THE AAO
FORUM FOR OSTEOPATHIC THOUGHT

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Somatic Dysfunction – A Reflection on the Scope of Osteopathic Practice

see page 17 . . .

Instructions to Authors

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

The AAO Journal welcomes contributions in the following categories:

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

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

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

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

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

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

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

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Submit all papers to Anthony G. Chila, DO, FAAO, Editor-in-Chief, Ohio University, College of Osteopathic Medicine (OUCOM), Grosvenor Hall, Athens, OH 45701.

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

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

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A PEER-REVIEWED JOURNAL

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

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American Academy of Osteopathy®
Calendar of Events

2006

Jan 20-22	*Diagnosis of Muscle Imbalance and Exercise Prescription: The Greenman Protocol* at LECOM-Bradenton, FL
Jan 27-28	AAO Education Committee meeting in Indy
Feb 10-12	*Clinical Jones Strain-Counterstrain II: Pelvis and Extremities* in Tucson, AZ
Feb 21-23	AOA Board of Trustees in St. Petersburg, FL
Mar 19-21	*Visceral/Structural Integration* in Birmingham, Alabama
Mar 22	AAO Boards of Governors and Trustees in Birmingham
Mar 22-26	*AAO Convocation* in Birmingham
May 5-7	*Diagnosis and Treatment of Low Back Pain* in Durham, NC
May 19-21	*Prolotherapy: Above the Diaphragm* at UNECOM
Jun 16-18	*OMT for Common Organic and Clinical Problems* at UMDNJ-SOM
Jul 1	AOBNMM application deadline
Jul 14-16	*Visceral Manipulation: Urogenital* in San Francisco
Aug 18-20	*The Still Technique (Applications of a Rediscovered Technique of Andrew Taylor Still, MD)* at Southpoint Hospital in Cleveland, OH
Sep 15-17	*Advanced Clinical Jones Strain-Counterstrain: Emphasis on Extremities* at University of Indianapolis
Oct 15	One-day course – *Introduction to Osteopathic Medicine for the Non-physician Licensed Health Care Provider* in Las Vegas
Oct 16-20	*AOA Convention* in Las Vegas
Nov 3-5	*Prolotherapy: Below the Diaphragm* at UNECOM
Dec 1	AOBNMM application deadline
Dec 1-3	*Visceral Manipulation: Membranes* in San Francisco

View from the Pyramids

Anthony G. Chila

Growth and Advancement

Recent years have seen continued growth and expansion in the numbers of osteopathic physicians available to the public as well as the numbers of educational institutions for preparation of these physicians. The rapidly changing environment of the health care industry has also exerted profound effects on the continuum of clinical training for predoctoral students and postdoctoral graduates. The longer term outcome of these factors remains to be seen. The rapid growth and expansion of the osteopathic profession during the early 20th Century (1897-1904) can be viewed retrospectively for some of the lessons which might be appropriate for the present time.

The *American School of Osteopathy* was founded by Andrew Taylor Still and chartered in May 1892. Lengthening and enriching of the curriculum followed three lines of development: Preparation of Osteopathy to meet the reasonable demands made upon it by all classes of people; Insistence that an osteopathic education should not be inferior to that of any other school of practice; and, Insistence by the people (enactment of laws) for an educated profession. By 1897, over 3,000 graduates were practicing in many areas of the United States and several were practicing in foreign countries. Not all of the subsequently developing contemporary institutions were so fortunate.

The *National School of Osteopathy and Infirmary Association* (Baxter Springs, Cherokee County, Kansas) was chartered by the Secretary of State of Kansas, June 27, 1895. This school was later located at Kansas City, Missouri, and a new charter secured from that state in 1897. The curriculum of the school was not in compliance with the law requiring at least twenty months' attendance before issuance of a diploma. This led to vigorous opposition from reputable osteopathic practitioners and the denial of claims for patronage from the parent school. Reorganization on the basis of a two-year program, with an enlarged faculty, was attempted in 1898. The school was unsuccessful in gaining admission to the Associated Colleges of Osteopathy in 1899 and again in 1900. These were probably the chief factors which finally led to suspension of the school in 1900.

The *Northern Institute of Osteopathy* was established at Minneapolis, Minnesota in June, 1896. Consolidation with the *S.S. Still College*, Des Moines, Iowa occurred in January 1902. The school ceased functioning at Minneapolis in June 1902.

The *Colorado College of Osteopathy*, Denver, was organized as the Western Institute of Osteopathy in September, 1897. In 1899 the name was changed to the *Bolles Institute of Osteopathy*. This school was a charter member of the Associated Colleges of Osteopathy. Transfer to the American School of Osteopathy occurred in 1904 and the institution was closed with the graduation of the June class of that year.

The *Milwaukee Institute of Osteopathy* was incorporated in May 1898. The name was changed to the *Milwaukee College of Osteopathy* in 1900. A law passed in 1901 stipulated a change to a four-year course after the expiration of two years. Because of educational competition, arrangements were made with the *American School of Osteopathy* to take the students of the *Milwaukee College of Osteopathy* at the end of the academic year 1901.

During this same period of time, three educational institutions came into existence, the names of which have changed over the years. The contributions of these institutions to the growth and expansion of the osteopathic profession has continued without interruption since their founding.

In June, 1898, Doctors S.S. and Ella D. Still, Colonel and Mrs. A.L. Conger, W.L. Riggs and W.W.G. Helm secured articles of incorporation for the *S.S. Still College of Osteopathy*, located at Des Moines, Iowa.

The *Philadelphia College and Infirmary of Osteopathy,* located at Philadelphia, Pennsylvania, was established by Doctors O.J. Snyder and Mason W. Pressly in the early months of 1899.

The *American College of Osteopathic Medicine and Surgery* was organized in May, 1900, by Doctors J.M., J.B., and D. Littlejohn. This college, located at Chicago, was incorporated under the laws of the state of Illinois. ❒

Contributors

Karen M. Steele. Osteopathic Care of Children. The 2005 Scott Memorial Lecture is dedicated to considerations in treatment of "the little folks". The author skillfully weaves appropriate anatomical and physiological discussions in presentations of three clinical subjects. Ear infections, plagiocephaly and gastroesophageal reflux disease (GERD) are the subjects addressed. An additional contribution is the discussion of personal method in addressing "the little folks" as the patients they really are. **(p. 13)**

Zachary Comeaux. Somatic Dysfunction – a reflection on the scope of osteopathic practice. The author presents a request for discussion of the definition of the work of the osteopathic profession. The *Glossary of Osteopathic Terminology* , while subject to ongoing refinement since 1981, currently accepts input from the Glossary Committee of the *World Osteopathic Health Organization.* In the hope of bringing about productive discussion and evolution of thought, this contribution has been suffixed for American and German versions. The latter version was published in *Osteopathische Medizin,* 6. Jahrgang Heft 3/2005. **(p. 17)**

Luc Peeters. The Relation Between Restricted Internal Rotation Of The Hip (In 90º Flexion) And Restricted Sidebending In The Lumbar Spine. The relationship between bilateral hip flexion and flexion in the lumbar spine has been the subject of various studies. The author, in a classic correlation study, hypothesizes that a restriction of lumbar sidebending, influenced by gravity, is associated with a heterolateral restriction of hip internal rotation. Measurement is done with the subject seated, hips flexed at 90º. A clinical test is also presented as a component of this study. **(p. 23)**

Kathryn E. Calabria. Adam's Rib. The author offers a concise and challenging consideration of the accuracy of allegory, myth, truth. **(p. 32)**

Regular Features

DIG ON. 20th Century Influenza pandemics occurred in 1918, 1957 and 1968. Since 1997, public concern has been building in anticipation of a new pandemic associated with a particularly severe virus. The state of preparedness/unpreparedness is discussed. The success of distinctive osteopathic care in the severe 1918 pandemic is recalled. **(p. 7)**

FROM THE ARCHIVES. *Osteopathic Lesion* is a descriptor no longer used in the definition of osteopathic etiology and pathology. This term was replaced by the descriptor *Somatic Dysfunction* in 1969. The year 2006 will mark the centennial of publication of *Practice of Osteopathy* (Carl Philip McConnell and Charles Clayton Teall). A thoughtful re-reading of Part I, pages 25-39 might well demonstrate for today's practitioners that the osteopathic profession was well aware of the significance of definition, even then. **(p. 9)**

BOOK REVIEW. The work of William L. Johnston, DO, FAAO (+2003) is continued in the appearance of the second edition of *Functional Methods.* Released in 2005, the new edition is the work of Doctor Johnston's original co-author, Harry D. Friedman, DO, FAAO and David C. Eland, DO, FAAO. Those familiar with the first edition (1994) will appreciate the careful attention given to continuity of thought and exposition of Doctor Johnston's later ideas. **(p. 33)**

ELSEWHERE IN PRINT. Perceived hamstring tightness, cranio-cervical flexion test using pressure biofeedback, cervical spine manipulation and prescribed exercise all address aspects of osteopathic practice. *International Journal of Osteopathic Medicine* (Volume 8, Number 3, September 2005) offers clinical studies and a single case study experimental design relevant to these topics. This publication is an official journal of the Australian Osteopathic Association, General Osteopathic Council (UK), and Osteopathic Society of New Zealand. **(p. 34)**

CME CREDIT. In response to reader requests, *AAOJ* will offer CME Credit to readers completing the enclosed quiz. At this time, 1 Hour II-B Credit will be offered, with request for upgrade as *AAOJ* qualifications are reviewed by the **American Osteopathic Association**. **(p. 22)**

Dig On

Pandemic Influenza

An influenza pandemic occurs under two conditions: the emergence of a flu virus strain having the capacity to be easily transmitted between persons; differentiation from previous strains sufficient to render sensitive practically every person. During the 20th Century, this occurred in 1918, 1957 and 1968.

The current concern about a flu pandemic may have begun in 1997 with the appearance of a virulent form of avian influenza (A/H5N1) in Hong Kong. In addition to practically complete killing of chicken flocks, humans who occasionally were in contact with the birds became infected, resulting in six human deaths. This was the first instance of human infection from the H5 virus subtype. In February 2003, two members of a Hong Kong family having recently visited China became ill with H5N1 flu; one died. The third appearance of the H5N1 virus in Southeast Asia occurred in December 2003. Since that time, approximately 140 million birds have died. Human infection numbered 125 persons, approximately half of whom have died. Recognition that this is no longer an Asian problem has followed the appearance of the virus in Mongolia, Kazakhstan, Siberia, Romania, Croatia and Greece.

