoover, D.O., Tacoma, Wash.; T. J. Ruddy, D.O., Los Angeles, Calif.; Harold S. Saita, D.O., Vancouver, B.C.; and Paul K. Theobald, D.O., Oakland, Calif.*

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# Exercise Prescription: Greenman's Method

June 8-10, 2012, at South Pointe Hospital in Warrensville Heights, OH

## Course Description

This course will demonstrate how to access muscle balance of the musculoskeletal system, particularly in reference to somatic dysfunction. The primary goal is to prescribe an exercise program and self-mobilization techniques to fit patients' somatic dysfunction in order for them to manage themselves.

## Objectives

1. To understand the functional anatomical connections of upper and lower quarter musculature to the proximal trunk and pelvis.
2. To introduce the concept of neuromuscular imbalance as a contribution to musculoskeletal dysfunction.
3. To learn exercises to address specific somatic dysfunctions found in the vertebral column and pelvis.
4. To be able to design and sequence a home exercise program for patients to complement manual medicine.
5. To be able to instruct patients on an exercise program based on their functional goals and lifestyle.

## Prerequisites

A basic understanding of functional anatomy and one Level I course or its equivalent.

## CME

20 hours of AOA Category 1-A credit is anticipated



## Program Chair



**Brad Sandler, DO**, is a 1992 graduate of Des Moines University College of Osteopathic Medicine. He completed his rotating internship at Oakland General Hospital in Madison Heights, MI, and his residency training in osteopathic manipulation and biomechanics at Michigan State University College of Osteopathic Medicine. He joined Corrective Care in Mishawaka, IN, in 1995, and became its vice president in 1999. Dr. Sandler is board certified in NMM/OMM, and specializes in the treatment of difficult muscle, tendon, ligament and joint pain syndromes. Dr. Sandler not only teaches exercise prescription, but takes his own medicine by incorporating exercise into his lifestyle for the past 30 years.

## Course Times

Friday and Saturday: 8:00 am - 5:00 pm (lunch provided)  
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## STRUCTURAL PELVIC FUNCTION

FRED L. MITCHELL, D.O., F.A.A.O.

Chattanooga, Tennessee

The subject, I realize, is controversial and there are probably as many different opinions as there are authors, and even more. These facts notwithstanding, my purpose here is to present an explanation of sacroiliac, iliosacral and symphyseal motion that will stand the scrutiny of the anatomist as well as the clinician and technician.

There are many who have written on the subject and ALMOST satisfied my need of explanation, and I keep hoping to find an authority to back my opinion completely. Now I have reached the point I am afraid I will find someone, and these efforts will have been in vain.

The men who have come closest to the correct description (as far as I am concerned) are H. V. Halladay,<sup>1</sup> C. G. Beckwith<sup>2</sup> and Harold I. Magoun.<sup>3</sup>

Since publication of this article in the 1958 Academy Yearbook I have found no reason to change the basic premise. An opportunity has been afforded to present my impressions of the subject to many groups from coast to coast. For this I am grateful. There has been some just criticism of several points, but not nearly as many helpful suggestions or questions as hoped for. There have been those who have taken the time to report on improved results on patients. For these I am also humbly grateful. A normally functioning pelvis is one of the major factors in health and disease. A need for knowledge of its function, recognition of its functional derangements and effects on total body economy, and the knowledge of its management become increasingly apparent.

F. L. M.

### INTRODUCTION

The importance of normal structural pelvic function I have tried to express in a few words.

The pelvic girdle is the cross-roads of the body, the architectural center of the body, the meeting place of the locomotive apparatus, the resting place of the torso, the temple of the reproductive organs, the abode of the new life's development, the site of the two principal departments of elimination, and, last but not least, a place upon which to sit.

When the osteopathic physician appreciates the relationship of the bony structures of the pelvic girdle to good body mechanics, circulation to the pelvic organs and lower extrem-

ities, reflex disturbances to remote parts of the organism through endocrine or neurogenic perverted physiology, and can master the diagnosis and manipulative correction, he has the basic tool from which all therapy can begin. This knowledge helps take him out of the symptom-treatment class and sets him apart as the physician par excellence. The sacroiliac and iliosacral and symphyseal lesions are technical and complicated. The technique for the correction is not difficult, and is worthwhile knowing.

To the osteopathic specialist in gynecology and proctology, here is a challenge. He can give a service unequalled in the history of the healing arts.

### PURPOSE

The purpose of my efforts is to point out

the importance of the pelvis to the entire body economy, to present for your consideration a tentative classification of the pelvic lesions, and to outline methods of diagnosis and treatment of the classification presented.

Fryette<sup>4</sup> has this to say of the sacrum: "Little wonder that the ancient Phallic Worshipers named the base of the spine the Sacred Bone. It is the seat of the transverse center of gravity, the keystone of the pelvis, the foundation of the spine. It is closely associated with our greatest abilities and disabilities, with our greatest romances and tragedies, our greatest pleasures and pains."

At the Sacro-Iliac Society meeting in Dallas in 1939 Northrup<sup>5</sup> made this observation: "Whenever we study body mechanics we are forced to recognize that the sacroiliac articulation is the real mechanical base of body structure. Often the feet are referred to as the foundation of the body but from a real mechanical study we must admit that all foot activity is dependent on the mechanics of the hip and pelvis. Therefore, there is no doubt that the sacroiliac forms a logical starting point for all osteopathic study."

#### ANATOMICAL CONSIDERATIONS

##### The Bones

The two innominate bones formed from the three embryological parts, the ilium, the pubis, and the ischium with the sacrum, presenting their varied and complicated articulations, form the eternal triangle and, as usual, where this situation exists, there is trouble brewing. The pelvis develops into male and female types, but sex is not the determining factor. It depends upon the individual's degree of andricity or genicity. We find both types in both sexes. The importance lies in the fact that a large, heavily-muscled man with extra large thighs is going to have a pelvis of the female type with small auricular surfaces, and thus is more liable to injury. The normal, or weak thighs would be of the male type, with larger articulations and thus more stability. Fryette<sup>4a</sup> pointed this out, and also typed the sacra showing the variations of both the sacroiliac articulations and the lumbosacral articulations. Fig. 1 shows the Type A Sacrum in which the dorsal transverse segment is slightly greater than the ventral, and the second segment is distinctly broader across the dorsal surface. The third segment is distinctly narrower across the dorsal aspect. We can readily see the wedge-shaped sacrum with



Fig. 1



Fig. 2

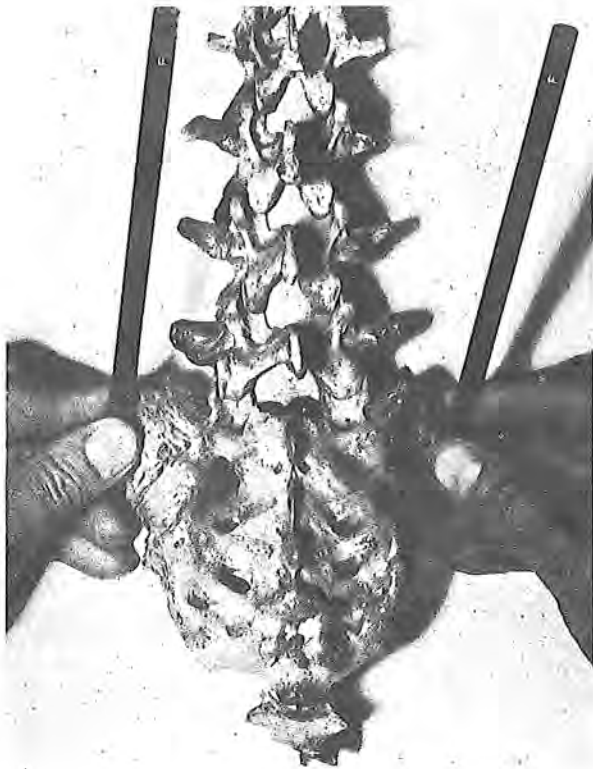


Fig. 3

the apex down. Fig. 2 shows the Type B Sacrum. Here we see the dorsal transverse measurement of the first segment is distinctly less than the ventral, and the wedge-shaped sacrum has its apex upward. In Type A the lumbosacral articulation is of the thoracic type, while Type B articulation is lumbar or sagittal. Fig. 3, Type C, is a combination of Type A and Type B, both as to auricular and lumbosacral facet facing.

The point of interest to the clinician is the realization of the fact that the direction of force to follow the articular plane must be altered to fit the individual, and in Type C must change in the treatment of the two halves. Also the lumbosacral facet facings determine 5th lumbar motion whether rotation is a major motion as in the thoracic or cervical type, or if rotation is restricted, as in the sagittal type; flexion, extension, and side-bending would be the consideration in treatment.

Auricular surfaces differ greatly. Fryette<sup>6</sup> shows in Fig. 4 three types: Type D is unusual in that it is smooth and quite convex antero-posteriorly. This is the type where the rare outflare or inflare innominates occur. "Inflare" and "Outflare" refer to specific sacroiliac osteopathic "lesions" which can only occur on a

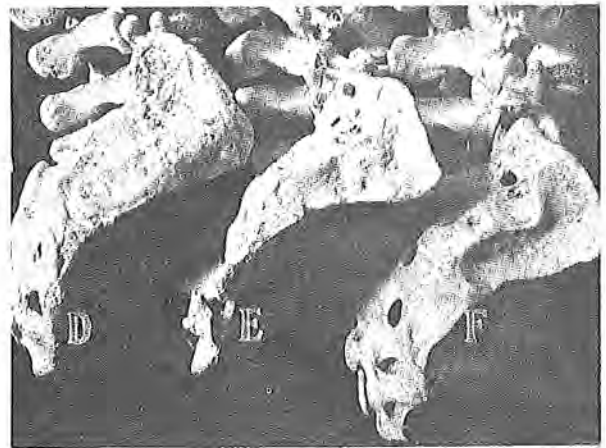


Fig. 4

convex auricular surface. Diagnostically, they can be recognized by unequal distances of the anterior superior iliac spines from the sagittal orientation plane of the body. Mobilization to correct this deformity is usually quite easy with gentle muscular energy techniques using the legs with the hips flexed. This is not to be confused with anatomic variations in the morphology of the innominate. Type E is the average auricular surface. Type F, extremely irregular and concave, is a very stable type of joint. Fryette<sup>7</sup> found these bilaterally uniform as a rule. However, occasionally they may be different in the two halves. Again knowledge of these variations is important in the treatment program. Anomalies in this part of the skeleton are frequent and bizarre. I do not wish to enlarge on that subject here. I would like to say merely that in my experience they have been observed, but frequently are not a part of the presenting mechanical problem.

#### The Symphysis Pubis

The symphysis pubis is designed for motion and has a joint cavity and a capsule as well as hyalin cartilage on each articular surface. It is amphiarthrodial in type. Morris<sup>8</sup> verifies these facts. Here is one of the best examples of bone function. It absorbs, directs, controls, restricts, and stabilizes motion.

#### The Sacrococcygeal Articulation

Due to the ligamentous attachments of sacrotuberous and sacrospinous ligaments the correction of coccygeal problems cannot be complete without the balancing of the pelvis. With this done, the other treatment is simplified.

### The Landmarks

Dr. Halladay<sup>9</sup> had this to say about landmarks: "Before making any attempt at diagnosis, we must first discover the palpable structures of the pelvis that change their position with movement." The landmarks listed are used in the analysis of pelvic function as presented in this paper. These landmarks are:

1. The anterior superior spine found at the anterior extremity of the iliac crest.
2. The pubic tubercle located superiorly on the pubes and at the lateral margin of the symphysis at the anterior end of the iliopectoneal line. Here it affords attachment for the inguinal ligament.
3. The medial malleolus located on the inner side of the lower end of the tibia.
4. The posterior superior spine found at the posterior end of the iliac crest.
5. The inferior lateral angle of the sacrum is the shelf made up of the fifth segment of the sacrum, superior and lateral to the sacrococcygeal synchondrosis.
6. In addition, the sacrotuberous, sacrospinous, posterior sacroiliac, and the ilio-inguinal ligament are used as landmarks. They are checked for tension, tenderness, and consistency.
7. The sulcus is found medial to the posterior superior spine and is used as a determining factor of the sacral base position. It is the method of recognizing the position of the sacral base in relation to the posterior superior spine.