During the 1918-19 pandemic, approximately 650,000 persons in the United States and 40,000,000 worldwide died as a result of a particularly lethal strain of influenza virus. This was the pandemic in which no specific vaccine or serum had been developed. No drug therapy was known which could have shortened or minimized the course of the disease. Patient care by isolation, hygiene and fluid intake was followed by the MDs and DOs of that period. Drug therapy utilized by MDs included calomel, Dover's powders, aspirin and strychnine. Eschewing the use of these, DOs utilized manipulative measures. In the attempt to retrieve and record outcomes of the two approaches, it was roughly determined that management by DOs resulted in 0.2% mortality in listed deaths from influenza (12-15% for MDs) and 10.1% mortality in listed deaths from pneumonia (25% for MDs).[1]

Present activity in preparation for a pandemic that is inevitable recognizes that such may occur in months or not for years. Reconstruction of the 1918 virus from frozen and chemically preserved tissue of three victims has been completed after 10 years. It is now recognized that the "Spanish" flu of 1918 was a bird virus adapted to man. It is also recognized that the Asian H5N1 strain has genetic similarities to the 1918 virus. No government can be said to be ready at this time. New vaccine and immunization technologies include: Intradermal injectors; Adjuvants; Cell-cultured vaccines; DNA vaccines; All-strain vaccines. Today's flu antivirals disable specific proteins on the surface of a virus. Approaches are in various stages of readiness, mostly for testing in 2006. Examples include: Inhibition of neuraminidase protein; Inhibition of viral attachment to cells; Stimulation of RNA interference mechanism; Antisense DNA to block viral genes.

If it should happen that the H5N1 virus does not morph into a form that can spread easily between persons, scientists watching the evolution of a potentially pandemic virus are certain that some other flu virus will do so. Complacency is regarded as the great enemy.

Of the three 20th Century pandemics, the occurrence of 1918 remains the most severe. Should the next expected pandemic be as severe or worse, what will be the contribution of osteopathic medicine?

Reference

1. Gevitz, Norman. The DOs: Osteopathic Medicine in America; Second Edition, 2004. The Johns Hopkins University Press; Baltimore MD, 81-82.

Letters to the Editor

Dear Editor

In a recent issue of USA Today, there was an article about the increasing cost of the care of patients with asthma. It blows my mind to hear of all the drugs and inhalers these patients take every day. In fifty years of pediatric practice, we were able to control (cure?) asthma with simple medications, cleaning up environment, osteopathic manipulation, and occasionally desensitization. I had also read that deaths from asthma are increasing dramatically.

When I was a child, my father (Martyn L. Richardson, DO, PCO 'O5) would use manipulation to improve my breathing in an asthmatic attack. I did the same for my children.

The thought occurs to me that this is a wonderful opportunity for a clinical research project.

Have several (or many) manipulative DOs who have cooperation with MDs and DOs treating asthmatics enroll the patients in a study-probably not a double-blind. Have patients keep a record of their use of medications, inhalers, etc. Hopefully, it will decrease! At DO's office, check with spirometer before treating and after.

How to obtain funds? Would American Lung and other organizations contribute? Would other health groups contribute?

I would expect the DOs to contribute their time but might need help for record keeping.

I am certain others will have more ideas if everyone will work together.

Sincerely,
Martyn E. Richardson, DO, FACOP
11 Cedar Circle
Scarborough, ME 04074

Dear Editor

There has been some direct instructions by pediatricians for newborns and infants to sleep on their backs. They don't seem to know why this position has reduced SIDS by 60%.

When at Waterville Osteopathic Hospital, 1976 thru 1985, I introduced newborn evaluation and treatments to all newborns. To date the newborns from 1976 thru 2004 have had only one SIDS episode.

This evaluation and treatment of newborns, which continues today, is related, in part, to mobilization of the cranial base. I believe this assists the medulla control centers toward a better balanced physiology - especially the respiratory center.

I believe, when the newborn and infant lie on their backs they are balancing the medulla centers by the light pressure from the weight of their heads.

The mechanism for this physiological balancing come from semi-closed hydraulic systems pumping action thru the cranial rhythm. This regular pumping action has great influence on the 4th ventricle fluid (CSF) activity and therefore on the membrane system surrounding it. The attached membrane system has balancing influence on the bony occiput both on an internal level and on the occiput itself, which then continues its balancing influence on the sphenoid and the rest of the cranial mechanism.

So, the cranial rhythm thus normalizes the activity of the Medulla through the normalization of the fluid pressure changes of the 4th ventricle and the above physiological membrane and bony change toward normal.

The pediatric physician group is also demonstrating that part of the 60% reduction in SIDS is related to the infant sucking on a pacifier or breast. The sucking action effects mobilization of the bilateral TMJ joints. It then can mobilize the bilateral temporal bones thus providing for potential mobilization and better balancing of the entire cranial base, i.e. occiput, sphenoid, temporals. The sucking action can also mobilize the bilateral maxilla, the palatines the vomer and ethmoid complex. Thru the above mild occiput compression in the supine posture and sucking action we have a cranial mechanism to explain the 60% reduction in SIDS.

However, the 40% who have not been affected is the group of infants who cannot mobilize themselves on a subtle, self-healing basis. These infants are the ones who need osteopathic manipulative evaluation and treatment especial at the cranial level. Thus, all newborns and infants should have the above evaluation and treatment by experts and the SIDS dysfunction would drop to 95% reduction!

Regards,
Richard C. MacDonald, DO
548 Greenway Drive
North Palm Beach, FL 33408-3720

Truth

"We often speak of truth. We say great truths, and use many other qualifying expressions. But no one truth is greater than any other truth. Each has a sphere of usefulness peculiar to itself. Thus we should treat with respect and reverence all truths, great and small. A truth is the complete work of a Nature, which can only be demonstrated by the vital principle belonging to that class of truths. Each truth or division as we see it, can only be made known to us by the self-evident fact, which this truth is able to demonstrate by its action."

Philosophy of Osteopathy, pp. 24-25

Reprinted from *Sage Sayings*, p. 51

From the Archives

Osteopathic Etiology and Pathology

From: "Practice of Osteopathy", 1906, pages 25-33

Carl Philip McConnell and Charles Clayton Teall

Osteopathic etiology and pathology constitutes the most interesting chapter of osteopathic science. The primal divergence of the osteopathic schools from previous systems is to be found in the osteopathic interpretation of disease causes and processes, and not in osteopathic therapy as some may think. Osteopathy makes claim to an independent school because it possesses a distinct etiology, pathology, diagnosis and treatment. Thus osteopathic practice is not a mere method, but instead a system, a school, a science.

At no period of medical history have physicians of the older schools felt more keenly the futility of medical methods and the lack of an all-embracing principle of medicine than at the present. A recent writer[1] who claims to have discovered a principle that encompasses the entire field of medicine, says: "We found, we may say, that the backbone of medicine was the absent factor, and that if the patient labors of so many great minds had not proven as useful in the development of practical medicine as they should, it was because they lacked such a fundamental framework to afford a fixed *nidus* for each discovery, wherein its true relation to other discoveries would at once become evident."

Since the conception of osteopathy its fundamental framework has not changed one iota as to principle, although the application of the principle has been greatly elaborated. When Dr. Still proclaimed, "the rule of the artery is supreme" he gave utterance to a basic physiological truth. But when he demonstrated that osseous and other anatamo-mechanical lesions disturbed the artery and caused disease, and that readjustment of the anatomical cured the disorder, thus allowing the physiological to potentiate and revealing that the living body contains all the attributes of a vital and physical mechanism, did his teaching contain the germ of a comprehensive philosophy; this gave osteopathic science a "backbone" with a consequent fixed *nidus* for all existing facts and future discoveries. And thus, it should always be emphasized that mechanical readjustment of the component parts of the vital body is the eternal keynote of the osteopathic school of healing.

The Osteopathic Lesion – Broadly speaking a lesion is "any morbid alteration in a tissue whether attended by a recognizable structural change or not; but especially a change in which the continuity of some of the tissue elements is broken in upon.[2]" There are several kinds of lesions expressing the tissue involved, character of degeneration, locality of same, etc. But upon analyzing the medley of arbitrarily defined lesions the fact will be evident that much of medical etiology and pathology has not been logically and consistently sifted and arranged; and, moreover, it will be found the **cause of causes** of many diseases is unknown.

Herein, arises the great significance of the osteopathic lesion, for the lesion alters the very governing and controlling tissues of the body, viz., the nervous tissue and the vascular channels. Hulett[3] defined the osteopathic lesion as "any structural perversion, which by pressure produces or maintains functional disorder." The constant maintenance of the structural perversion will, also, cause organic disease, although it is granted that functional disorder must necessarily result prior to any organic change.

The osteopathic conception of a lesion, functional and organic disorder caused by pressure from disturbed structures, does not bring us into an absolute new field. Medical literature of all ages contains references to diseases caused by pressure of tissues on nerves, blood vessels, or other channels. But the osteopathic idea is an absolutely new one in the application of this principle universally. It simplifies and makes uniform the arbitrariness of present semeiology.

Thus the osteopathic idea that many diseases originate, primarily, from anatomically maligned, mal-positioned, or' mal-related tissues causing a blockage of vital processes, immediate or remote, is a theory inclusive of disturbances to all tissues. This principle is fundamental and is supported by the physiological truth that uninterrupted vital channels preserve health; moreover clinical and experimental data, as will be shown later, substantiate this fundamental. It at once places interpretation of a lesion in an entirely new light from preconceived concepts, and is analogous to and co-extensive with etiology and pathology. →

1. Sajous-The Internal Secretions and the Principles of Medicine, Vol. I, 1903.
2. Foster-Medical Dictionary.
3. Hulett-Principles of Osteopathy.

Etiological Factors – The osteopath believes in the potency of inherited and environmental influences. There can be no question that a few diseases and certain disease tendencies may be inherited, the principle feature, however, from the standpoint of heredity is, various organs and tissues have less vital resistance. These should not be confounded with congenital weaknesses and diathetic tendencies.

Environmental influences are very important factors. One's surroundings and daily habits in the home, shop, or office count for much in the aggregate. Food, drink, air, rest, sleep, clothing, exercise, mental attitude, etc., all count for much in the sum total of health, and consequently ill-health may be traceable to their abuse. In fact, all hygienic and sanitary measures are duly considered by the osteopath. Various abuses, over use, and disuse of the functions will certainly be followed by physiological discord.

The germ theory contains much truth, but in the very large percentage of cases where the micro-organism is a factor its significance is only of secondary consideration. Usually the microorganism plays the role of an exciting and determining factor; before it can multiply and grow there must be a field that is first nutritionally disturbed. Nutrition of the tissue is the one great point always to be considered. The constitution of an individual is the pivot around which predisposing, environmental, and exciting factors of disease center. Health represents the integrity of the artery as well as a maintenance of that master tissue, the nervous system, and anything that produces or influences, directly or indirectly, a disturbance of physiological functioning borders on the pathological.

Hence the osteopath recognizes many of the common medical causes of disease, but reserves the privilege of rearranging their relative positions, for the osteopathic cause of disease greatly modifies their value.

Osteopathic Etiology distinctively emphasizes structural derangements and perversions. Of **first** importance is the **osseous** lesion. This lesion is represented by any abnormal change of position or relation of the many bony constituents of the body. The framework of the body is subject to not only any and every physical violence of any mechanism, but moreover being the corporeal foundation of a vital mechanism is subject to both direct and indirect biochemic changes and influences.

Thus the osseous lesion is caused (a) by traumatism, e. g., strains, falls, blows, etc.; (b) indirectly by atmospheric changes, over and violent exercise, etc., through the medium of muscle changes; (c) by nutritional effects disturbing the elements of bony tissue; (d) compensatorily and reflexly through the media of body distortions and muscular irritability or debility, e. g., an innominate lesion may be compensatory to a lumbar curvature, dietetic errors may cause dorsal muscular irritation and contraction and produce a constant osseous lesion which in turn may result in chronic indigestion.

The pathological changes in the osseous lesion are commonly one of structural derangement, deviation or complete displacement. The vertebral segments are of primary consideration owing to their important relations to the spinal nerves, spinal cord centers and sympathetics; the ribs owing to the close sympathetic and spinal nervous relations; and then other osseous tissues, as the innominata, clavicle, etc., depending upon their importance to contiguous vessels, nerves and organs. It should always be remembered and emphasized that mechanical changes of the anatomical structures is the primary essential in osteopathic etiology; this is the one great inception of pathological variations from the distinctively osteopathic conception, which the osseous lesion typifies. Consequently the osseous lesion factor is actually a luxation (complete, or partial, even to a very slight degree), or malalignment of the bony constituents, which by virtue of their physical malposition impinge or irritate contiguous tissues.

Second in importance is the **muscular lesion**. The muscular lesion may be an actual dislocation of either muscle or tendon, but rarely. Commonly it is a contracted, or tensed, or contractured muscle. The muscle may be also diseased either from primary or secondary sources and thus be an etiological feature.

The muscular lesion is caused, (a) by direct or indirect violence the same as the osseous lesion; (b) by atmospheric influences; (c) by reflex irritations; (d) by compensatory changes; (e) by disease causing hypertrophy or atrophy; and, (f) (which is of the most frequent origin) secondary to osseous lesions, being the result of impignment to the muscles' nervous control. The tensed or stretched muscle results from a separation of the points of origin and insertion.

Herein, as with the osseous lesion, the fundamental osteopathic concept is the resulting affection due to the physical encroachment, directly or indirectly, of the muscle tissue upon vascular channel or nerve fibre.

Muscular contractions, displacements, and tensions play a most important part in acute disorders, although muscular lesions that are secondary to other lesions are usually taken into account when treatment is given. Muscular lesions affect (a) blood and lymph vessels, and (b) nerve fibres. Muscular contractions, especially, impede mechanically the return of the venous blood to the heart. The lesions to the nerves may be manifested in innumerable ways, depending upon the location of the muscle and the function and distribution of the nerve affected.

Then there is the relaxed, overstretched, and atonized muscle. This condition results as a secondary effect to mechanical strains, these being so severe and constant as to cause direct stretching and possibly tearing of the muscle fibres. This should be distinguished from the exhausted or debilitated muscle, e.g., as found in neurasthenia and anemia.

Diagnostically there are, (a) contractions of more or less area, symmetrically, due to atmospherical changes; (b) the deeply seated contractions involving a very small area, caused by vertebral and rib lesions; (c) contractions due to reflex disturbances; (d) contractions caused by postural effects and. deformities; (e) contractions from spasms of the blood vessels as a result of nervous irritations; (f) contractions due to toxicity of the blood. All of these characteristic muscular lesions give a direct hint as to both etiology and prognosis.

Third, the **ligamentous lesion** is usually of secondary importance to the osseous lesion. There are two features that should be noted in particular when considering this lesion; first, thickenings and adhesions; and, second, relaxations.

The tone and integrity of the ligaments cannot but be of vital concern to the stability, suppleness, and adaptability of the bony framework in all physical movements. No matter how slight the osseous lesion may be the ligament must of necessity be involved. The osseous derangements are either a source of irritation to the ligamentous tissue, resulting in congestion and inflammation and hence thickening and adhesions, or else the ligaments are so strained and tensed that in time atony occurs. Probably, in a fair percentage of atonized cases the first disturbance to the ligament was one of irritation and congestion, and from long continued involvement irritation was supplanted by debility.

Consequently the primary consideration of the ligamentous lesion from the etiological standpoint is the character of the tissue (ligament) changes. This, also, gives us a direct hint that is of the utmost value in prognosis. The independent displacement of a ligament is rare, thus ligamentous lesions from the viewpoint of purely physical displacements are secondary to if not an actual part of the osseous lesion. Ligaments, when displaced or tensed, readily impinge or irritate contiguous tissues, but the original cause of the structural perversion is commonly the osseous lesion. Hence, whatever factors enter into the production of the bony lesion will at least indirectly produce the ligamentous lesion.

Fourth, the **visceral lesion** is frequently overlooked as being of much moment as an osteopathic lesion. Visceral displacements acting as a source of functional and organic annoyance on the physical plane (structural perversion which produces and maintains pressure) alone are not in the least uncommon.

Any or all of the abdominal viscera, or even the organs of the thorax, may be displaced (physically) pathologically. Actual displacement of the viscus is a prolific source of distinct disorders and many obscure symptoms. True it is the organs are most frequently displaced from indirect causes, but nevertheless the actual physical malposition is in turn a primary cause of still another train of symptoms and diseases.

Visceral lesions are caused by, (a) vertebral lesions; (b) postural defects; (c) direct violence; (d) nutritional disorders; (e) childbirth; (f) unhygienic measures (tight lacing, heavy skirts, etc.); and (g) congenital weakness.

From the displaced heart due to valvular and debilitating influences to the displaced liver, the stomach, the kidneys, the intestines, the ovaries, and the uterus may arise a source of direct or indirect irritations, a train of apparent or masked symptoms, or a group of nutritional disturbances that include an extremely important chapter in etiology. Moreover not only may one organ alone be involved but several may be displaced or prolapsed as a whole as in splanchnoptosis; and even these in turn may be the direct cause of further organic displacements as the abdominal viscera prolapsing upon the pelvic organs. Here is a very fruitful field for the diagnostician, for to separate cause from effect requires keen perception, an acute sense of touch, and above all, most careful weighing of all the factors that enter into the maize.

Fifth, the **composite lesion** is not always recognized as an extremely important osteopathic factor. By composite lesion is meant a structural lesion that primarily includes the osseous, muscular, and ligamentous tissues as a whole. This may be termed a lesion *en bloc* or *en masse*.

Composite lesions are of exceedingly frequent occurrence. Indeed, many composite lesions are overlooked and instead of treating the *en bloc* disturbance as a consistent whole the component factors are treated separately with no concern or attention to the whole.

Postural defects are excellent types of the composite lesion. The various curvatures, the tilted pelvis, etc., are representative of the composite lesion. Etiologically, pathologically, diagnostically, and therapeutically the contour of the spine and ribs, the relation of the innominata to the sacrum and spine, and the symmetry of the body generally should he recognized and appreciated. The relation of the part to the whole and of the whole to the part are of vital etiological concern. An incipient curvature may be easily overlooked, a pendulous abdomen neglected, and a slipped innominatum pass unnoticed wherein as a result the entire vertebral column is malaligned in relation to the physiological curves or to the perpendicular line of gravity.

Frequently attempts are made to correct individual lesions when attention should be directed to the composite lesion and *vice versa*, e. g., a displaced rib is usually dependent upon a corresponding vertebral lesion, and thus the transverse plane or section of the body should be considered as a whole. A single lesion may be dependent upon a composite lesion or a composite lesion dependent upon one or more single lesions. A slipped innominatum or a disordered hip joint may bring about a strain to a greater or less section of the spinal column, or a twisted vertebra may cause a curvature, whereas on the other hand postural defects may cause a strain at its maximum focal point resulting in overstretching and relaxing of ligaments so that an osseous lesion results, or a spinal curvature cause an innominatum displacement. Thus there is a constant establishing of equilibrium, physically and physiologically, through the medium of compensation, but at some phase of the change there is apt to be pathological phenomena resulting, and very frequently physiological harmony is not re-established but instead irritation, debility and other disease symptoms are constant effects until relieved.

Consequently osteopathic etiology is many sided and complicated. To know whether an osseous, ligamentous, muscular, visceral, or composite lesion is primary or secondary, compensatory, reflex, predisposing, or exciting, requires a command of theoretical knowledge backed by much actual clinical experience.

In noting the above distinctive osteopathic etiologic features the student should not lose sight of the constitutional status of the patient which may be modified by inherited, congenital, diathetic, and environmental influences, all of which go to make up the predisposition of the individual and has an important relation to osteopathic factors. Then it should be recalled that disease processes might be of insidious progress, and the products and effects of pathologic changes accumulative. Δ

Diagnosis of Muscle Imbalance and Exercise Prescription

(The Greeman Protocol)

January 20-22, 2006
LECOM, Bradenton, FL

Brad S. Sandler, DO, Program Chair
Philip Greenman, DO, FAAO, Featured Speaker
and Author of *Principles of Manual Medicine*

Course Description: Level II

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 the patient's somatic dysfunction in order for the patient to manage themselves.

Learning 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 chronic 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 the patient in an exercise program based upon his/her functional goals and life-style.

Prerequisites

Functional Anatomy; One Level 1 course or equivalent

CME:

The program anticipates being approved for 20 hours of AOA Category 1-A CME credit pending approval by the AOA CCME.

Program Time Table:

Friday, January 20	8:00 am - 5:30 pm
Saturday, January 21	8:00 am - 5:30 pm
Sunday, January 22	8:00 am - 12:30 pm

(Friday & Saturday include (2) 15 minute breaks and a (1) hour lunch; Sunday includes a 30 minute break)

Course Location:

Lake Erie College of Osteopathic Medicine/FL
5000 Lakewood Ranch Blvd.
Bradenton, FL 34211
www.lecom.edu/bradenton

Hotel Accommodations:

Hotels/Motels near course site: Comfort Suites (941) 360-2626 and Holiday Inn Lakewood Ranch (941) 782-440 (ask for LECOM rate at both locations); For other hotel possibilities, visit: www.expedia.com; www.travelocit.com; www.priceline,com; or www.BizRate.com

Registration Form
Greenman's Exercise Prescription
January 20-22, 2006

Full Name _____

Nickname for Badge _____

Street Address _____

_____

City _____ State_____ Zip_____

Office phone # _____

Fax #: _____

E-mail: _____

By releasing your Fax number/E-mail address, you have given the AAO permission to send marketing information regarding courses via the Fax/E-mail.