### The Muscles

Muscles do not play a major part in directly moving the sacrum between the ilia. In observing the spinal movement it is easy to visualize the muscles as prime movers. Sacral movement, however, is the result of forces carried to it through the pull of the ligaments and gravitational forces or both. For example, in forward bending of the lumbar spine the ligaments lock the region and pull the sacral base superiorly and posteriorly as each segment reaches its limit of motion. Simultaneously, the ventral compression of the disc of L5 moves the sacral base in the same direction. This occurs after the forward bending component of

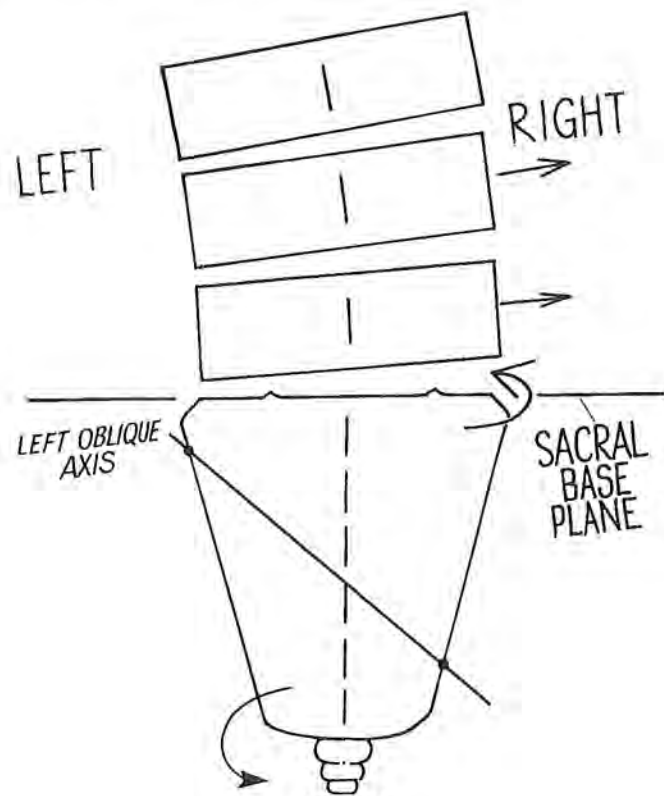


Fig. 4A

acetabular motion has reached its limit. Side bending of the lumbar spine and its accompanying rotation toward the convexity produces a gravitational force which locks the sacral base at its superior pole on the side of the concavity resulting in rotation of the sacrum on its oblique axis toward the concavity. (Fig. 4A)

The same is true of the muscles attaching to the innominates. The four powerful muscle groups of the thigh find origin in the innominate to move the lower extremity. Again the sacroiliac articulations act as a buffer; absorbing, directing, and equalizing force and energy from below. The gluteus maximus and piriformis cross the sacroiliac joint and pull in the direction of the oblique axes influencing pelvic function in this plane. The ilio-psoas helps to stabilize the sacroiliac anteriorly, being the only muscle to attach to the spine, pelvis and lower extremity. The coccygeus has the distinction of being the only muscle to insert on the sacrum; its origin being the spine of the ischium, and conceivably, could be a factor in the respiratory movement of the sacrum. Thus, these muscles are an integral part of its function. While these muscles are an important asset to sacroiliac function, at the same time, they must accept the liability

of the stresses that result from losses of motion, either in total pelvic function or specific sacral fixations.

Postural adaptation to our bi-pedal stance, and to the influence of gravity, is a harmonious interplay between muscle, fascia, ligaments, cartilage, bone and the articulations. The powerful muscles of the thigh and pelvis, as they propel us along, send foot-pounds of energy into the innominate bone where it is absorbed, equalized, conditioned and redirected by the muscles that attach to the innominate from above, (i.e., abdominal group) so that less stress and strain is thrown on the vulnerable sacroiliac and lumbosacral articulations.

There are twenty muscles on each side that attach to the innominate, and reach laterally or caudally for their insertion. Only eight find origin and extend cephalad to their destination. Of these eight, four are the abdominals that play a very important part in antero-posterior posture. The abdominals are the first, as a rule, to fail to hold up their end of the bargain. From a little simple arithmetic observe that twenty-eight muscles find origin on the innominates, and only eight originate on the sacrum. Muscle action is the chief activator of innominate movement, but muscle, articular locking and gravity influence sacral motion.

In the lesioning process there will be found muscles both in the role of instigator and maintainer. Those of the spinal mechanism, along with the fascia, ligaments and other structures, produce and maintain the sacroiliac lesions. While the muscles, fascia, and ligaments of the lower extremity and abdomen play a similar role in producing and maintaining iliosacral lesions.

When abnormal demands through muscle contraction accumulate to the point of pulling joints beyond their limits, the muscle is in a sense the instigator. When a contracture from an insult to the muscle structure and associated fascial changes occur, the contracture then becomes one of the lesion-maintaining factors. Thus, bilateral myofascial harmony is disturbed and it becomes part of the problem to be solved. Muscle length and strength should be equal bilaterally.

#### The Axes of the Pelvis

The axes of the pelvis described herein are the keys to the secret of sacroiliac and iliosacral differential diagnosis. An adequate knowledge of the anatomy, and thus of the bony landmarks, opens the door. I have been aware

of these axes since 1948, but not until 1957 was I able to find anyone with knowledge of anatomy and physiological movements who would sit down and hear this through. Dr. Paul Kimberly of St. Petersburg, Florida, took his valuable time to do this. He helped me in descriptive terminology, and with the organization of this section. My thanks to him.

Several of the axes have been described in previous orthopedic and osteopathic literature. Some describe motion without defining the axis. Some describe the axis but fail to completely describe the motion. Dr. Sutherland<sup>10</sup> has called attention to an involuntary movement of the sacrum between the ilia in contradistinction to the postural mobility of the ilia upon the sacrum. According to Sutherland the respiratory axis is an arc around a transverse line running approximately through the articular process of the first and second sacral segment. The arrangement of the ligament is such that the sacrum can swing within limits between the ilia along the line of these ridges without materially changing the tension.

Magoun<sup>11</sup> describes in one phase the oblique axis without giving its exact location, indicating to me his understanding of one important phase of sacroiliac motion. He said, "The common type of movement encountered is about an oblique axis running from the top of one hip pocket to the bottom of the other as found with the ordinary 'twisted' pelvis." Here the sacral base on one side (in proximity to the posterior superior iliac spine) is anterior, and the apex on the other side, (in proximity to the posterior inferior iliac spine) is posterior. Such sacral positioning is not hard to determine by carefully probing with the thumb the tissues overlying the sacrum while the patient is prone.

There are many other references to the axes which would lend support to the ones herein set forth. I do not wish to belabor the point. The axes are:

1. A transverse axis through the symphysis about which the pubes rotate to permit motion of the ilia in walking. This amounts to yielding of the soft tissues composing the articulation. There is no measurable superior or inferior positioning in the normal ranges of motion.
2. A transverse axis through the articular processes of the second sacral segment, (Note: this will be called the Superior Transverse Axis) about which the sacrum swings as if suspended from the posterior sacroiliac ligaments. (Fig. 4B) This is Sutherland's Respiratory Axis,

and the movement occurs during:

- a. Respiration - the sacral base moves posteriorly with inhalation and anteriorly with exhalation.
- b. Synchronously with movements of the spheno-basilar symphysis the sacral base moves posteriorly with spheno-basilar flexion, and anteriorly with spheno-basilar extension.

This axis is not used in the motion cycle of walking, nor is there measurable motion from the bony landmark viewpoint. It may be used in the extremes of postural bilateral flexion or extension.

3. A transverse axis through the pivot points of the lateral L-shaped articular surfaces of the sacrum which lies at the level of the second sacral body. (Note: this will be called the Middle Transverse Axis, Fig. 4B). The sacrum rotates about this axis in normal flexion, (base downward and forward, apex posterior and superior); and in normal extension. There are variations of this movement in different specimens. Also changes from one axis to another during one movement may occur; a pivotal type action may change to one of gliding.

4. A transverse axis through the inferior pole of the sacral articulation extending laterally through the ilia near the posterior inferior spines (Note: this will be called the Inferior Transverse Axis) about which the ilia move during one phase of the motion cycle of walking.

5. Oblique axes through the sacrum which extend from the superior end of the articular surface on one side to the inferior end of the articular surface on the other side. (Fig. 4B) These are named for the side of origin, thus may be called Right or Left Oblique Axis. Movement of the sacrum about this axis results in the sacral base opposite to the origin of the axis moving anteriorly and inferiorly while the apex of the sacrum on the same side as the origin of the axis moves posteriorly and inferiorly, (Fig. 4C) as a result of motion of the curved sacrum about a diagonal axis.

A point of anatomical importance in the accumulation of forces that help to establish and maintain the oblique axis is the pull of the gluteus maximus and piriformis when the pelvis shifts to the side away from the one for which the axis is names; i.e., in the case of the left oblique axis the pelvis shift would be to the

## AXES

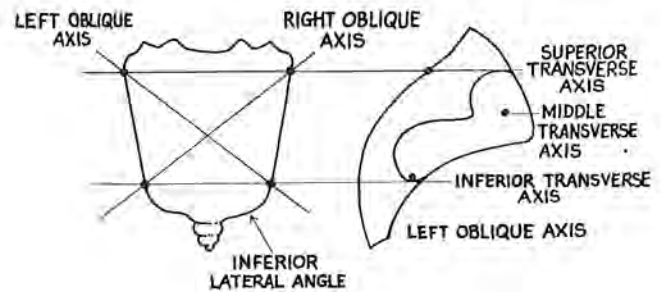


Fig. 4B

right, thus tensing these muscles on the right. This movement is also one phase of the motion cycle of walking. Postural change as in forward bending with side bending causes cephalic motion of both the sacral base on one side and the apex on the other and again is the result of motion of the curved sacrum about a diagonal axis. In the case of left side bending rotation in forward bending the right side of the sacral base moves posteriorly and cephalad on the short arm of the right auricular surface, and the left side of the apex moves anteriorly and cephalad on the long arm of the left auricular surface.

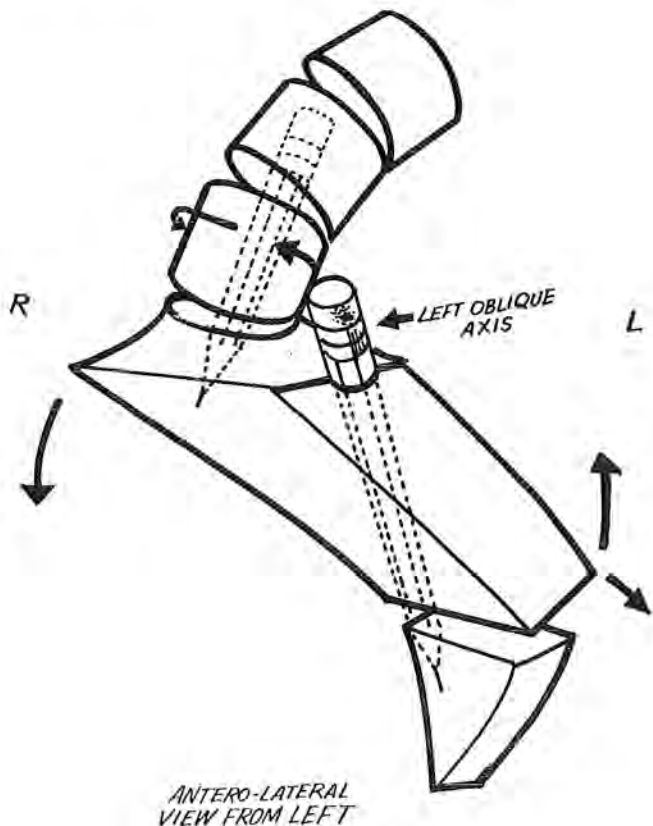


Fig. 4C

6. A vertical axis through the sagittal plane of the sacrum is used in total pelvic motion, but not in the physiological movement of the sacrum in relation to the ilia.

### THE MOTION CYCLE OF WALKING

#### In Relation to Sacroiliac Movement

The cycle of movement of the pelvis in walking will be described in sequence as though the patient were starting to walk forward by moving the right foot out first.

To permit the body to move forward on the right, trunk torsion in the thoracic area occurs to the left accompanied by lateral flexion to the left in the lumbar with movement of the lumbar vertebrae into the forming convexity to the right. There is a torsional locking at the lumbosacral junction as the body of the sacrum is moving to the left, thus shifting the weight to the left foot to allow lifting of the right foot. The shifting vertical center of gravity moves to the superior pole of the left sacroiliac, locking the mechanism into mechanical position to establish movement of the sacrum on the left oblique axis. This sets the pattern so the sacrum can torsionally turn to the left, thereby the sacral base moves down on the right. Increasing the sacral base plane's right tilt is the total pelvic right side bending that conforms to the lumbar C curve that is formed to the right.

When the right foot moves forward there is a tensing of the quadriceps group of muscles and accumulating tension at the inferior pole of the right sacroiliac at the junction of the left oblique axis and inferior transverse axis, which eventually locks as the weight swings forward allowing slight anterior movement of the innominate on the inferior transverse axis. The movement is increased by the backward thrust of the restraining leg when the heel strikes the ground. As the heel comes in contact with the ground, tension on the hamstring begins; as the weight swings upward to the crest of the femoral support, there is a slight posterior movement of the right innominate on the inferior transverse axis. The movement is also increased by the forward thrust of the propelling leg action. This ilial movement is also being influenced, directed and stabilized by the torsional movement on the transverse axis at the symphysis. From the standpoint of total pelvic movement one might consider the symphyseal axis as the postural axis of rotation for the entire pelvis.

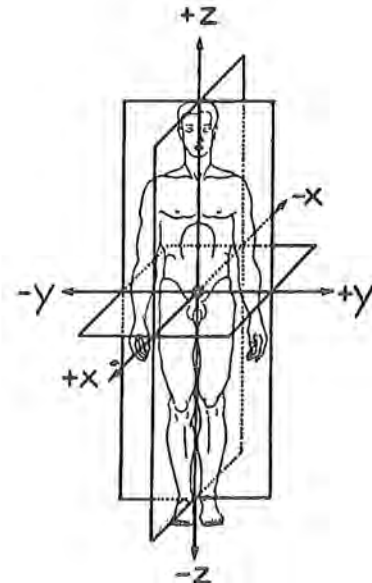
As the right heel strikes the ground and

trunk torsion and accommodation begin to reverse themselves, and as the left foot passes the right foot and weight passes over the crest of the femoral support, and the accumulating force from above moves to the right, the sacrum changes its axis to the right oblique axis and the sacral base moves forward on the left and torsionally turns to the right.

The cycle on the left is repeated identically to the right half movements. The shifting vertical center of gravity moves to the superior pole of the right sacroiliac locking the mechanism into mechanical position to establish movement of the sacrum on the right oblique axis.

### RELATIONSHIPS

In order to make visual and palpatory interpretations of the previously described landmarks, it is necessary to understand the relationships of these landmarks to the cardinal and orientation planes and the relationship of the sacrum to the lumbar spine, to the lower extremities, to the pelvic organs; also, the relationship of the sacrum to the ilia and the ilia to each other should be understood.



General orientation planes of the human body.

YZ frontal plane

XZ sagittal plane

XY transverse plane

The origin O is the common center of gravity.

Fig. 5

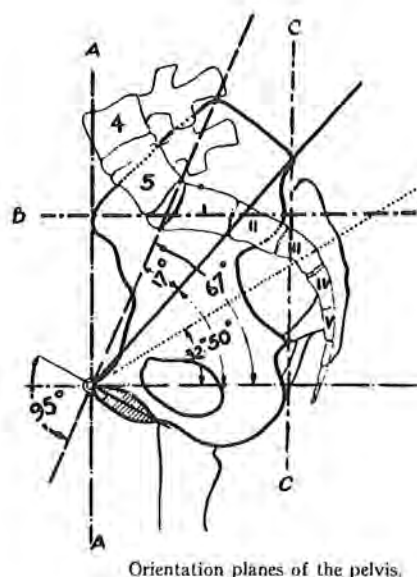


Fig. 6

With knowledge of the cardinal and orientation planes as presented by Steindler<sup>12</sup>, one is able to describe the motion of any given landmark as to direction and degree, and in relation to any other specified landmark. Reference to Fig. 5 will show the cardinal planes. First, the transverse plane is laid through the center of gravity with the body upright. Second, the sagittal plane is laid anterior-posteriorly, dividing the body into unequal parts. These planes bisect the center of gravity of the body in the upright position.

The special orientation planes of the pelvis are also described by Steindler<sup>13</sup> (Fig. 6). In the upright position a plane is laid touching the anterior superior spines and the superior edge of the symphysis pubis. This is parallel and anterior to the coronal plane, and is called the Pelvic Frontal Plane. (Fig. 6.)

A second plane slightly below the transverse cardinal plane through the anterior superior spine anteriorly and the posterior inferior spines posteriorly we will call the Pelvic Transverse Plane. (Fig. 6) One of the goals of treatment is to establish this plane in its correct relationship. Not described by Steindler, but for our purpose, there is a third plane laid through the posterior superior spines, parallel to and behind the coronal plane. This will be referred to as the Pelvic Dorsal Plane.

Positional changes by, or of, the anterior

or superior spines, the posterior superior spines, the pubic tubercles, the inferior lateral angle of the sacrum, and other landmarks can now be measured and visualized in relation to these planes.

In movement of the sacrum, especially in the oblique axis, between or on the ilium there is nearly always complimentary ilial motion. It is measurable as a rule. Even in bilateral flexion (base down and forward) there is some hinge-like motion at the symphysis, and an approximation of the posterior superior spines. Here the changing relationships are participated in by all three members of the pelvis. However, frequently there are found unilateral changes in which the relationship is not disturbed on the opposite side; such as the unilateral sacrum in flexion, and the anterior or posterior innominate. These will be discussed under movements. The unilateral changes are extremely common and are seen in patients with a large variety of complaints.

Relationship of the sacrum to the spine is of great importance. It is through this association that the sacrum absorbs energy and gravitational forces from above. It is here that nature plays most of her anomalous tricks which must be taken into consideration in a relative way. It is here the torsional stresses must be absorbed by the ligaments and transferred to the sacroiliac junction. It is here the angle of inclination of the sacral base must be evaluated. Magoun<sup>14</sup> handles this subject very ably in the 1946 Academy Year Book, so I will not belabor this point other than to say that a lateral film of the pelvis in some of the problem low-backs gives valuable information on the angle of inclination. Total spinal mechanics influence movement and restriction of movement at the lumbosacral articulations, and hence, to the sacroiliac junction. The anterior-posterior angle of inclination does not determine the amount of lordosis or lack of normal lumbar curve, but it is a determining factor in which area of spinal or pelvic mechanics the greatest stresses may fall.

The relationship of the ilia to the lower extremity at the acetabulum and thence influence to knee, ankle and foot conditions must be considered. The ilio-femoral ligament of the hip joint when stretched sends reflex pains into the lower extremity that may easily be confused with the reference pains of the sacroiliac ligaments. An interesting article by Dr. Borman<sup>15</sup> pointing out the articular facet variations in the lower lumbar and lumbosacral area in relation to herniations of the interverte-

bral disc, brought to my attention the frequency and type of changes occurring in this area. While I do not agree with his assumptions and certain conclusions as to the mechanisms of production of the radiculo-disc syndrome, his ideas must be included in our thinking until a broader understanding is achieved. The impression we need to develop is the frequency of occurrence of the "zygopophyseal tropism" at the lumbosacral junction and lower lumbar, so that in our management of this area we understand treatment takes into consideration the bilateral differences; not forgetting the change in sacroiliac direction which accompanies the coronal and sagittal facet facings. Dr. Borman did not extend his study to the sacroiliac joints, i. e., the type, A, B, and C. sacrum.

Dr. Charles Owens<sup>16</sup> in the mid-thirties impressed on my thinking the importance of pelvic balance, and also the fact that pelvic balance has not been achieved unless the organs it houses are in proper relationship to the bony structure, and to each other. Therefore, the retroversions, retroflexions, other malpositions and myofascial changes in the supporting adnexa must not be overlooked.

#### MOVEMENTS OF THE PELVIS

While there is a great difference of opinion of the sacroiliac and iliosacral movement, in my opinion, one of the barriers has been the lack of a common vocabulary, plus the failure of the informed on the subject to verbalize. My opinions have been arrived at mostly by observation. Recently I have tried to substantiate them with all the literature I could find pertinent to the subject. Halladay<sup>17</sup> in his outline of movements of the articulations of the pelvis covered most of the material, but failed on several points to extend his discussion.

In general, there can be visualized and palpated bilateral flexion or extension of the sacrum either on the superior or middle transverse axis, but this does not produce superior or inferior movement at the symphysis. It does produce a slight hinge-like action not palpably measurable as a rule. Unilateral ilial movement may or may not produce measurable superior or inferior displacement at the symphysis pubis depending on the degree of motion. In the majority of cases no measurable change is found at the symphysis.

Unilateral or bilateral superior or inferior movement at the symphysis pubis involves the sacroiliac articulations. The sacrococcy-

geal articulation, by its ligamentous and muscular attachments, is influenced either by sacroiliac or iliosacral movement.

Exaggerations and fixations in sacroiliac movement in the physiological planes are the chief concern of this paper, and they will be described. Only a few of the atypical displacements will be touched upon.

#### Physiologic Sacral Movements

Postural bilateral extension is a response to lumbar forward bending; the sacral base moving posteriorly and the apex moving anteriorly; thus decreasing the pelvic outlet. This movement is around the middle transverse axis.

Postural bilateral flexion is a response to lumbar backward bending. The sacral base moves anteriorly and the apex posteriorly. Since the apex is a greater distance from the middle transverse axis, the greater movement is at the apex, the point (inferior lateral angle) most available for diagnostic palpation. Bilateral deepening of the sulcus, tenderness of the superior spinous ligament between L5 and the sacroiliac, and the inability to forward bend at the lumbosacral junction, are diagnostic features.