AOA # _____ College/Yr Graduated _____

I need AAFP credit ❒
I require a vegetarian meal ❒

(AAO makes every attempt to provide snacks/meals that will meet participant's needs. But, we cannot guarantee to satisfy all requests.)

Registration Rates

	On or Before 12/20/05	After 12/20/05
AAO Member	$550	$650
Intern/Resident/Student	$450	$550
AAO Non-Member	$765	$865

(Non-members – see membership application on page 23)

AAO accepts Visa or Mastercard

Credit Card # _____

Cardholder's Name _____

Date of Expiration _____

Signature _____

2005 Scott Memorial Lecture

Karen M. Steele

Osteopathic Care of Children

The goal of the Scott Memorial Lecture is to "do something for present day students of osteopathy that would give them a glimpse of Dr. A.T. Still's principles and techniques." What I have chosen is to talk about the osteopathic care of children, discussing why one would do osteopathic manipulative treatment on children more than how. In so doing, I hope to impart a fuller understanding of the philosophy that underlies the osteopathic approach to the care of all our patients.

We live by stories, we identify with stories, we learn by stories. In medicine we call our stories "cases". I will illustrate what I would like to impart to the young osteopathic physicians of tomorrow with stories from my practice of more than 25 years.

Why would one treat a child with osteopathic manipulative treatment (OMT) for ear infections? Rachel, who is two, had recurrent ear infections. Her physician was recommending surgery to perforate the tympanic membrane and create an artificial pathway for her middle ear to drain. Her mother decided to first try osteopathic treatment. As an osteopathic physician, we must understand the pathophysiology of the disease we are treating. Otitis media is most common in children who are around other children. It is worse in children under two and the incidence dramatically drops off at age six. We know acute otitis media begins with a viral upper respiratory infection, leading to development of fluid in the middle ear, followed by infection of that fluid with bacteria. Looking at the child's anatomy, we know the angle of the Eustachian (ventilatory) tube is part of the issue, because it is nearly horizontal. Whatever goes into the posterior pharynx is going to go into the middle ear. Retrograde flow of whatever fluid is in the posterior pharynx is thought to contribute to the colonization of the middle ear fluid, leading to an ear infection.

What can we do for otitis media based on what we know? We can reduce the initial viral upper respiratory infection by not having the child be in daycare as early or as often, and immunize them for viral diseases. We can educate parents not to bottle feed their child lying down to reduce the milk backwash into the middle ear that leads to middle ear contamination. We can consider surgery to drain stagnant middle ear effusion so it doesn't become infected, and so that the child can hear. And we can prescribe antibiotics both for the acute bacterial overgrowth, and prophylactically during the winter months to reduce the recurrence of acute otitis media.

Sadly, standard care for recurrent ear infections is not satisfactory. The addition of OMT to standard care helps. Philosophically, OMT is applied anatomy. Otitis media is a plumbing problem. Part of the problem is in the pipes and part is in the pump. Osteopathic manipulative treatment can help to improve the functioning of the pipes, and the pump. There are two pumps that are generally restricted: one in the head; the other in the abdomen.

Why would one treat a child with osteopathic manipulative treatment (OMT) for ear infections?

In the head, the temporal bones are oscillating, rolling in at about 10-14 times per minute. The Eustachian tube leaves the middle ear, coursing through the temporal bone, and then leaves the bony case to weave among the muscles and fascias at the posterior pharynx finally dumping its contents out in the posterior pharynx. As the temporal bones are slowly oscillating, a gentle pull on the ventilatory tube occurs, which aids in drainage of the middle ear. Understandably, if the temporal bones are not moving, the middle ear is less well drained and ventilated, leading to middle ear infections and hearing loss. Simple OMT can restore the temporal pump and thereby improve fluid drainage from the middle ear.

The other pump important in draining the middle ear is the piston of the entire chest, run by the abdominal diaphragm, and creating a negative pressure that aids in draining that middle ear. Restriction in respiratory excursion can negatively impact middle ear health, by reducing the pressure gradient between the upper and lower airways. Restrictions of the upper thoracic spine and upper ribs, and lower thoracic spine, lower ribs and abdominal diaphragm are common in children with recurrent ear infections and treating these areas can be quite beneficial in the care of such children.

Osteopathic treatment of children with recurrent ear infections is simple, quick and fun. Galbreath Mandibular Drainage technique is designed to drain the middle ear by stretching the ventilatory tube and encouraging temporal bone rocking. In this treatment, the physician gently tugs on the mandible, pulling anteriorly in a repetitive manner about 20 to 30 times in one minute. By distracting the mandible anteriorly, the pharyngeal portion of the Eustachian tube is repetitively pulled promoting drainage of the middle ear. The parent is taught this technique and instructed to perform it daily at home. By regularly, mechanically draining the middle ear, the ability of fluid to accumulate and become infected is reduced. As the child matures, the angle of the ventilatory tube increases and retrograde flow is less likely. However, while the child is small, this is a simple means of improving temporal bone motion and ventilatory tube function, thereby reducing fluid accumulation in the middle ear and blocking the cascade leading to otitis media.

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When considering the function of the chest, one must palpate for restriction of movement of all ribs, the thoracic and lumbar spines, the thoracic inlet and the abdominal diaphragm. Treatment of children can be accomplished by gently, but firmly, encircling their torso with the hands at the area of greatest restriction and following their movement. Let your hands move with the child, but follow the child's movement with a bit of a lag time, so as to do both myofascial release and articular treatment of the torso. Then separately assess and treat the abdominal diaphragm, which I find consistently tight in children with chronic ear infections. Treatment can be performed in the same manner, holding onto the lower torso with specific attention to the muscle of the diaphragm and doing a slow myofascial unwinding.

There are other techniques that are commonly used in the treatment of children with recurrent acute otitis media, but my purpose today is to discuss the philosophical basis of OMT in children. Therefore, I have chosen to discuss the idea of impaired fluid pumps as one basis for the development of recurrent ear infections in children, and provide a simple example of an osteopathic treatment to address the underlying plumbing failure grounded in anatomy.

Before we go to my next story, or case, I would like to share some observations on treating children. I have learned to speak to the child first when I enter the treatment room, no matter the age of the child. Then I speak to the parent. Recognize the parent, but talk to the child. No matter how young the child is, even if they are two weeks, or if they are 12 or 15, recognize the parent, but focus on the child. By establishing rapport with the child, rapport is simultaneously established with the parent as well. Take the history from the child first, then from the parent. After the exam, tell the child what your findings and recommended treatments are, in age appropriate language, then the parent. Children who have been to the doctor a lot generally have great fear about going to the doctor. Speaking to them directly reduces that anxiety and engages them as the key player in their recovery. Ask the child's permission to do the OMT then ask their parent's. When doing OMT on a young child, have the parent engaged by entertaining their child. Most parents love being told it is their job to play with their child for 15 or 20 minutes. And all children love the undivided attention of a caregiver and physician simultaneously. I recommend having toys in the room with which the parent and child can play during the OMT. Children know when you are focused on them. Adults probably know, as well, in their heart of hearts when our attention wavers, but they do not act out. Children will act out if they are not the center of attention. Following Dr. Still's admonition, keep a picture of the normally functioning anatomy in mind when treating your patient. Only think of information you are getting through your hands, through your eyes and through your awareness of interacting with that child. Visualize the Eustachian tube and its angle, the temporal bones gently and rhythmically pumping, middle ear fluid draining in the posterior pharynx and the torso creating an alternating pressure gradient that pulls against the Eustachian tube opening to clear the middle ear, so air can vibrate in the middle ear chamber, not fluid.

"As the twig is bent, the tree shall grow" is a great allegory for benign positional plagiocephaly.

Let us continue to consider this idea of improving functional anatomy with Jessica's story. Jessica was nearly four when I first saw her for plagiocephaly. Plagiocephaly is the term for a slanted or asymmetrical head. On a CT scan at age five months, she demonstrated distortion in all three planes. Generally, plagiocephaly of this degree is treated with helmet therapy with fairly good outcomes, but must be initiated before age one year. However, Jessica was not referred for helmet therapy. When she was age three and a half, she was referred for osteopathic care. She has had a wonderful outcome. Jessica had benign positional plagiocephaly, or asymmetry of the skull, that is not from premature sutural closure. The conventional wisdom is that the soft infant skull is deformed by pressure against it during intrauterine and early post-natal positioning. It is more common in twins and larger babies. It is more common in children with torticollis. And generally the distortion creates a parallelogram shape to the head, with the right parietal and left frontal flattened, and the right face more anterior than the left.

Jessica was a twin. She had the flat right parietal, with the right half of her face anterior and inferior in relation to the left. She also had a palpable strain in the base of the cranium, or a right lateral strain of the sphenobasilar symphysis. As her brain grew, the skull was forced to grow. With the center of the skull angulated, the resultant vault growth was predictably asymmetrical. The deformation that was in the cranial base at birth expressed itself in a parallelogram deformity of the vault with growth. As the visceral cranium, or the face, grew, the forces from the base and the vault forced a facial asymmetry such that the right face was significantly anterior and inferior to the left. This strain was probably palpable at birth. It was definitely visible by several months of age.

"As the twig is bent, the tree shall grow" is a great allegory for benign positional plagiocephaly. In the osteopathic paradigm, the original distortion was in the base, which resulted in distortion of the vault and face with growth. Plagiocephaly leads to cosmetic deformity, reading problems because the eyes are not on the same plane, TMJ problems because the jaws are uneven, and some studies indicate an association with learning disabilities. Therefore, treatment is warranted, and for far more than cosmetic concerns.

The "back to sleep" program was initiated in 1994 to reduce the incidence of Sudden Infant Death Syndrome from infants sleeping prone. If an infant is born with a lateral strain of the cranial base, and is not given supervised tummy time, they naturally lie with their head turned to the flat spot side. The best, and earliest, intervention is for the parent to change positions and provide supervised tummy time. Prone positioning forces the child to strengthen the posterior neck muscles, which then pull on the cranial base and help to reduce any cranial base strains. After the flat spot has become evident, counter positioning is recommended,

laying the child on the "pointy" side. A helmet or band is used if these measures fail, in which gentle pressure is applied against the prominent angles of the parallelogram deformity by a contoured orthotic device. Treatment is usually beneficial, takes about five months, and requires that the child wear the device most of the day.