Sacral torsion is the term used to describe the type of motion the sacrum assumes in its effort to do rotation and lateral flexion. The sacrum cannot and does not physiologically rotate on a vertical axis between the ilia. Rotation may occur on this axis only if forces are great enough to break through the physiological barriers. Neither does the sacrum do lateral flexion in relation to the ilia; due to their anatomical relationship this becomes an impossibility. But the sacrum does accomplish both of these movements in one action by turning its base and apex in the same direction on one of the oblique axes. Since this movement is of a twisting nature, the term "torsion" seems appropriate. Halladay<sup>17a</sup> gives this description: "On the side to which the sacrum is rotated, that is, on the side to which the body of the sacrum is rotated, there will be extension of the innominate at the sacroiliac articulation, and upward and forward gliding at the symphysis pubis, following the long axis of the joint, and the tensing of the sacrosacral ligaments on that side, resulting in slight deflection of the coccyx toward the same side." This movement as described above needs only a little clarification, and its counter-motion described to be complete. That Halladay was aware of

this type of motion was very pleasant to me. As described under the axes, the oblique axes run from the upper pole of the sacroiliac articulation to the lower pole of the opposite sacroiliac. If the sacrum moves in torsion on the left oblique axis to the left in the flexion phase, the body or base of the sacrum moves to the left, down the short arm of the right sacroiliac; thus simultaneously, the apex moves down the long arm of the left sacroiliac, carrying the inferior lateral angle of the sacrum posteriorly and inferiorly on the left. This is easily palpable. It is a physiological movement and position, and when locked or exaggerated is frequently seen as the presenting lesion or problem. Still using the left oblique axis, a less common motion is observed when the sacrum goes into torsional extension, turning the base to the right on the left oblique axis. This movement is a part of forward bending and rotation of the vertebral bodies into the concavity to a given side. In this case, to the left. The sacral base moves up the short arm of the right sacroiliac and up the long arm of the left sacroiliac. The inferior lateral angle on the left moves anteriorly and superiorly, while the right maintains its normal relationship with the right innominate. In both movements the ilia are carried in the direction the sacral base turns, as a rule. However, I have seen cases where ilial movement was of very minor amount, depending on the type of sacroiliac articulation.

Of more than passing interest is the engineering feat that occurs at the lumbosacral junction, and the appreciation of this helps to simplify its management. While authorities fail to agree on the motions of the lumbar spine, it has been my experience that a large majority of the patients I have examined osteopathically and with x-ray do demonstrate rotation of the lumbar vertebrae into the convexity from neutral or slightly backward bent position when sidebending is introduced. In forward bending, followed by turning of the body to accomplish side bending, the lumbar bodies rotate into the forming concavity. To some degree this must occur with the 5th lumbar in relation to the sacral movement, especially with lumbar type facets at the lumbosacral junction. Since the sacral base plane inclines to the right as the sacrum moves in torsion on the left oblique axis, turning its body to the left, there is automatically an effort of the body to pull the weight back in the midline, so a lumbar curve of the easy normal sidebending rotation occurs, and the bodies of the lumbar vertebrae turn to the right, while the sacral body

is turning to the left. This acts as a locking, protective mechanism, but becomes locked or fixed in a great number of patients with low back problems (i.e., the postural low back, the one-leg stander, the crossed-leg sitter, etc.). Reversing this mechanism is a key to part of the low back syndrome, to be described under treatment.

Unilateral sacral flexion is a movement which may be considered as abnormal. While it uses the superior transverse axis (the respiratory axis) and glides down the articular length of the sacroiliac arc, it exceeds the range of motion used by the sacrum in respiration and occurs on only one side. The relationship on the opposite side is positionally undisturbed, but, of course, is in strain and has some degree of locking. The inferior lateral angle is more inferior and less posterior in contradistinction to the bilateral sacrum in flexion when the middle transverse axis is used and the inferior lateral angle is more posterior and less inferior. Here the greater motion would be posterior with less caudal displacement. These are minor points, but if understood help in direction of force in correction. Occasionally the middle axis is used in postural unilateral sacral flexion.

Unilateral Sacral Extension is a movement which occurs rarely. When it does, it uses the middle transverse axis. The sacral base moves back and up as the apex (inferior lateral angle) moves up and forward on the side of involvement.

#### Innominate Movement

Unilateral Innominate in Extension (Posterior Innominate). There are many who feel this and a unilateral sacrum in flexion are one and the same. My experience has been that they are two distinctly different lesion patterns. Previously it was pointed out that from an anatomical standpoint the ilium is part and parcel of the lower extremity, while the sacrum enjoys the same relationship with the spinal mechanism. The forces moving or restricting movement of either come through their related anatomical counterparts. The muscles, ligaments, fascias, etc., of the spine are responsible for sacral movement, or lack of movement. The same is true of ilial movement; the lower extremity is the mover or restrictor.

Further, there actually occurs a different type of movement when the ilium moves on

the sacrum, in which the inferior transverse axis is used, and this sets up differential diagnostic points. The inferior transverse axis is at the inferior pole of the sacroiliac articulation when ilial movement occurs. The inferior lateral angle of the sacrum is level in relation to the transverse cardinal plane and the posterior inferior spines bilaterally. The finding of a deepened sulcus with prominent posterior superior spine that also occurs in a unilateral anterior sacrum has been a factor in preventing a differential diagnosis. The disturbed inferior lateral angle is the main differential point. Other differentiating factors will be given under diagnosis.

In a majority of cases there will be no measurable change at the symphysis, only torsion yielding the tissues. However, if the accommodating factors at the symphysis are broken through, there would be an elevation of the symphysis on the side of the extended innominate.

Unilateral Innominate in Flexion (Anterior Innominate). This lesion occurs most frequently on the right side. Using the inferior transverse axis, it moves forward along the entire joint, producing a shallow sulcus medial to the posterior superior spine with no change at the inferior lateral angle. Like its neighbor, this one has been confused with Sacrum in Extension, a rare type of lesion. It may, or may not carry the symphysis inferiorly on the same basis as described for the extended innominate.

Symphysis Pubis. When the symphysis pubis is lesioned as a primary factor, it can be quite disabling, since it acts as the postural axis of rotation for the pelvis, using a movable transverse axis for its normal response to ilial movement. When this axis is disturbed, and it presents superior or inferior displacements, it receives priority in the treatment program.

Its movements in response to the iliosacral physiological movements amount to a rotation yielding of the tissues about a movable transverse axis, with possibly some gliding along the long axis of the joint which is not measurable. When the sacral base bilaterally moves forward in sacral flexion the posterior superior spines approximate, and there is a slight hinge-like movement at the symphysis. The hinge movement is reversed in bilateral extension of the sacrum. The shearing movement, superiorly or inferiorly, along the long axis of the symphyseal articulation in which

the pubic tubercle is measurably higher on one side or lower on one side, is not a physiological movement, but is the important one to be considered here. There is always an associated ilial lesion.

#### Sacrococcygeal Movement

This movement is flexion or extension with a slight lateral flexion possible. A big problem for so small an area at times. Many times involved in sacroiliac and iliosacral disturbances.

#### DIAGNOSIS

Diagnosis is based on history, osteopathic evaluation, physical and laboratory findings, x-ray being used to rule out or substantiate physical tentative diagnosis. Fryette<sup>18</sup> says: "A diagnosis should be so complete that it will indicate the technic of correction." "If based on scientific mechanics, the diagnosis will tell what physiological movements and what forces are necessary to move the displaced joint surfaces and overcome the tissue resistance in correcting a lesion with accuracy and a minimum of trauma. Diagnosis of an osteopathic lesion includes the recognition of both the bony relationships and the condition of the soft tissues in the lesioned area." "The accurate detection of all of the findings of a Still lesion is not a thing to be quickly accomplished or lightly passed over. It is an absolute must for satisfactory results in treatment."<sup>18A</sup>

As to the short-leg problem, my experience agrees with the findings of Nelson<sup>19</sup> reporting on Kettler's<sup>20</sup> contribution. Kettler was the first to focus my attention on the importance of the vast amount of tissue involved between joints, muscles and fascia, and the changes it undergoes in the lesioning process. Further, without establishing bilateral myofascial harmony the lesion pattern is not obliterated, and hence, returns again and again. Viscerosomatic and somato-somatic reflex changes are also given special attention, but are not a consideration in this paper.

The sacroiliac functions as two different joints, depending on the introduction and activation of force. If the force, gravitational or muscular energy, comes from above and moves the sacrum, there is a sacroiliac lesion. By the same token, if the force or energy comes from below, the result is an iliosacral lesion.

Diagnosis of the lesion is made by observation and palpation. Measurement of joint

motion by palpatory means is only a minor consideration in this method. The major evaluation is made by palpation of specific landmarks and the ability of the patient to put his sacroiliac through its normal movements. Therefore, diagnosis is made in four positions: standing, sitting, lying supine and lying prone.

#### Patient Standing

Position of the pelvis should be noted, whether in side-shift, rotation, or combination. Always look for spinal curves, shoulder positions, head carriage, tight hamstrings, short tenso-fascia-lata, etc. In this method the shortened muscles, fascia, ligaments, the concavities of the spinal mechanism, the partial fixed flexions and extensions of the spine or lower extremities, are the areas of which to make note.

Ask the patient to walk; note position of feet; function of knees; and pelvic motion. With his back to the operator, have the patient bend forward, while the operator places his thumbs on the posterior superior spines. Direct the patient to bend forward, arms hanging free. Have patient's feet about four inches apart. If the sacrum is free to move, the posterior superior spines will maintain their positional relationship to each other. However, if the sacrum or ilium is locked, the ilium will be picked up and carried forward and up, indicating the restriction to postural movement, a point in differentiating the lesioned side. Observe the spinal curve and position of the free-hanging hands. Many times one hand will be one to three inches nearer the floor.

At this point the spinal curve may be very misleading, giving the impression of disturbed spinal mechanics. Not until the patient is seated and bends forward can it be determined if the factors producing or maintaining the curve are in the spine or lower extremity mechanism. Note which knee bends first as the patient bends forward, or in which leg the patient feels pain as the pull on the hamstrings increases. Or, ask the patient which leg pulls the most. Palpate the tenso-fascia-lata to determine which is more tense as the patient stands with heels together. This is the first step in making a tentative diagnosis. Motion loss is the criterion; not pain.

#### Patient Sitting

Position the patient seated with feet flat on floor, knees at right angles and apart sufficient to allow shoulders to come between them in forward bending. Have patient bend

forward, reaching for the floor with his hands. If he is able to accomplish this, and the former curve seen in the standing position is obliterated, you, at once, know the restraining mechanism is in the lower extremity. (This is important in the treatment program) If the patient cannot bend forward, locate the area of pain that is preventing the motion. It may be spinal, pelvic or lower extremity, or a combination.

A second check is made to see if free sacroiliac movement is possible. Place thumbs over the posterior superior spines and have the patient bend forward. Note if posterior superior spines do not move, allowing sacrum to freely extend, or if it is locked, thus carrying the fixed ilium (posterior superior spine) superiorly. If the fixation is on the same side sitting as determined when the patient was standing, you know on which side the lesion is, and you are now ready to make the final diagnosis with the patient lying. Here use is made of cardinal and orientation planes to better visualize landmark positional changes, keeping in mind at all times the relationships of the bones to each other.

#### Patient Supine

Check bony landmarks, pubic tubercles, anterior superior spines, the medial malleoli, and also the inguinal ligament if there is a symphyseal shearing lesion. Symphyseal superior or inferior movement is easily visualized, as the pubic tubercle on a given side moves up or down in relation to its fellow, and to the transverse plane lying on top of the symphysis.

The anterior superior spines may be visualized in relation to the pelvic frontal plane (the spines moving anterior or posterior to this plane) as well as in their anterior posterior changed relationship to each other. The pelvic transverse plane makes superior or inferior movement of the spines readily visualized in relation to this plane and to each other. In this position the patient should also be checked for the rare inflare and outflare innominate lesions. The anterior superior spines are measured in relation to the cardinal sagittal plane which passes through the umbilicus. The locked side, as demonstrated in standing and forward bending, is the lesioned side.

#### Patient Prone

Check the posterior bony landmarks, posterior superior spines, medial malleoli, and the inferior lateral angle of the sacrum (point

of differential diagnosis of iliosacral and sacroiliac lesions). The posterior superior spines can be best visualized in relation to the pelvic dorsal orientation plane as one or the other moves anteriorly or posteriorly to this plane. The pelvic transverse plane can be visualized at the level of the posterior superior spines, so superior and inferior movements of the posterior superior spines can be determined.