You, with your hands on the newborns, can prevent this deformity from being expressed and can reverse it if you start soon enough. You can change a life at the beginning of life. Providing OMT to a child for plagiocephaly involves treating the entire child. The whole child was pressed into the small space, perhaps against its twin or the mother's sacrum, or constrained in its movement in utero due to too little amniotic fluid. The base of the child's cranium is strained, as are the torso, the pelvis and the extremities. The cranium is where the greatest deformity is expressed, but without removing restrictions in the entire child the result will be less than optimal. I have found the abdominal diaphragm to be a key player in the maintenance of plagiocephaly, just as it is for recurrent acute otitis media. But do not discount the strains of the infantile pelvis in the maintenance of the distortion of the head, when evaluating and treating the child with plagiocephaly.

Osteopathic treatment for plagiocephaly generally begins with gentle treatment of the cranial base, commonly with the child in the parent's arms. For those not comfortable with osteopathy in the cranial field, there is still much OMT to offer for the little ones with asymmetrical heads. Gentle myofascial release of the neck, chest, abdomen and pelvis helps a great deal, when combined with supervised tummy time and counter-positioning. During treatment, they wiggle, of course. They free themselves of their non-cranial dysfunctions when we just hold onto the tight spots and provide gentle resistance. It is interesting to note that an "incidental" reduction in the incidence or severity of torticollis, ear infections and reflux are commonly seen in children who are treated for plagiocephaly. When considering the osteopathic paradigm, the improved functioning of the upper GI and respiratory systems is predictable.

For my last story, please meet Justin. Justin is nine months old and has had severe reflux since birth. With medication his weight gain was fine. Common complications of gastroesophageal reflux disease (GERD) are apnea, bradycardia, wheezing, and an increase in their gag reflex. Standard treatment for GERD includes: changing formulas, on the premise of food allergy; feeding sitting up; and sleeping sitting up. When lying down, stomach contents reflux into the pharynx leading to aspiration, asthma and respiratory infection; and into the middle ear, increasing the colonization of middle ear fluid leading to ear infections. It has been observed that GERD in children can be improved with OMT. Applying the osteopathic paradigm, and looking at functional anatomy, strains of the cranial base could be contributory.

At birth, the cranium has many parts that later become fused. The occiput is in four parts at birth: basi-occiput, two occipital condyles, and the supra-occiput. These bony parts compress against each other during vaginal decent and delivery then separate after birth with nursing and crying. However, sometimes they do not separate, but remain compressed. For a child with GERD, the importance of this occurrence lies in the jugular foramen. The occiput forms half of the jugular foramen, though which exit all the cranial nerves that control the suck and swallow mechanism. When there is jamming of this area, the cranial nerves are compressed. When a nerve is compressed it "complains" with the only voice it has. A sensory nerve "complains'' with pain, dysthesia or numbness. A motor nerve "complains" with weakness, paralysis or spasticity. An autonomic nerve "complains" with dysautonomia. In this case, it is theorized that pressure on the Vagus nerve at the compressed jugular foramen leads to impaired functioning of the upper gastrointestinal tract with dysfunction of the lower esophageal sphincter and to esophageal reverse peristalsis. A simple osteopathic technique can provide relief of symptoms, fairly quickly, if provided in the early post-natal period. If treatment is delayed, adaptation occurs, and more osteopathic treatments are needed. If left until adulthood, osteopathic treatment can reduce symptoms temporarily, but it is unlikely to resolve the problem. This simple technique is occipital decompression. The physician gently contacts the suboccipital area of the infant providing very light posterior and lateral pull in order to decompress the compressed bony parts of the newborn cranial base. After a few moments, the physician observes a reduction in resistance to this distraction. Generally, improvement in symptoms of GERD is noted at the next feeding. Several treatments may be needed, depending on the age of the child at initiation of treatment, and the disease severity. Applying the paradigm of dysfunctional anatomy to Justin's case, other areas of his body generally need to be treated as well. Commonly, the abdominal diaphragm is tense in children with GERD, just as with recurrent ear infections and plagiocephaly, and it is treated as described before with myofascial release, or balanced ligamentous tension techniques.

The osteopathic philosophy leads us to see our patients as much more than just a physical body, and this is true also for our littlest patients.

Expanding on the osteopathic paradigm, I would like to discuss the similarities and dissimilarities between the osteopathic treatment of children and adults. Children are like adults in that they can have emotional strains that occur at the time their physical strains are incurred, and those strains commonly occur at birth. Please remember to obtain a birth history. If the mother was terrified during delivery, it is likely the child will have an emotional strain locked into their physical strain. Commonly, such children have behavioral issues and when receiving osteopathic treatment they have "somato-emotional" releases, just as do adults. They will generally be brought for osteopathic treatment of what we could now call a "symptom" of their somatic dysfunctions: recurrent ear infections; plagiocephaly; GERD; or any other of a myriad of childhood diseases with an underlying dysfunctional body-mind-spirit component. When treating their physical strains parents commonly note a

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difference in the child's behavior, as well as in their medical condition, for which they ostensibly received OMT.

How are children different? Their strains are mostly membranous and fluid. Their cranium is deformable and their anatomy changes with age. One does not need to focus on Fryette physiologic motion, but rather tissue tension. We must intervene early, in order to prevent diseases, with their attendant morbidities and cost; such conditions can be reversible and curable at an early age. Look through their entire being for dysfunctions that can be reversed; and think reversible dysfunction.

The osteopathic philosophy leads us to see our patients as much more than just a physical body, and this is true also for our littlest patients. When we "get" the osteopathic paradigm, we can no longer separate the body, the mind, or the spirit of our patients. We see them as three interwoven parts of one being, each of which deserves recognition and treatment, and each of which affects the other two in health and disease. This is the paradigm that I hope I have expressed in this lecture as we explored the osteopathic care of children. Keep the image of the normal functioning anatomy in your mind, search for dysfunctioning anatomy, treat what you find, focus only on the child during treatment, and most importantly, have fun. It certainly is a very delightful practice. Δ

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Component Societies' CME Calendar and other Osteopathic Affiliated Organizations

December 9-11, 2005
24th Annual Winter Update
Indiana Osteopathic Association
CME: 20 Category 1A (anticipated)
Crowne Plaza Hotel at Union Station
Indianapolis, IN
Contact: IOA
800/942-0501
317/926-3009

January 18-21, 2006
17th Annual Osteopathic Winter Seminar
Pinellas County Osteopathic Medical Society
Tradewinds Island Grand Hotel
St. Pete Beach, FL
CME: 27 Category 1A (anticipated)
Contact: Kenneth Webster, EdD
Executive Director
phone: 727/581-9069
fax: 727/581-8537
E-mail: docwebster@aol.com

February 10-12, 2006
Annual Seminar
Indiana Academy of Osteopathy
Airport Radisson Hotel
Indianapolis, IN
CME: 20 Category 1A (anticipated)

February 22-26, 2006
Midwinter Basic Course in Osteopathy in the Cranial Field
The Cranial Academy
Tampa Palms Golf and Country Club
Tampa, FL
CME: 40 Category 1A (anticipated)
Contact: The Cranial Academy
317/594-0411

February 23-26, 2006
103rd Annual Convention
Florida Osteopathic Medical Association
Ft. Lauderdale, FL
CME: 33 Category 1A (anticipated)
Contact: FOMA
800/226-3662

June 17-21, 2006
Basic Course
The Cranial Academy
Founders Inn
Virginia Beach, VA
CME: 40 Category 1A (anticipated)
Contact: The Cranial Academy
317/594-0411

June 22-24, 2006
AACOM's 2006 Annual Meeting Challenges and Opportunities
Renaissance Harborplace Hotel
Baltimore, MD
Contact: AACOM
301/968-4143

June 22-25, 2006
Annual Conference – "Bent Twigs: Pediatric Osteopathy and Beyond"
The Cranial Academy
Founders Inn
Virginia Beach, VA
CME: 40 Category 1A (anticipated)
Contact: The Cranial Academy
317/594-0411

Somatic Dysfunction – a Reflection on the Scope of Osteopathic Practice

Zachary Comeaux

Abstract:

The development of a consensus regarding osteopathic terminology has shadowed the struggle to express the intention, method and scientific understanding of this aspect manual diagnosis and treatment. The term "somatic dysfunction" has come into use in the context of this struggle. As the osteopathic profession simultaneously expanded yet attempts to maintain unity, a review of the history, relevance and future of the definition seems timely. This article reviews these issues, intending to stimulate discussion toward a broader international consensus regarding the biophysiologic implication of the definition of somatic dysfunction.

Key words:

somatic, dysfunction, osteopathy, lesion, musculoskeletal, function, articular, functional, tensegrity, coherence, oscillation, cranial

Introduction:

Despite the claim by Dr. Still that osteopathy is an eternal science (Still, A., 1981) and that it is defined as a study of the Mind of God in Nature (Still, A., 1986), the public and most practitioners require a more specific focus. As our understanding has continued to evolve, the target of treatment has been expressed as the osteopathic lesion and, since 1968, as somatic dysfunction. Whether or not the term and its current definition convey the full scope of osteopathic practice as it continues to mature is the question raised by this review.

Historical inception of the definition:

The term and definition of somatic dysfunction are included in the Glossary of osteopathic terminology as printed in *Foundations for Osteopathic Medicine*, a primary reference text published under the auspices of the American Osteopathic Association (Ward R., 2003) The Glossary, since its first publication in April 1981 (Ward, R., Sprafka, S.), has been sponsored by the Educational Council on Osteopathic Principles, now under the auspices of the Association of Colleges of Osteopathic Medicine Revisions. Refinement of the glossary is ongoing and international input is accepted from the glossary committee of the World Osteopathic Health Organization.

The current published definition of somatic dysfunction is as follows: somatic dysfunction: Impaired or altered function of related components of the somatic (body framework) system: skeletal, arthrodial and myofascial structures, and their related vascular, lymphatic, and neural elements. Somatic dysfunction is treatable using osteopathic manipulative treatment.

The positional and motion aspects of somatic dysfunction are best described using at least one of three parameters: 1) The position of a body part as determined by palpation and referenced to its adjacent defined structure; 2) the directions in which motion is freer; and 3) the directions in which motion is restricted. See also T.A.R.T. See also S.T.A.R.

The original 1981 definition varies from this only in its final cross-referencing: "See also osteopathic lesion (Osteopathic Lesion Complex)"

Clearly, the definition has a primary bias toward musculoskeletal biomechanics.