The inferior lateral angle positional change is readily observed by using the sagittal cardinal plane and the pelvic transverse plane to make a big plus (+) mark at this landmark. (Fig. 7) The transverse bar of the plus sign is at the lower border of the inferior lateral angle, and the vertical bar bisects the transverse bar at the sagittal plane which vertically bisects the sacrum and coccyx. Visualization of the anterior-posterior or superior-inferior movement is apparent.

To further differentiate if the lesion is primarily an anterior innominate or posterior innominate have the patient raise up on his elbows. The restricted side (many times the asymptomatic side) will be noted by its failure to allow the sacral base to move down and forward. The operator's thumbs are bridging the sacroiliac at the level of the posterior superior spine to determine free or fixed sacral movement. Having an appreciation of the normal positional relationship of the innominate to the body as a whole is a further aid in differentiating primary from associated pelvic changes. This knowledge is used in both supine and prone positions.

Occurrence of single lesion patterns is not the rule, but for visualization purposes it seems best to discuss them as occurring singly.

#### Lesions of Symphysis Pubis

With the patient supine, examine the pubic tubercle. Approach with light pressure, using the index or middle fingers, bringing the fingers in contact bilaterally. (Fig. 8) Locate pubic tubercle. Determine if it is in superior or inferior position. With patient's knees drawn up, place thumbs inside anterior superior spines along the ilio-inguinal ligament. Determine amount of tenderness and tension. Determinations from sitting and standing positions indicate the locked side, and are used to further diagnose the primary involvement. Torsional and hinge-like locking as the result of bilateral flexion of the sacrum and sacrum in torsion may be determined at times by springing the symphysis with the heel of the hand.

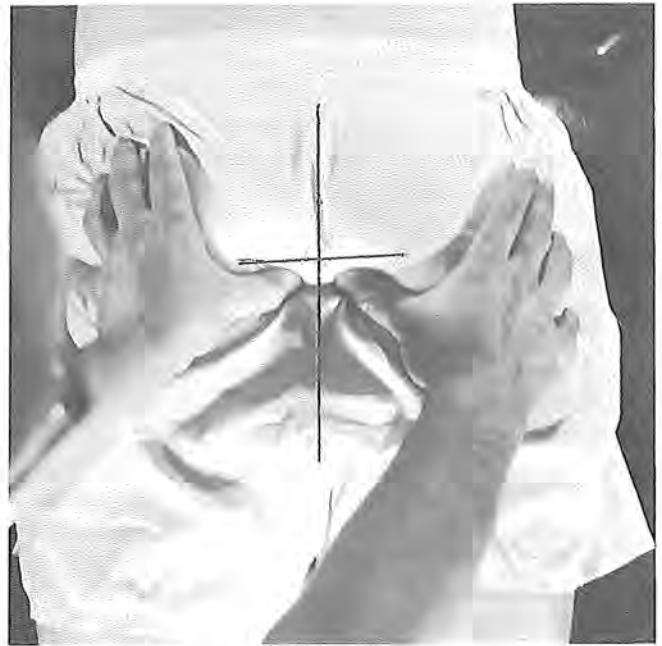


Fig. 7

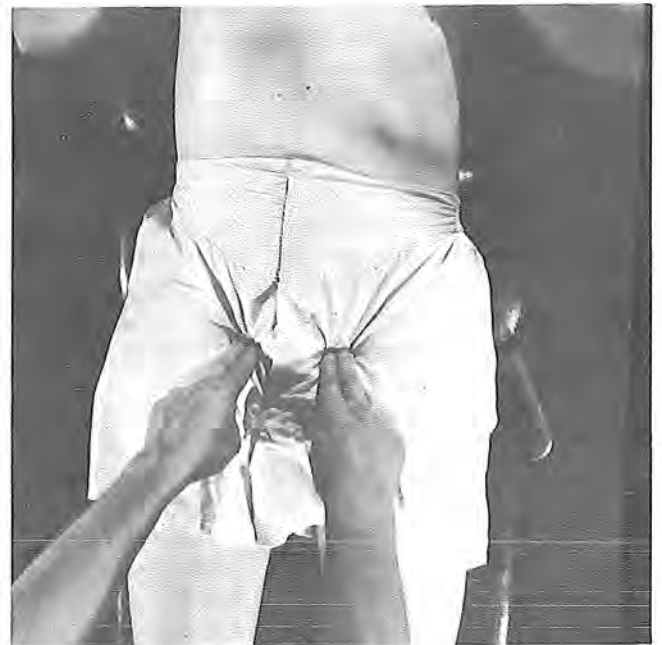


Fig. 8

#### Iliosacral Lesion or Innominate Lesions

##### Examples

1. Ilium in extension left (posterior innominate left)

Patient supine - check anterior landmarks.

The anterior superior spine has moved superiorly and posteriorly on the left. The pubic tubercle shows no measurable change.

The medial malleolus moves superiorly

or cephalad on the left.

Patient prone - check posterior landmarks.

Posterior superior spine has moved posteriorly and inferiorly on left.

Sulcus - is deepened on the left. Posterior sacroiliac ligament is tense on left.

Inferior lateral angle shows no change.

Medial malleolus is cephalic on the left.

2. Ilium in flexion on right (anterior innominate right).

Patient supine.

The anterior superior spine has moved anteriorly and inferiorly on right.

The pubic tubercle shows no measurable change.

The medial malleolus is caudal on right.

Patient prone.

The posterior superior spine is anterior and superior on the right.

The sulcus is shallow on right.

The inferior lateral angle shows no change.

The medial malleolus is caudal on right.

3. Out-flare innominate on right. (Can occur only with convex articular surface of sacrum). May have flexion or extension as an associated component. Use finding in 1 and 2 to determine.

Patient supine.

Anterior superior spine moves laterally and to the right in relation to the sagittal cardinal plane and its fellow.

Pubic tubercle shows no measurable change other than stress.

Medial malleoli show no change unless complicated by anterior or posterior innominate, which frequently is the case.

Patient prone.

Posterior superior spine on right approximates sagittal cardinal plane.

Sulcus is narrowed on right.

Inferior lateral angle shows no change.

Medial malleoli show no change.

4. In-flare innominate on left. (Occurs only with convex sacral articulation).

Patient supine.

Anterior superior spine on left moves medially and approximates sagittal cardinal plane.

Sulcus is wider, ligament tense.

Inferior lateral angle shows no change.

Medial malleolus shows no change.

5. Up-slip innominate. (Not physiological,

but for completeness, is included.)

Produced by extreme force when weight is caught on one leg with the body in the upright position. The arc-like movement of the innominate is not accomplished. There is a shearing, cephalic movement of the innominate in the sagittal plane, producing a relaxed sacro-tuberous ligament. There is a short leg on the same side. Both anterior superior spine and posterior superior spine superior on same side

### True Sacroiliac Lesions

There are six of these.

1. Bilateral flexion
2. Unilateral flexion
3. Bilateral extension
4. Unilateral extension
5. Torsion on left oblique axis to right and left.
6. Torsion on right oblique axis to right and left.

The inferior lateral angle is the most important landmark. It is the point of differential diagnosis of sacroiliac and iliosacral lesions. The change in its position is the result of arc-like movements which the sacrum makes around the superior and middle transverse axes and the oblique axis. Its change of position in relation to the cardinal and orientation planes and to the ilia is the major factor in diagnosing the present lesion.

1. Bilateral Sacrum in Flexion. (Base down and forward)

Patient supine.

Anterior superior spines - no change.

Pubic tubercles - no change. (hinge-like locking at symphysis may be noted)

Medial malleoli - no change.

Patient prone.

Posterior superior spines - equal but approximated.

Sulci - deepened. Ligament tense bilaterally. (Interspinous ligament between 5th lumbar and 1st sacral spine always tender if true lumbosacral lesion.)

Inferior lateral angles - posterior and inferior bilaterally. Sacrotuberous and spinous ligaments tense.

Medial malleoli - no change.

2. Unilateral Sacrum in Flexion on Left.

Patient supine.

Anterior superior spine - carried posteri-

only and superiorly on left  
Pubic tubercle - no change.  
Medial malleolus - caudal or inferior on left. (The left leg in a posterior innominate lesion would be short - differential point.)

Patient prone.

Posterior superior spine - posterior in relation to sacral base on left. (May or may not be in relation to orientation planes)

Sulcus - deepened on left.

Inferior lateral angle - inferior and posterior on left. The positional relationship of the right sacroiliac unchanged. (Second differential point from posterior innominate lesion in which no change is noted in the inferior lateral angle.)

Medial malleolus - inferior or caudal.

3. Bilateral Sacrum in Extension. Rare in proportion to bilateral flexion. Occurs in persons who squat or bend over for long periods of time.

Patient supine.

Anterior superior spines - no change.

Pubic tubercles - no change.

Medial malleoli - no change.

Patient prone.

Posterior superior spines - equal in relation to each other bilaterally. Anterior in relation to sacral base.

Sulci - shallow.

Inferior lateral angles - equal anteriorly and superior bilaterally. Persons with this type of lesion cannot straighten up - the debutante slouch - or tail tucked under. Kyphotic or reverse lumbar curve.

4. Unilateral Sacrum in Extension on Right (Rare)

Patient supine.

Anterior superior spine - anterior and inferior on right.

Pubic tubercle - no change.

Medial malleolus - proximal or cephalic on right.

Patient prone.

Posterior superior spine - anterior in relation to sacral base on right.

Sulcus - shallow.

Medial malleolus - proximal on right.

Inferior lateral angle - superior and anterior on right.

5. Sacral Torsion on Left Oblique Axis to the Left.

Patient supine.

Anterior superior spine - movement depends on degree of torsion. Moves superiorly and posteriorly on left, anteriorly and inferiorly on right. (In some cases whole pelvis twists; in others, no visible twist.)

Pubic tubercle - no change.

\* Medial malleolus - proximal or cephalic (short leg) on left.

Patient prone.

Posterior superior spine - posterior on left in relation to the pelvic dorsal plane, but not in relation to sacral base on the left. Posterior in relation to sacral base on right, anterior in relation to pelvic dorsal plane.

Sulcus - deepened on right. No change in upper part but shallow in lower part on left.

\* Inferior lateral angle - posterior and inferior on left.

\* Medial malleolus - proximal on left.

\*Note: When these occur in combination, the diagnosis of sacrum in torsion on the left is clinched.

6. Sacrum in Torsion Right on Left Oblique Axis.

Patient supine.

Anterior superior spine - superior and posterior on right. Anterior and inferior on left.

Pubic tubercle - no change.

Medial malleolus - proximal or cephalic on right.

Patient prone.

Posterior superior spine - posterior on right in relation to orientation planes. Anterior in relation to sacral base planes. Anterior on left in relation to orientation planes, no change relative to sacral base.

Sulcus - deepened on left. Shallow on right.

Medial malleolus - proximal on right.

Inferior lateral angle - superior and anterior on left.

The same mechanisms are produced on the right oblique axis but the frequency is much less. While I have no exact records, percentage-wise, on a large number of cases I would estimate that 90 per cent or more of the lesions occurring on the oblique axis occur on the left oblique axis. This agrees in

part with the postural lesioning patterns reported by Neidner<sup>21</sup> in his observations of the effects of gravity in producing this lesion pattern. (Counter-clockwise in this meridian)

The occurrence of single lesion patterns from a clinical standpoint is seen in the younger age group. Yes, even before they become ambulatory, and from the time of the first step these preambulatory lesions help determine facet facings and other developmental anomalies; or the patient just gets over the first trouble without seeing a doctor, and when a doctor does see him the accommodative stresses have added their structural changes and a second, or even a third injury has superimposed lesions on top of the primary one. The order of occurrence is difficult to determine at times, but an orderly approach to unravel the problem will be covered under TREATMENT.

An example of a rare but interesting combination of lesions emphasizes this point. Only one phase of diagnosis will be given. I believe this will point out the complicated lesion sufficiently. Patient lying on table.

Diagnosis: Symphysis superior on left, complicated by an anterior innominate on the left. 99 per cent of the associated lesions with symphysis superior on the left would be a posterior innominate on the left and could occur simultaneously, while the rare 1 per cent occurs as two incidents.

#### Supine.

Anterior superior spine - may be level from standpoint of pelvic frontal plane on left. Or may be slightly posterior, depending on the degree of symphyseal lesioning. \*It is superior on left.

\*Pubic tubercle - superior on left.

Medial malleoli - may be equal - or proximal, depending on the degree of each lesion.

#### Prone.

\*Posterior superior spine - posterior in relation to the pelvic dorsal plane.

\*Anterior in relation to sacral base.

Sulcus - shallow on left.

Medial malleoli - no change, or slightly superior.

\*Note: Important points of diagnosis.

The combinations of superimposed lesions are many, but with knowledge of the norm and of each single lesion possibility, the complicated diagnosis becomes a step by step simple analysis.

## TREATMENT

Many considerations must be weighed in the treatment program. The selection of indicated technique must come from the history of the problem; age, weight, mental attitude of the patient, and many other factors, including how much should be accomplished with the first, second, and following treatments. The dosage is as exacting as a dose of digitalis in many instances.

The articular and myofascial techniques to be discussed are intended to demonstrate a principle and most assuredly does not indicate that these techniques are used on every patient. They represent only two methods useful on a good number of cases.

One of the contributions made by the faculty of the Academy B Course was an outline of the principles basic to osteopathic manipulation. The application of any technique can be made to fit into the outline. Most of the outline is self explanatory; however, the word "barrier" may need clarifying. The barrier, as referred to here, means the restricting mechanism, which can be made up of one or many factors, i. e., ligamentous tension (including capsular tightening), muscular contraction, fascial restraint, pain producing muscular splinting, etc. The direct approach carries the lesioned components directly through this barrier into their physiological relationship, using any or all of the activating forces. The indirect approach carries the lesioned components away from the barrier to the ideal balanced ligamentous tension and allows the inherent intrinsic forces to reposition the joint components. Both methods are effective and either may be the method of choice in a given case. The outline as developed is presented herewith:

### Principles Basic to Osteopathic Articular Manipulation

**PURPOSE:** To restore physiological articular relationship by manipulation.

#### Essential factors:

1. Positioning of joint components.
  - (a) Direct method - engagement against the barrier in the several planes.
  - (b) Indirect method - disengagement from barrier and balancing ligamentous tension in the several planes.
  - (c) Combined method - disengagement followed by direct retracement.

## 2. Activation.

- (a) Extrinsic: Operator effort
  - Guiding
  - Thrust
  - Adjuncts
- (b) Intrinsic: Respiratory cooperation (inherent)  
Active Muscle cooperation

The goal of treatment is to normalize all tissues that are restricted in motion or function; to gain a state of equipoise, a condition of equilibrium where all opposing forces are equal; to attain dynamic rapport of tissues where all positions of normal range may be assumed, and in which the forces and counterforces maintain a balanced equilibrium. To be more specific; to establish bilateral myofascial length and strength in all the planes of the body, thereby creating physiological myofascial harmony in the dynamic sense of body unity.

This is neither the time nor the place to go into all the techniques to be used in patient management, nor even to discuss the principles of each. I do want to try to present one method of correction in seven different lesion patterns (listed below) which will demonstrate the direct method, using as the activating force the extrinsic guiding operator effort, plus the intrinsic respiratory and muscular cooperation of the patient.

1. Sacrum in torsion to the left on the left oblique axis.
2. Sacrum in torsion to the right on the left oblique axis.
3. Symphysis pubis superior on right.
4. Symphysis pubis inferior on left.
5. Sacrum in flexion on left.
6. Anterior innominate on right.
7. Posterior innominate on left.

1. Sacrum in Torsion to the Left on the Left Oblique Axis. (Fig. 4C)

This technique may be used on acute or chronic cases. Its simplicity and effectiveness assure and give confidence to the patient while being physically easy on the operator.

First, position the patient on the left side, knees drawn up to 90° angle; left arm behind patient hanging off the table. (Fig. 9). Visualize the sacral base turned to the left, moving down the short arm of the auricular surface on the right, and the apex slipping posteriorly and inferiorly along the long arm of the left auricular L. This is total sacral move-



Fig. 9



Fig. 10

ment, and is corrected with one positional action. (For superimposed lesions the technique for each one is employed). The associated spinal mechanics is related to the lumbosacral and lumbar type of facets, and if bilaterally coronal, there is most frequently a lumbar C curve convex to the right with vertebral bodies rotated into the formed convexity, or to the right. If, however, the facet facing is sagittal, L5 will rotate in the same direction as the



Fig. 11



Fig. 13

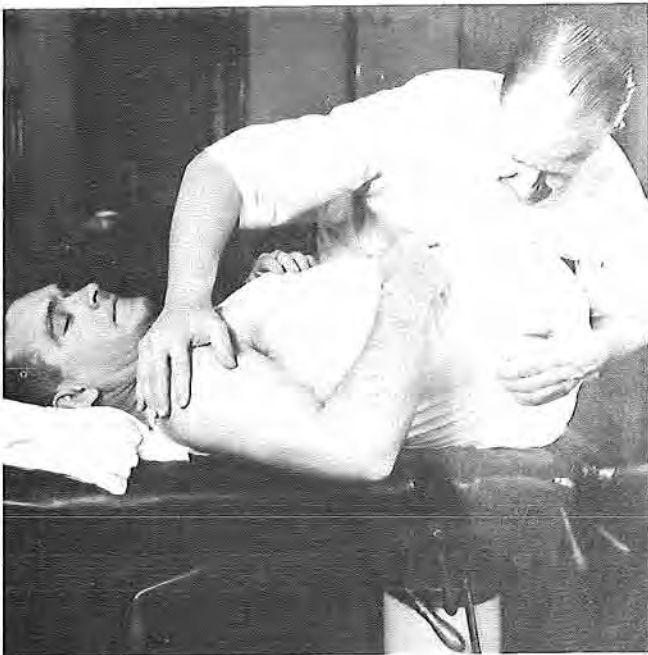


Fig. 12



Fig. 14

sacrum. Correction of the sacral torsion is not altered by this fact. The lumbar problem above this point is not in the scope of this paper.

Second, to reverse this by direct action with a guiding force, using the respiratory and muscular cooperation of the patient, place the patient's knees against operator's thighs so that the weight of the patient's knees is resting on the operator's thighs. (Fig. 10)

Third, place tip of middle and index fingers over junction of spines of L5 and S1 (Fig. 9) to palpate for motion. Shifting of operator's thighs locks patient's lumbar in forward bending, but allows free lumbosacral movement.

Fourth, place right hand over patient's right scapula (Fig. 9).

Fifth, have patient inhale, then exhale; instruct him to slowly reach toward the floor



Fig. 15

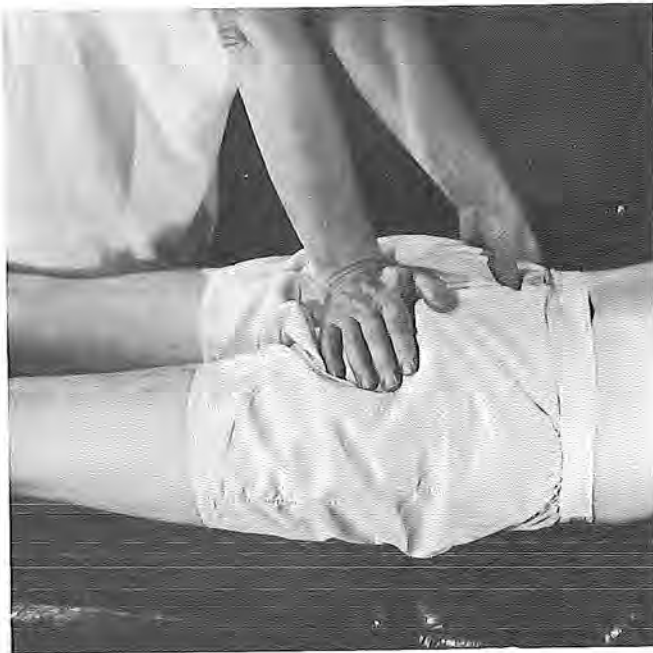


Fig. 16

with the right hand during exhalation. Take up slack with increased pressure of operator's right hand. Repeat breathing phase three times. The knees are carried toward the head (by shifting the operator's knees toward the patient's head) a slight amount with each exhalation to increase the forward bending as the lumbar vertebrae rotate into the forming concavity. An additional influence may be added. The

operator's left hand, as in Fig. 10, holds the feet down as the patient is requested to push toward the ceiling, slightly, with his feet. The reversing mechanism of spinal action allows the sacrum with the induced component of forward bending (bringing patient's knees up) to turn torsionally to the right in the direction of correction. It is easy - it works - it is physiological. To increase left lateral flexion, place the left hand on the patient's feet and push toward the floor. (Fig 10). This movement is not done except in resistant cases.

## 2. Sacrum in Torsion to the Right on the Left Oblique Axis.

This is the same type of technique as used in the above (No. 1) with reversal of the presenting mechanism. Using a guiding force with muscular and respiratory cooperation of the patient, it is used on the patient with the kyphotic lumbar, usually of the chronic type, not necessarily found in the uni- or bi-lateral antalgic position. Here the forward-bending lumbar spine has introduced rotation of the vertebral bodies to the left into the formed concavity, while the sacral base, by necessity, tilts to the left as the body of the sacrum turns torsionally to the right on the left oblique axis, moving cephalad along the auricular surface of the short arm of the right sacroiliac to the right, and up the long arm of the left sacroiliac L. This is the position created by the operator in correction of the sacrum in torsion to the right on the left oblique axis.

First, position the patient on the left side, left shoulder drawn forward, (Fig. 11) knees drawn up to a ninety degree angle and resting on the operator's thighs.

Second, place tips of index or middle finger of left hand at lumbosacral interspinous junction. Place right hand on patient's right shoulder.

Third, ask patient to inhale and exhale; and as he exhales, roll his right shoulder and head backward, to his right. (Fig. 12). Take up the slack (as the vertebrae rotate to the right) with your right hand during exhalation, and maintain. Repeat this three times. The knees are carried down slightly (away from the head) on each exhalation to produce spinal extension and facilitate lumbar rotation into the convexity. The feet may be depressed toward the floor on the last respiratory excursion to increase the convexity on the right, thereby allowing the vertebral bodies to easily rotate into the forming extended convexity, and the

sacral base on the right accomplishes its phase of flexion in response to lumbar extension and rotation by torsionally turning to the left.

### 3. Symphysis Pubis Superior on the Right.

First, position the patient on his back (Fig. 13) on the edge of the table so the sacrum is resting on the edge of the table, and the right leg is hanging off the table. Operator stands on the right side of the table.

Second, right hand of operator is placed on the patient's left hip below and over the left anterior superior spine. Maintain firm but gentle contact. Place operator's left hand above patient's right knee.

Third, using direct guiding force with the left hand, have the patient, with muscular cooperation, raise the leg. Operator holds leg and resists to the count of nine.

Fourth, ask the patient to relax and the operator then takes up the slack, pushing the leg toward the floor. This is repeated three times. Check the pubic tubercles to determine if correction is complete.

### 4. Symphysis Pubis Inferior on the Left. (Fig. 14).

First, position patient on back. Operator stands on right side of table. Place patient's left knee in operator's left axilla.