Although the earliest definition reflects the review by multiple individuals and organizations involved in osteopathic education, it is essentially the restatement of the 1968 work of the Hospital Assistance Committee of the Academy of Applied Osteopathy chaired by Ira Rumney, DO. (Rumney I., 1969)

Preemptively, the committee had developed definitions for osteopathic diagnosis and treatment to be included in the Hospital Adaptation of International Classification of Disease, part of an ongoing international effort to recognize and define medical care. Without this initiative, the osteopathic profession would have accepted definitions and diagnosis with associated code numbers imposed from outside the osteopathic community. As insurance companies and a critical public require specific criteria for defining a service, the definition of somatic dysfunction was developed for this purpose. It was an initiate motivated by medical economics.

Problematic - internal consensus building

Osteopathic practitioners recognize the challenge in describing with words the existential experience, including the vast variability in findings and dynamics, which occurs in the encounter with the patient.

Both before and since the term "somatic dysfunction" was adopted by the AAO's Hospital Assistance Committee, the term has been recognized as a semantic compromise. The debate over best terminology has entwined the elements of personal experience and philosophical paradigms including various approaches to biological science. Despite the apparent sterility of the term, it was not invented at a scientific symposium. True, Irvin Korr (1948) had influenced the debate over terminology by using the phrase "somatic component of the disease process" to help expand the scope of interest and effect of osteopathic diagnosis →

and treatment. Cole (1952) in turn used the term "spinal dysfunction" in reporting the pathologic state induced by trauma in experimental animals. The marriage of the two would appear to have spawned the current term. (Rumney, 1975)

However, the debate over appropriate osteopathic terminology was not new then nor is it new now. One issue is the scope of consideration in the definition related to the balance of anatomy and physiology.

The biomechanical approach to unity of body function was a key concept of Andrew Still's and often this was expressed by impressing students to look at the summation of function on individual joints. Early on, the articular dysfunction, which impeded healthy physiological function, was termed the osteopathic lesion. As early as 1915, enough variation of interpretation had arisen to motivate several teachers of osteopathic technique to discuss, adapt and recommend the acceptance of a list of 43 defined terms beginning with the following:

"Lesion- A lesion (Latin, laesus, from laedere, to injure) is any adjustment of structure which in addition to being a condition of disease, with its symptoms and signs, is an intrinsic cause of disease, with its remote effects." (Forbes H, 1915)

To develop a larger consensus on this topic of terminology, the following year the AOA appointed a committee, headed by M.C. Hardin, to develop a Latin terminology for osteopathy consistent with then current international medical terminology. (Rumney I., 1971) As will be mentioned below, this group never made a report.

In an editorial some years after, McConnell, (1922) attempted to impress the importance of specific treatment of the primary lesion versus general treatment but at the same time including the importance of ligaments and muscle in restricting motion of the bony vertebra. Clearly there was a debate about the focus of attention, or scope, in diagnosis and treatment.

Since the 1916 working committee never arrived at group consensus, in 1932 a committee under the auspices of the Associate Colleges of Osteopathy reworked a revised list of terms with the following definition:

"The osteopathic articular lesion is any alteration in anatomical or physiological relationships of the articular structures resulting in local or remote functional disturbance." (Pritchard, W. et al 1933)

The focus is more clearly articular, the chain of causation is clear, but the phrase "physiological relationships" lends itself to broader implications. Halliday (1936) reflects that the term alteration makes allowance for those who prefer positional diagnosis (reflecting bony articular consideration) as well as those using a more physiologic approach (reflecting bony, muscle and ligamentous tissue) in motion testing.

Is this inclusive enough? The clinical dimension

The challenge to be precise, tenable, but not prematurely exclusionary is not to be taken lightly. Dr. Still had the same problem. Despite his bold statements describing the body as a machine, he also recognized the limitations of these analogies. He describes the complex nature of the person as Triune, of physical, spiritual, and mental bodies. (1986, p. 16) and explored the arena of vitalism in his chapter on biogen, (Still, 1986 p. 251) and his explorations of nerve force (1986, p. 40). He describes the body as a machine but clarifies: "The human body is a machine run by the unseen force called life." (p. 184)

At the end of his great "digression" on the topic of Biogen, Still summarizes:

"We have given a few thoughts on this line of life, hoping the osteopath will take up the subject and travel a few miles farther toward the fountain of this great source of knowledge and apply the results to the relief and comfort of the afflicted who come for counsel and advice." (1986, p. 258)

William Sutherland, student of Still's, thought there was more. Despite his beginning with the concept of biomechanics in the cranium, he progressed through dynamism of the cerebrospinal fluid, to potency to explain what he observed. Later he described vital force as "liquid light", only to retrench for pragmatic reasons to defense of his more demonstrable (articular and membranous) descriptions. (Sutherland, 1967, p. 347)

Rollin Becker (1997), Sutherland's student, addresses the difficulty in verbally describing the dimensional criteria of his diagnosis by describing the "anatomical-physiological wholeness of the patient's body". p. 155

"The anatomical-physiological mechanism and its structure-function carry the total picture for disease and restored health." p. 155

"I am not talking about the anatomical-physiological units of tissue. I am talking about the kinetics of the energy fields that make up this stress pattern. The anatomical-physiological tissue units are manifesting this kinetic energy and are expressing this dysfunction as tissue changes and symptoms." p. 162

Robert Fulford, another student of Sutherland's, in acknowledges his teacher's reluctance to fully describe the extent of his model, adapted terminology from "energy medicine" to further describe the activity and potential for osteopathic intervention with the human person. His equivalent of somatic dysfunction he called the "energy sink". (Comeaux 2002)

Nicholas Handoll analyzes the experience of palpation and the potential for further understanding of the scope of osteopathy by introducing the perspective of physics. The general theory of relativity and observations of quantum physics have implications for interpreting touch and the sensation of restriction of motion. This may cause us to reexamine our premises about wellness, patient-practitioner boundaries and actual manner of treatment effectiveness. In this review, dysfunction reflects a suspension of the body's self-regulatory process, accessible on multiple levels of organization. p. 145

In developing a model called Facilitated Oscillatory Release (FOR), Zachary Comeaux (2003) applies the concept of energy, vibration and oscillation in a practical way. Building on the phenomenon of phase resonance synchronization of neural firing in nerve and muscle function, and the disruption of such in dysfunction, FOR extrapolates this concept to other body tissues as is consistent with coherence models of body organization which will be described below. In this way of looking at coordination of body motion, somatic dysfunction represents a proprioceptive arrhythmia treatable by

entrainment of endogenous oscillators.

The application of vibration or oscillation is not here unique in osteopathy. This type of force has been used in a variety of settings, though it is rarely emphasized. (Comeaux, 2000)

Is this descriptive enough? The scientific conceptualization

Andrew Still proposed that osteopathy be based in science. We have cited above Dr. Still's interest but difficulty in expressing the inter-relationships between biomechanical, visceral, neural, vascular and vital function. His students have tended to focus on subsets of this interaction because of the complexity in describing total human function. For Still, scientific study entailed anatomical dissection.

Halliday, Fryette, Hulette, McConnell and others variously tried to establish a more scientific understanding of anatomico-physiologic relationships. Early scientific work in establishing the physiologic basis for the "osteopathic lesion" turned to animal studies. W. Cole (1952) provides a comprehensive review and summarization of the first 50 years of osteopathic research. Citing the work of Louisa Burns and others who did histological analysis after mechanically induced lesions in animals, Cole emphasizes that the osteopathic lesion is not strictly an articular fixation but involves a complex of tissues associated with the joint. It is a complex inflammatory response, which he labels a syndrome. He emphasizes the primary role of neural coordination of the tissue response to trauma in the osteopathic lesion. Additionally he emphasizes the effect of somatovisceral and viscerosomatic reflexes which rely heavily on the autonomic balance influencing both periarticular muscle tone as well as visceral function.

Although Cole separately mentions the work of Denslow (1948) and Korr (1945) in applying these principles of sympathetically mediated hypersensitivity (spinal facilitation), Korr made further lasting contributions to the next generation's appreciation of the role of neural coordination in somatic dysfunction. The work of Denslow and Korr relies largely on the increased role of instrumentation in measuring effects of strain and of treatment, but largely in normal subjects.

Beginning from his collaboration with Denslow on the facilitation model, Korr postulated a further factor, dysregulation in the Alpha-gamma efferent-afferent loop, in maintenance of muscle hypertonia, one of the clinically observable finding often association with somatic dysfunction. In Korr's words, "A new theory is offered to… elaborate modeling of muscle spindle functional theory and it becomes clear why the 'gamma loop' is often viewed as a high-gain servomechanism, and the gamma neurons as the gain-control components of the system." "I propose as a hypothesis that in the lesioned areas the 'gain' has been turned up in the spindles of one or more muscles."

But he qualifies this by adding:

"The hypothesis says only that the 'lesioned' segment behaves as though gamma motor neuron activity (gain) in that segment has been turned up. In presenting this hypothesis, I hope, whether or not it turns out to be valid, that it stimulates testing and inquiry in clinical practice and in the laboratory, leading to new insights, sounder theory, and more efficacious practice." (Korr, 1974)

This hypothesis was later cited as an important aspect of dysfunction by Lawrence Jones and Fred Mitchell, Jr., the authors of major works on strain counterstrain and muscle energy techniques respectively. (Jones, Mitchell) The theory satisfied many in the profession with a tenable scientific explanation of clinical observation and response to treatment; of special interest was the somatic response to visceral conditions as is evidenced by the elaborate explanation and diagrams in an articles by Robert Schaefer, Hannah Bailey, and H. George Grainger.[11,12,13] However, interestingly Mitchell adds as a disclaimer, "At present, with much relevant laboratory research yet to be done, clinical empiricism is the principal basis of MET theory." To many, however, the hypothesis has been treated as if it were factual.

This hypothesis is challenged by the nociceptive model, which is another aspect of the contemporary legacy of the concept of the sympathetically mediated "facilitated segment." A competitive hypothesis for the cause of the segmental facilitation behind dysfunction was summarized by Richard VanBuskirk (1990) proposing that nociceptive rather than the proprioceptive afferent input was the primary cause of retained muscle hypertonia. This trend of thought was also championed by Frank Willard,[17] who cited the work of Anderson and Winterson to refute the gamma loop hypothesis. In Willard's presentation, persistence of alpha-gamma mediated contraction could not occur after cutting the dorsal root of the spinal nerves as is included in these experiment. Willard more recently refutes also the concept of the sympathetically mediated "facilitated segment." As relevant to somatic dysfunction, Emphasizing rather the role of central sensitization as a causal factor in the chronic pain associated with somatic dysfunction. This latter modeling incorporates but expands some of the work of Steinmetz, et al (1982, 1985) in extrapolating spinal neural sensitization as observed in animal models as a cause of persistent pain in further refining the facilitation model.