Second, place the thenar eminence of operator's left hand over patient's left anterior superior spine. Operator's right hand is put on the table so the knuckles act as a fulcrum when the thenar eminence contacts the tuberosity of ischium.

Third, carry the patient's thigh medially by operator shifting his body (Fig. 15). Do not lock by putting too much pressure on the knee and leg ... only enough to slightly gap the sacroiliac articulation posteriorly.

Fourth, have patient inhale deeply then exhale completely. At the beginning of exhalation increase pressure with both hands continuously through exhalation.

### 5. Sacrum in Flexion on the Left.

The method is direct. The operator uses a guiding force with respiratory and muscular effort of the patient.

First, place the patient prone, operator stands on the left side of the table with the thenar eminence of his right hand at the patient's inferior lateral angle of the sacrum on the left side. (Fig. 16).

Second, with the patient's feet comfortably

apart (so no bind is on the sacroiliac joint) ask the patient to turn the left toe in (medially). This gaps the sacroiliac posteriorly. (Fig. 17).

Third, ask the patient to breathe deeply and hold breath in; then take in another breath deeper, and (without letting breath out) breathe again deeper. All this time the operator is exerting a rhythmic pressure along the direction of the inferior sacroiliac L at the inferior lateral angle. Request patient to exhale, and operator continues pressure on inferior lateral angle until complete exhalation is accomplished. Check position, and repeat if necessary.

### 6. Anterior Innominate on the Right.

This method is direct, using a guiding force and the respiratory cooperation of the patient.

First, place the patient prone (Fig. 18) with the body on the edge of the table so the right leg may move freely without abduction. The arch of the patient's foot is placed on the operator's left patella, and the operator's other leg is positioned so that the lower inside of the thigh is pressed against the dorsum of the patient's foot, or on the ankle. The patient's right arm is placed on the table. The left forearm hangs off the table, the elbow bent at a ninety degree angle. The operator grasps the patient's right knee with his right hand, and places his left hand on the sacrum.

Second, carry the right thigh into flexion as far as possible without discomfort to the patient, and without a distortion to the spinal mechanism.

Third, visualize an inferior transverse axis at the inferior pole of the sacroiliac articulation. Have the patient inhale, as simultaneously the operator flexes his own knee slightly. The operator guides the patient's knee in the direction it moves most freely; i.e., forward with slight abduction or adduction. Have patient exhale, as operator continues to flex and guide the patient's knee in the direction of freest motion. The foot will lower and the patient's knee will elevate as the innominate is being rotated up and back on the inferior transverse axis.

Fourth, if the range of motion is great it may be necessary for the operator to move his feet forward, maintaining the position gained. Repeat the action twice more, through inhalation and exhalation, keeping steady pressure on the sacrum with the left hand. Do not allow the force to carry over into the sacral mechanism. This is very effective technique and may be used on both acute and chronic cases.



Fig. 17



Fig. 19



Fig. 18

#### 7. Posterior Innominate on the Left.

This is the most frequently occurring lesion in the pelvis, both as a single lesion and as a superimposed mechanism. The following technique may often be chosen. The method is direct, with the use of high velocity, low amplitude thrust.

First, patient is placed in prone position, operator stands on right side of table (Fig. 19),

and places his right thenar eminence approximately one inch above the left posterior superior spine, arm straight. (The apex of the short arm of the sacroiliac L is superior to the posterior superior spine). Flex the patient's left knee and grasp with fingertips of left hand (operator's arm completely extended) the patient's left knee.

Second, raise the thigh to a height allowed comfortably by the patient. If the quadriceps group is too short, attend the shortened group with muscular energy technique to stretch, then proceed.

Third, adduct and abduct the thigh to a point of greatest sacroiliac freedom.

Fourth, make a quick, short thrust that comes from the shoulder and is directed down the short arm of the left sacroiliac L. There is a slight lateral component to the thrust that gives separational effect. Movement is palpated by the thrusting hand, as a rule.

Presentation of these few techniques in no way represents a complete management program for sacroiliac problems. The intent is merely to show some methods of application of the principles presented.

#### SUMMARY

The knowledge of anatomical variation in sacroiliac articulations is of clinical importance in their manipulative management.

The symphysis pubis, often overlooked in management of the pelvis, deserves priority

in diagnosis and treatment. In my opinion it is the postural axis of rotation of the entire pelvis.

Bony landmarks are reliable in the pelvis in a vast majority of cases. They are used in determining motion changes in symphyseal and sacroiliac lesions. Loss of motion is the major criterion for determining the joint in trouble. The axes presented here are based on twenty-three years of observation and bits of information from osteopathic literature and anatomical studies. Cognizance of these axes simplifies visualization of physiological movements of the sacrum and ilium.

Relationship to cardinal and orientation planes has been used to help the reader visualize landmarks in relation to the body as a whole, and the bones to each other. Using

these planes any point on a specified bone may be described in relation to any other given point. Movements of the sacrum and ilia about the axes and in relation to the orientation planes and each other become a simple matter to visualize.

To the knowledge of axes and planes add the knowledge of landmarks and the patient's ability to articulate the sacrum and ilia in the three positions of standing, sitting, and lying, and the tools for diagnosing are at hand.

Treatment as presented here has already been clarified as a means of demonstrating only one method of application of the principles outlined. With knowledge of the physiological movements of the sacrum and ilia, one can devise his own techniques as he adapts them to a given patient.

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# Osteopathic Considerations in Systemic Dysfunction: Common Clinical Problems

July 20-22, 2012, at New York College of Osteopathic Medicine (NYCOM)

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This course presents a practical, hands-on osteopathic manipulative treatment (OMT) approach to everyday patient systemic complaints—ranging from sinusitis to pneumonia, gastritis to irritable bowel syndrome and headache to angina. The program centers on designing rational osteopathic care that integrates the five osteopathic care models and can be delivered in a clinically-effective, time-efficient manner.

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## Faculty

**Hugh Ettlinger, DO, FAAO**, is a 1987 graduate of NYCOM, where he serves as an Associate Professor of Osteopathic Manipulative Medicine (OMM) and director of the NYCOM/St. Barnabas NMM/OMT Residency Program.

**Michael Kuchera, DO, FAAO**, is a 1980 graduate of Kirksville College of Osteopathic Medicine. He currently directs the OMM Research and Human Performance and Biomechanics Laboratory at Philadelphia College of Osteopathic Medicine. He is also clinical director of the Center for Chronic Disorders of Aging and secretary-general of the International Federation of Manual/Musculoskeletal Medicine.

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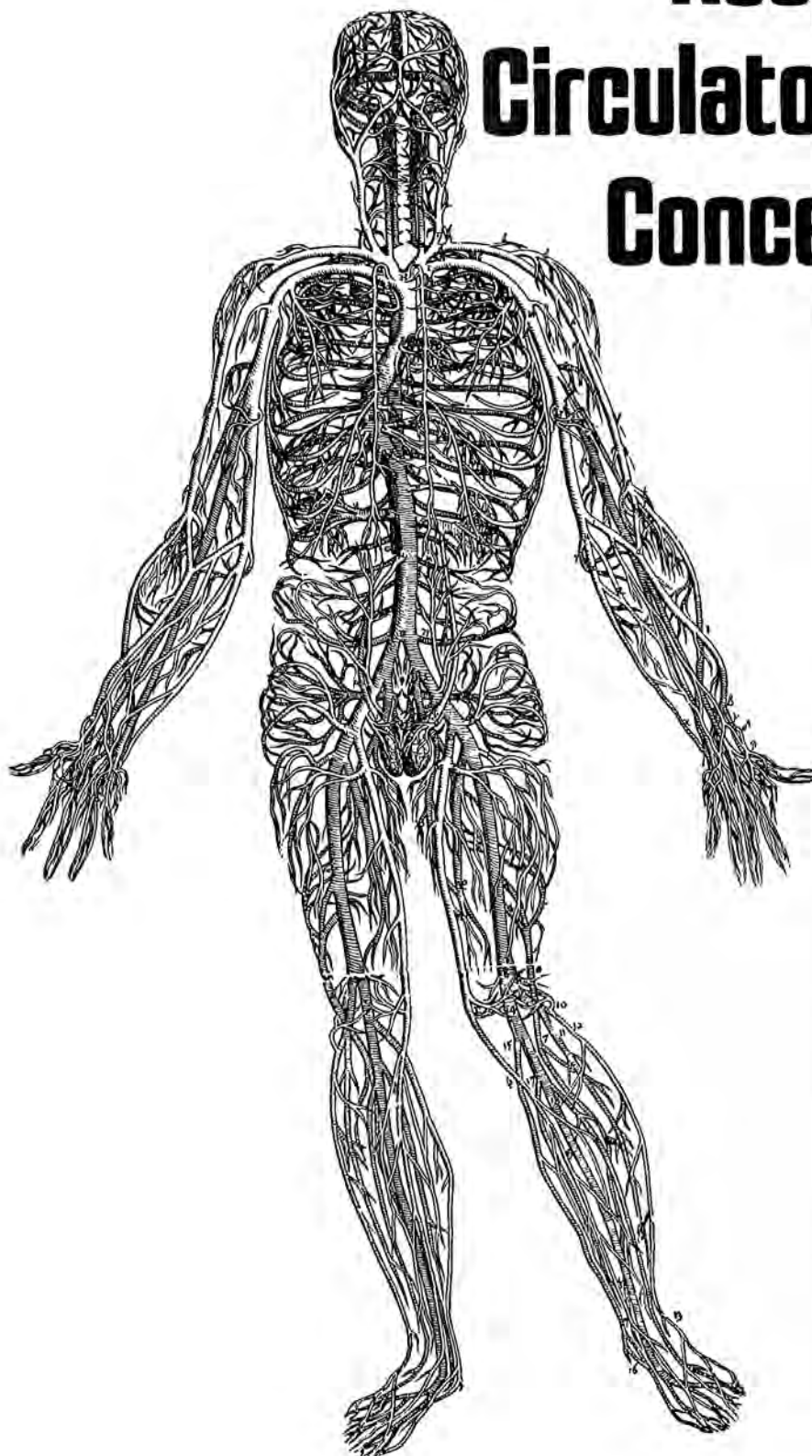


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# Respiratory and Circulatory Care: The Conceptual Model

By J. GORDON ZINK, D.O.



**F**orty years in the general practice of osteopathic manipulative medicine has convinced me that we as osteopathic physicians, by applying the principles laid down by Dr. Andrew Taylor Still and elaborated upon by Dr. William Garner Sutherland, can enhance the efficiency of external respiration, the movement of all body fluids, and, therefore, internal respiration throughout the body. It is the purpose of this article to share with you some of the observations that I have made over the years, to describe palpatory diagnosis, and finally to present the principles to be applied in treating the body osteopathically, using respiratory hydrodynamics, to achieve well-being.

Respiration and circulation are unifiable functions. The need for es-

establishing "normal" respiration, which is diaphragmatic when the patient is resting in the supine position, is obvious when we consider the fact that most of the volume of blood is found in the venous reservoir. This low-pressure system is dependent on pressure differentials in the body cavities for effective flow, because there is no assistance from the muscles, which are aptly called "peripheral pumps." The cardiogenic aspect of circulation depends on the respirogenic aspect of circulation to complete the circuit. But that is not all; the most important feature is the fact that "terminal" lymphatic drainage into the venous system is also dependent on this effective diaphragmatic respiration when the patient is resting.

As osteopathic physicians, we should strive to restore the tremendous intrinsic, elastic forces stored up in the thorax. These forces rely on the passive motion of the sacrum between the ilia during respiration, a level pelvis, and a spine with no lateral curvatures — free to move as designed so that when the patient is supine, the lumbar spine will flatten to the table. The ribs and their cartilages, as well as the sternum, must be able to move without myofascial restrictions or ligamentous articular strains. The end result of such effort is to increase the pressure differential in the various body cavities, maintaining the movement of the fluids of the body at rest.