In an entirely different direction, several teams have worked to validate the clinical observation of oscillatory motion in the cranium and its relevance to somatic dysfunction and osteopathic treatment. Measurable relationships between intracranial volume and intravascular pressure changes correspond to reportable phase changes reported as flexion and extension by cranially oriented osteopaths. (Moskalenko et. al. 2003) Additionally, osteopathic researchers are evaluating the physiologic laws and phenomena such as the Traube-Hering-Mayer oscillation that support osteopathic diagnosis and treatment. (Nelson et al 2002)

Further biologic modeling

Osteopathic research and practice do not occur in a vacuum and there is the challenge of incorporate thought from the larger scope of physical and biological sciences. Complementing the osteopathic principle of working with the person as an integrated whole are two parallel avenues of biological modeling which to this author have strong relevance to an expanded view of somatic dysfunction. One is the synthesis of Inger (2003) and others cited as the tensegrity model and the other is the coherence model of bio-

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logical communication and organization described separately by Ho (1998) and by Oschman (2003).

Ingber is motivated by a sense of the need for a sophisticated biomedical model based on current research that conserves the physicality of disease in the face of biomolecular models of genetic control. Ingber translates the architectural concept of structural organization among tensional and compressive elements to describe a more sophisticated plan of body organization from the molecular to the level of gross anatomical form. Ingber's model is easily adaptable as an updated approach to osteopathic myofascial work since he presents the structure/function relationship of tissue as a continuum even into the intracellular level. The seamless collagen matrix of the body continues down to the cell membrane and then further as intracellular tubulin microtubules. This matrix provides communication linkage and structural form to the intracellular organization of organelles, nucleus and other intracellular space.

A further functional complement to this structural model is supplied by Ho (1998). Mae-Wen Ho, a biochemist intrigued by quantum physics and quantum optics, emphasizes the role of this network as a conduit for communication. One of her key concepts, citing a spectrum of research, is that the speed of many complex processes and reactions in the body are not consistent with the paradigm which ascribes all body processes to physical continuity of pathways which transduce all events as chemical ones, dependent on energy transfer through intermolecular bonds. (Ho, p. 114) She proposes that the mechanism for many communications is one in which the connective tissue matrix of the body behaves as a crystalline structure in which components act as semiconductors so that electrons and other charged entities may be distributed instantaneously. Rather than discarding molecular microbiology, Ho adds another level onto the interpretation of the relationship between structure and function.

Besides actual energy transfer, coherence may be the vehicle for consciousness, in which case coherence is a measure of the physical, emotional, and mental health of a system; a very osteopathic compatible concept. (Ho, p. 246) In this context, somatic dysfunction is a lack or coherence, or resonance, among resonant activities. This very strongly parallel's Still's conceptualization of the complementary function of physical, mental, and spiritual body.

It is easy to extend these thought regarding physical yet energetic communication to the level of patient /practitioner interaction. In an approach compatible to Ho's, J. Oschman (2003) does so in the following statement:

"Coherence signals from the hand of a therapist influence wavefronts flowing through out the molecular fabric of their client's body. When emotionally "charged" regions are contacted, there may be a sudden recall of stored memories. The memory trace is released as an energetic pulse and interacts with other waveform present in the body. The memory is erased when various polymers, such as ground substance and microtubules, de polymerize or fall apart." (Oschman 2003 p. 292) The implications for osteopathic palpation and treatment in a subtle mode are apparent. They validate connective tissue work done in the style of Rollin Becker or Robert Fulford.

Despite the fact that many of these latter models seem fancifully irrelevant to many osteopaths who emphasis joint position and cavitation; many others in the profession readily incorporate these thoughts into their work. Here we have a new generation of challenge in maintaining consistency yet inclusiveness in our osteopathic terminology, including a definition, which describes what it is that we treat.

Challenge of Global Diversity

Besides the challenge from this blend of biophysics and energy medicine, osteopathy has to contend internally with the complexities within the profession associated with its progressive global growth. In various settings internationally, osteopathy has been most influenced by a balance of four conceptual streams. Most of early osteopathy beyond America came through the filter of J. M. Littlejohn who, after serving as Dr. Still first dean, returned to Great Britain and established the British School of Osteopathy in 1917. Later influence from the United States in the 1960s to the present follows the scope of US osteopathic methodology; in some cases osteopathy in the cranial field; this method, with its own interpreted style, has been introduced in some places as basic osteopathy (Chaitow, 2005). A fourth emphasis has been contact with the disciplines of physical medicine and kinesiotherapy within individual countries.

More recently there have been national, regional, and international efforts to coordinate activities identified as osteopathic. On the international stage, now, is the challenge, which faced the profession initially in America and subsequently in each country in which it has taken root. The questions arise: what training does it take to be called an osteopath; what constitutes osteopathic technique, how do we describe what we do? Embedded in this is the age-old challenge of terminology. Inevitably, there will be another round of question, discussion, and compromise in going forward.

It is this author's contention, and that of others, that the current definition of somatic dysfunction reasonably covers the scope of past conceptualizations of osteopathic work. The question arises as to whether it allows for continuing expansion of application of science and experience of the profession as it grows. In time, the definition of somatic dysfunction will be revisited. In this context, the author puts forward the following definition to reflect a compromise between the classic definition and the emerging paradigm of subtle osteopathy:

Somatic dysfunction: def. A dysregulation of the whole body system (body, mind, spirit) usually expressed as a mechanical restriction of the musculoskeletal system (skeletal, arthrodial, and myofascial [connective tissue?] structures), often accompanied by sensitivity (pain) asymmetry, restriction of motion and tissue texture changes, with either causal or accommodative dysregulation of the related vascular, visceral, lymphatic, and neural elements.

It is the intent of the author to stimulate a discussion, as Still suggested, "We have given a few thoughts on this line of life, hoping the osteopath will take up the subject and travel a few miles farther toward the fountain of this great source of knowledge and apply the results to the relief and comfort of the afflicted who

come for counsel and advice." (Still, l986, p. 258)

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2. D
3. E
4. C
5. A

CME QUIZ

1. The first official endorsement of the term somatic dysfunction was in:

   a. The osteopathic syllabus of AT Still
   b. ECOP Comprehensive OPP Curriculum
   c. Glossary of osteopathic terminology
   d. Report of AAO Hospital Assistance Committee
   e. The writings of Wilbur Cole DO

2. The term was initially intended to communicate osteopathic diagnosis to:

   a. The scientific community
   b. Osteopathic students
   c. Patients
   d. Insurance companies
   e. Governmental agencies

3. In extending the physiology of the "osteopathic lesion" beyond joint mechanics, Wilbur Cole cited Louisa Burns study of:

   a. Animal models of lesions
   b. Energetic medicine
   c. Somato-visceral reflexes
   d. Segmental facilitation
   e. Patient outcome studies

4. According to the article, the quantum physics term "coherence" may be extended to describe :

   a. A process of therapeutic communication
   b. A route to self understanding
   c. The collective strength of a community
   d. The strength of myofascial structures
   e. The loss of integrated function

5. The primary premise of this article is that:

   a. Tradition should be respected and imitated at all costs
   b. Knowledge is progressive and terminology needs to keep abreast
   c. International developments in osteopathic thought are irrelevant
   d. Somatic dysfunction as a term has become archaic
   e. There is only one true way to conceptualize dysfunction

The Relation Between Restricted Internal Rotation of the Hip (in 90° flexion) and Restricted Sidebending in the Lumbar Spine

Luc Peeters

Abstract:

Previous studies have examined the relation between bilateral hip flexion and flexion in the lumbar spine.

The hypothesis of this study was that a restriction of lumbar sidebending, under influence of gravity, would be associated with a heterolateral restriction of hip internal rotation, as measured sitting with the hips flexed at 90°.

The study was a classic correlation study. The subjects (n = 63) were between the ages of 24 - 44 (54% male, 46% female). The lumbar sidebending was measured using a metal ruler, with the subject standing, sitting normally and sitting with both hips in active internal rotation. The internal rotation of the hips was measured using a universal goniometer.

The results showed a moderate significance (p = 0.001) between the sidebending restriction in the lumbar spine and the active internal rotation restriction in the heterolateral hip.

The study showed a difference in the range of motion in the lumbar spine, in that, the mobility in the standing position is greater than that in sitting position and much greater than in the sitting position with the hips in active rotation.

The study also showed that there is a difference in the internal rotation range of the hip between men and women. The range of motion is greater in women than in men with the average difference 4.3°.

The study presented an interesting clinical test for osteopaths wanting to improve hip and/or lumbar mobility.

1. Introduction:

Unilateral restriction of hip internal rotation is a very common phenomenon. It is significant that if the hip internal rotation is tested with the hip in a position of 180° without the influence of gravity another set of results are seen compared to when the hip internal rotation is tested with the hips flexed at 90° and under the influence of gravity.

In certain cases the internal rotation is only restricted when tested with the hip in a position of 180° without the influence of gravity, in other cases the internal rotation is only restricted when tested with the hips flexed at 90° and under the influence of gravity and then in other cases it is restricted in both test positions.

Patients with lower back pain and patients with hip complaints will often present loss of mobility in both regions.

Kapanji (1982) describes the hip joint as an articulatio sphaeroidea, meaning that a large part of the femoral head is enclosed within the acetabular ring and that this ring limits the mobility in the hip. He also suggests that loss of mobility in the hip could find origin in a loss of mobility in the lumbar spine. He never proved this relationship. The combination of sidebending restriction in the lumbar spine and unilateral internal rotation restriction in the hip certainly appears to be very common.

No studies exist to investigate this relationship in more detail. Observations exist of the relation between restricted flexion in the lumbar spine and bilateral hip flexion restriction but not for unilateral restrictions.

The aim of this study is to investigate if any correlation exists between restricted internal rotation in the hip and restricted sidebending in the lumbar spine.

The study also presents a clinical test using this phenomenon.

2. Biomechanics

a. Biomechanics of hip internal rotation in sitting position with the hip in 90° flexion.

- <u>Ligamentous relationship between the lumbar spine and the hip</u>
  - o In all bi- and quadrupeds the pelvis is a solid link between the vertebral column and the lower limbs, In order to make standing and gait possible an adaptation was needed to resist gravity. The sacro-iliac articulations modified in form and constitution towards flatter and more torsioned joints to be able to resist gravity on one hand, and to allow a degree of mobility on the other (Vleeming et al 1992, Sturesson et al 1998, Miller et all 1987, Lavignolle et al 1983).
  - o For the same reason the fibrous capsulo-ligamentous structures of the sacroiliac joint, the intervertebral joints and the facet joints were reinforced. The hip capsule and the ligamenta ischiofemoral, pubofemoral and iliofemoral undergo an axial torsion in a standing position and are only fully relaxed when sitting with the hip flexed at 90° (Kapanji 1982).
  - o Under influence of gravity nutation in increased, especially if there is significant pre-existing

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lumbar lordosis (Egund et al 1978, Sturesson et a! 1989). Nutation stretches the sacro-iliac ligaments so that the ilii are pulled together. This causes more compression in the sacro-iliac joints.