Impaired respiration causes venous congestion and lymphatic stasis. The body may continue to function for a long while without the patient's being aware that anything is wrong. Patients' only complaint may be that they tire more easily; they sleep enough but are not rested; the extremities may be "cold." They say that they are stiff or lame in the morning but that they feel better after

they have moved about. Perhaps the headache or backache that is present after resting, and disappears after they are up and about, can be attributed to lack of fluid motion due to faulty respiration while the body was inactive.

The patient may undergo a battery of tests only to find that he is "paper healthy." The symptoms are vague and the patient is subclinical, but he has lost the feeling of well-being that he once enjoyed. At this stage, there is dysfunction; if allowed to continue for some time, it will probably result in a diagnosable disease.

What would we be likely to find when we examine such a patient osteopathically? The first thing to look for is supraclavicular edematous congestion, which is indicative of faulty "terminal" lymphatic drainage. There may be tenderness and even thickening of the tissues around the trapezius and supraspinous muscles. The cervical lymphatic tissues may be enlarged, the tissues of the neck may be tender to touch, and there may be limited motion in the cervical area.

The axillary lymphatic tissues may be involved, in which case they would be enlarged. The whole area of the posterior axillary fold may be edematous; in a chronic situation, the tissues may become considerably thicker and very tender to touch. The anterior axillary fold should be examined for the same features. The inguinal mass of lymphatic tissue should be inspected and the two sides compared. One should look for the presence of "pouches" or folds of edematous or fatty tissue on the lower lateral aspect of the leg above the knees.

The tonus of the muscles and the turgor of the tissues of the thigh and calf should be noted. The state of the popliteal lymphatic tissues should be assessed; the presence of edema on

*continued*



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either side of the tendon of Achilles or in the feet should be considered. The arm should be examined in the same manner — i.e., one should note the presence of edema above the elbows, the state of the supratrochlear lymphatic nodes, the tonus of the muscles of the forearm, and the turgor of the tissues. Of course, the presence of any edema should be noted.

So much for observation, palpation, and evaluation of the body for evidence of congestion and lymphatic stasis. Let us now consider the body as a neuromyofascial-skeletal unit with the vascular components to which our interest is drawn.

The only reasonable way to approach such a matter is to describe what would be "ideal" but is never seen clinically. If we physicians could get a mental image of the "normal," we could begin to recognize the faulty structure with its dysfunction. Let us therefore proceed with the examination of such a "dream" patient. We will have the patient resting in the supine position so that the effect of gravity is minimal, the large vessels are horizontal, and the viscera tend to redome the diaphragm. What would we expect to find under these conditions?

First of all, this person would be breathing with the diaphragm! We would observe that the motion of the abdomen would be seen all the way down to the symphysis pubica. The rate would be slow. The upper portion of the thorax would be balanced slightly in the state of inhalation; i.e., it would be full, but there would be no motion in this area. The sternal angle would be evident. If we allowed our hands to drop from the medial third of the clavicles to the cartilages of the first ribs, there would be no depression. The subclavicular fossae would be found only at the lateral aspect of the clavi-

cle. Under light pressure the cartilages of the ribs would not be tender or rigid, but the tissues would yield. The manubrium and the body of the sternum would be in the midline, with one side not more anterior than the other — they would be level from side to side. A hand placed lightly on the sternum, so that the fingers are on the manubrium and the heel of the hand is on the lower part of the sternum, would be able to move the lower portion of the sternum from side to side easily and equally.

The thoracic cage in the lower lateral aspect would have a resilience when lightly compressed. The abdominal wall would have good tonus. If we were to place our hand under the spinous processes of the lumbar vertebrae, we would find that it would be in contact with the table. This is so essential for the efficiency of the thoracoabdominal pump, because the diaphragm can then completely relax and be redomed during exhalation.

The anterosuperior iliac spines would be level and horizontal. The crests of the ilia would be level. The ilia would be easy to rock in several directions equally. (To do this, the hands are placed on the ilia and one hand lightly strokes in a cephalad and lateral direction while the other hand is stroking in a caudad and medial direction. The motions are reversed, and the action should be the same on both sides.)

The inguinal ligaments would be without tension, ticklishness, or tenderness. The pelvis could be rotated from one side to the other easily by gently lifting one side at a time. The symphysis pubica would be found level and horizontal and would not be tender to touch.

The leg length would be the same, and so would the angle formed by the feet with the table. The patient would be perfectly comfortable with

the legs straight out on the table rather than crossed. The length of the arms, when stretched over the head, and using the styloid process of the radius for measurement, would be the same. The arms would contact the table without arching the lumbar spine. The angles of the arms with the forearms would be the same on both sides. Of course, this person would have good muscle tonus throughout the body and turgor vitalis.

The treatment for the patient who is dysfunctional is designed to achieve what we would find in the "normal," healthy person. We must recognize, however, that each patient has his own peculiar musculoskeletal pattern. Osteopathic treatment can improve the function of each person within his own pattern.

It is beneficial to understand common musculoskeletal stress patterns of the body so that the treatment can be focused on the transitional areas of the spine. This will allow us to quickly straighten the entire spine, including the relationship of the head, thorax, and pelvis to each other. The result will be to improve the thoracoabdominal pump by restoring diaphragmatic respiration when the patient is supine. All myofascial restrictions must be released, all ligamentous articular strains must be corrected, and all membranous articular strains of the primary respiratory mechanism should be taken care of for optimal health. This would include the synchronization of the pelvic diaphragm with the thoracoabdominal diaphragm. There is no set sequence to follow in treating a patient, but there are a few principles of hydrodynamics to be observed when using the respiratory-circulatory model.

Since effective flow of venous blood and "terminal" lymphatic drainage are paramount before treat-

*continued*

**Osteopathic treatment can improve the function of each person within his own pattern**

ing distal areas, one of the first goals would naturally be to create a negative pressure in the superior mediastinum. We can accomplish this by ensuring movement of the upper thoracic segments, vertebrae, ribs, and their cartilages with the manubrium. This may establish aspiration by respiration from the immediately surrounding areas in preparation for their treatment. The middle and then the lower thoracic areas can then be treated to prepare the lumbar spine and pelvis for re-evaluation and treatment. It is often more effective to treat the pelvis and low back and then the lower thoracic area to establish a better tonus in the abdominal

wall and pelvic floor, as well as to reduce the diaphragm, in order to prepare the tissues of the thoracic and cervical area. There are occasions when it is good clinical judgment to start osteopathic treatment in the cranium.

When we use the respiratory-circulatory model, we can always start treatment far away from the site of congestion, edema, and pain — the "too hot to handle" areas — and decongest them before either examination or treatment during the first visit. It also follows that one should treat the axial skeleton before paying attention to the appendicular skeleton. □

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  - references include direct, open-access URLs to posted, full-text versions of the documents
  - photocopies provided for referenced documents not accessible through URLs

- ☐ “Acknowledgments” section with a concise, comprehensive list of the contributions made by individuals who do not merit authorship credit and permission from each individual to be named in print
- ☐ For manuscripts based on survey data, a copy of the original validated survey and cover letter

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## Financial Disclosure and Conflict of Interest

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

# Component Societies and Affiliated Organizations

## Upcoming Calendar of Events

### April 18 - 22

*Atlantic Regional Osteopathic Convention*  
Bally's, Atlantic City, NJ  
CME: 30 Category 1-A AOA credits anticipated  
Phone: (732) 940-8899 Fax: (732) 940-9000  
E-mail: [rbowen@njosteo.com](mailto:rbowen@njosteo.com)  
Web site: <http://www.njosteo.com>

### April 19 - 22

*Ohio Osteopathic Association Annual Convention*  
Hilton Columbus at Easton Hotel, Columbus, OH  
CME: 30 Category 1-A AOA credits anticipated  
Phone: (614) 299-2107 Fax: (614) 294-0457  
E-mail: [lwhitt@ooanet.org](mailto:lwhitt@ooanet.org)  
Web site: <http://www.ooanet.org>

### April 20 - 24

*MSUCOM Continuing Medical Education*  
*Muscle Energy: Part I*  
MSUCOM, East Lansing, MI  
CME: 34 Category 1-A AOA credits anticipated  
Phone: (517) 353-9714 Fax: (517) 432-9873  
E-mail: [cme@com.msu.edu](mailto:cme@com.msu.edu)  
Web site: <http://www.com.msu.edu/cme/>

### April 27 - 29

*The Osteopathic Research Center*  
*Using Manual & Conventional Therapies to*  
*Enhance Musculoskeletal Health*  
Hilton Hotel, Fort Worth, TX  
Phone: (817) 735-0515 Fax: (817) 735.2270  
E-mail: [cathleen.kearns@unthsc.edu](mailto:cathleen.kearns@unthsc.edu)  
Web site: <http://www.hsc.unt.edu/orc>

### April 27 - 29

*Osteopathic Cranial Academy Muscle Function Course*  
Judith Lewis, DO, Course Director  
TBD, Oklahoma City, OK  
CME: 20 Category 1-A AOA credits anticipated  
Phone: (317) 581-0411 Fax: (317) 580-9299  
E-mail: [info@cranialacademy.org](mailto:info@cranialacademy.org)  
Web site: <http://www.cranialacademy.com/>

### May 2 - 5

*The Pennsylvania Osteopathic Medical Association*  
*104<sup>th</sup> Annual Clinical Assembly and Scientific Seminar*  
Valley Forge Convention Center, King of Prussia, PA  
CME: 34 Category 1-A & 6 Category 1-B credits anticipated  
Phone: (717) 939-9318 Fax: (717) 939-7255  
E-mail: [poma@poma.org](mailto:poma@poma.org)  
Web site: <http://www.poma.org>

### May 4 - 6

*Indiana Osteopathic Association 115<sup>th</sup> Annual Convention*  
Sheraton Hotel at Keystone Crossing, Indianapolis, IN  
CME: 25 Category 1-A AOA credits anticipated  
Phone: (317) 926-3009 Fax: (317) 926-3984  
E-mail: [info@inosteo.org](mailto:info@inosteo.org)  
Web site: <http://www.inosteo.org>

### May 31 - June 4

*Sutherland Cranial Teaching Foundation Basic Course:*  
*Osteopathy in the Cranial Field*  
Daniel Moore, DO, Course Director  
CCOM, Downers Grove, IL  
CME: 40 Category 1-A AOA credits anticipated  
Phone: (509) 469-1520 Fax: (509) 453-1808  
E-mail: [info@sctf.com](mailto:info@sctf.com) Web site: <http://sctf.com/>

### June 16 - 20

*Osteopathic Cranial Academy Introductory Course:*  
*Osteopathy in the Cranial Field*  
Zina Pelkey, DO, Course Director  
Marriott Buckhead Hotel & Conference Center, Atlanta, GA  
CME: 20 Category 1-A AOA credits anticipated  
Phone: (317) 581-0411 Fax: (317) 580-9299  
E-mail: [info@cranialacademy.org](mailto:info@cranialacademy.org)  
Web site: <http://www.cranialacademy.com/>

### June 21 - 24

*Osteopathic Cranial Academy Annual Conference*  
*Autism, A Spectrum of Expression and Hope: Osteopathy's*  
*Response to Neuroimmune Dysfunctions*  
Ali Carine, DO, Conference Director  
Marriott Buckhead Hotel & Conference Center, Atlanta, GA  
CME: 20.75 Category 1-A AOA credits anticipated  
Phone: (317) 581-0411 Fax: (317) 580-9299  
E-mail: [info@cranialacademy.org](mailto:info@cranialacademy.org)  
Web site: <http://www.cranialacademy.com/>