- o The sacrotuberal ligaments and the posterior sacro-iliac ligaments also play a role in this locking mechanism (Vleeming et al 1996). With nutation the sacrotuberal ligament is stretched and the posterior sacroiliac ligament relaxed.
- o With contranutation the opposite occurs.
- o The mechanical relation between hip rotation and the lumbar spine cannot be explained using ligamentous or capsular structures because the capsule is fully relaxed while sitting and because the lock mechanism of the sacroiliac joints is in action.

- Muscular relationship between the lumbar spine and the hip
  - o In order to make standing and gait possible it was not only articular and capsuloligamentous alterations that were required but, also muscular changes. As a result the m. gluteus maximus developed from a relatively small muscle (as seen in the chimpanzee) into one of the largest muscles in the human body (Lovejoy 1988).
  - o Two mechanical relationships between the lumbar spine and hip were found.
    - Vleeming et al (1995) demonstrated the relation the m.biceps femoris and the paravertebral musculature. Traction via the m.biceps femoris is transferred via the lig.sacrotuberal upon the deeper layers of the fascia thoracolumbalis that surrounds these paravertebral muscles; usually the homolateral side, sometimes the heterolateral side.
    - Vleeming et al (1996) and Gracovetsky (1990) proved the relationship between the m.gluteus maximus and the m.latissimus dorsi. Traction upon the superficial layers of the fascia thoracolumbalis via the m.latissimus dorsi gave variable results. The strongest results were achieved by traction upon the lowest part of the m.latissimus dorsi. This displaced the fascia thoracolumbalis by 8 to 10 cm from the mid-line. At the levels L4-L5-S1-S2 the heterolateral fascia also shifted. Traction via the m.gluteus maximus pulled the fascia thoracolumbalis 4 to 7 cm away from the mid-line and the traction was also seen on the heterolateral side. Traction via other muscles such as m.gluteus medius or m.abdominis externus produced only a small displacement and certainly did not involve the heterolateral side. These tests were done on cadavers and not repeated in situ.
  - o Porter and Wilkinson (1997) investigated the lumbar and hip flexion associated with flexion in a standing position. They found that this flexion was restricted in the subject group of male patients with low back pain compared to the control group. The subject group with chronic back pain was split into two sub-groups, one group had restricted lumbar flexion the second group had restricted hip flexion. They concluded that it was important to test and treat both the hip and lumbar flexion in patients with low back pain.
  - o Dolan and Adams (1993) completed a comparative study of patients with low back pain. They found that the hip flexion was reduced by 20% and the lumbar flexion by 7%.
  - o These studies show that a mechanical relationship exists between the hips and the lumbar spine and that this relationship is at least in part muscular. This is especially evident in patients with low back pain.

- Thoracolumbar fascia
  - o The posterior layer of the fascia thoracolumbalis covers the back musculature of the sacral region via the thoracic region up to the fascia nuchae. At the level of L4-5 and the sacrum a very strong bond exists between the superficial and deep layers.
  - o Different muscles are directly bound to the fascia. The m.transversus abdominis and the m.obliquus abdominis internus are indirectly bound with the fascia thoracolumbalis via fusions of the intermediate layer (Bogduk & Twomey 1987) and both laminae of the posterior layer. The superficial part of the posterior layer of the fascia thoracolumbalis runs further within the m.latissimus dorsi and the m.gluteus maximus and partly within the m.obliquus abdominis externus and the m.trapezius.
  - o The strongest bond is with the m.latissimus dorsi. The superficial lamina attaches onto the supraspinal ligaments and the processi spinosi L4 and higher. Inferior from L4-5 the superficial lamina is only loosely (or not at all) bound with the structures of the mid-line. It crosses the mid-line to insert onto the heterolateral side of the sacrum, the SIPS and the crista iliaca The level where this occurs is variable. Usually it is inferior of L4 but can occur as of L2-3.
  - o At the sacral level the superficial lamina runs into the fascia of the m.gluteus maximus. The majority of the fibers attach onto the crista sacralis. At the level of L4-5 and sometimes even level S1-2 the fibers partly or totally cross to the heterolateral SIPS and crista iliaca. Some fibers fuse with the fibers originating from the fascia of the m. latissimus dorsi.
  - o These anatomical relations between the hip and the back musculature via the fascia thoracolumbalis indicate a mechanical relation. These relations also cross the mid-line.

- Exorotators of the hip
  - The exorotators of the hip are: m.obturator internus and externus, mm. gemelli, m.quadratus

femoris, m.piriformis, m. gluteus maximus, m.sartorius, m.iliopsoas and m.biceps femoris (Gray 1980). The function of these hip rotators varies according to the degree of hip flexion.

- With the hip in 90° flexion the m.iliopsoas relaxes and the m.biceps femoris also relaxes due to the knee flexion. The m.piriformis loses exorotator function with the hip flexed 60° or more (Kapanji 1982).
- The only exorotator with an anatomical and functional relation with the lumbar spine seems to be the m.gluteus maximus.
- According to Andersson (1995) the m. iliopsoas is also involved in frontal plane stabilization of the spine when the subject is sitting with a straight back and with the body weight on one side.

b. Biomechanics of the lumbar sidebending

- *Biomechanics*
  - o The range of lumbar sidebending varies between 4° and 10°. Every level has approximately the same range except the lumbosacral joint that has very little sidebending (White and Panjabi 1990, Lumsden 1968).
  - o Dvorak, et al. (1990) studied the flexion/extension and sidebending mobility in the lumbar spine using radiography. The result of this study showed a clear translation movement in the frontal plane.
  - o Sidebending is associated with rotation (White, et al (1990), Panjabi, et al. (1989), Pearcy, et al (1984)). Separate authors found different combinations of motion but the consensus was that a certain combination existed.
- *Lumbar sidebenders*
  - o The most important muscles that side bend the lumbar spine are the m.quadratus lumborum, m.psoas, m.latissimus dorsi and the paravertebral musculature (the spinotransversal and the transversospinal system) (Gray 1980). The abdominal muscles are also active with homolateral contraction initiating the movement and the heterolateral muscles controlling it (Floman 1990).

c. Importance of the lumbar sidebending

- Panjabi (1984) suggests that flexion and sidebending provide the heaviest load for the intervertebral discs. Body weight and gravity are the two most significant forces acting on these discs and this force is increased during flexion and sidebending.
- It is generally accepted that reduced mobility can lead to dysfunction. If Dr. A. T. Still's "arterial rule" is considered then it is obvious that reduced mobility will also reduce blood flow to that area. This reduced circulation will cause a state of congestion, pressure increase, tissue anoxia, collection of toxins and tissue acidosis. Reduced mobility therefore results in possible degeneration and consequent complaints. Reduced mobility in a specific region can lead to increased mobility in another resulting in increased and abnormal forces passing through ligaments and muscles.
- It is not unreasonable to think, therefore, that the common clinical occurrence of disc problems at levels L4-5 and L5-S1 is related to the regional mechanics.
- Because there is less frontal plane mobility at L5-S1 compared to L4-5, we can assume that sidebending restrictions are more important for L4-5 in relation to disc problems.
- Further damage to the disc can occur during sidebending if the above mentioned translation in the lumbar spine during sidebending is restricted.
- The fact that sidebending is associated with rotation (White, et al. (1990), Panjabi, et al. (1989), Pearcy, et al. (1984)) can only exacerbate this.
- Pearcy (1985) found a larger range of motion at the level of L4-5 than at other lumbar levels. This could be the mechanical factor behind the apparent prevalence of clinical instability at this level.
- Weitz (1981) states that the study of sidebending is as diagnostically valuable as doing a myelography. This shows the importance of the lumbar sidebending test.
- Moreover, a good general mobility in the lumbar spine is essential during gait. Good lumbar, pelvic and hip mobility, in three planes, is necessary for a smooth and energy efficient gait pattern (Thurston 1983).
- Mobility restriction at any level of the vertebral column can cause pain and hypermobility in another region (Lumsden 1968).

d. Importance of the hip internal rotation.

- White, et al (1990) state that the lumbar and hip mobility determine the mobility of the rump.
- A good hip mobility is important for a normal gait pattern, in combination with a good lumbar mobility and good muscular function in the hips and lumbar spine (Gracovetsky 1990).

3. Hypothesis

A restriction of lumbar sidebending, under influence of gravity, will be associated with a heterolateral restriction of hip internal rotation, as measured sitting with the hips flexed at 90°.

4. Method

- Subjects
  - o The subjects (aged between 24 and 44 years) were recruited at the The International Academy of Osteopathy. All were students.
  - o The selection involved the subjects being asked to sit on a flat, hard table with the hips flexed 90° and knees together and light lumbar lordosis. An active bilateral internal rotation of the hips was asked and the subjects with a clear visible difference in internal rotation were selected.

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- Exclusion: potential subjects were excluded for the following reasons:
  - o Pain during the selection
  - o Known structural variations of the hips, pelvis or lumbar spine
  - o Obesity
  - o A prior history of low back pain or hip complaints.
- There were 63 subjects included in the study.

5. Measurements

- *Internal rotation of the hip*
  - o 1st measurement (Active Internal Hip rotation Separate Left) AIHSL
  - o 2nd measurement (Active Internal Hip rotation Separate Right) AIHSR
  - o 3rd measurement (Active Internal Hip rotation Bilateral Right and Left (AIHSR and AIHSL)
  - o 4th measurement (Passive Internal Hip rotation Separate Right and Left (PIHSR and PIHSL)
- *Lumbar sidebending*
  - o The Moll and Wright method was used.
  - o Two markers were placed on the skin, lateral on the flank with the patient in the "fundamental" position (Moll 1972).
  - o The lower marker was placed where a horizontal line at the level of the highest point of the crista iliaca crosses the coronary line. The upper marker was placed 15 cm above the lower marker. The distance between the markers was measured in centimeters using a metal ruler following full sidebending. The difference between this distance and the original 15 cm was used as reference for the sidebending.
  - o The test was completed with the subject standing (LLSR and LLSL, Lumbar Lateral Bending Standing Right and Left), with the subject sitting (LLSLRR and LLSHRL, Lumbar Lateral Bending Sitting Legs Relaxed Right and Left) and with the subject sitting with both hips in maximal internal rotation (LLSHIR and LLSHIL, Lumbar Lateral Bending Sitting Hips in Internal Rotation Right and Left).
- *Subject preparation*
  - o All measurements were taken immediately following a theoretical lesson where the students had been sitting for 1 hour and 45 minutes. This was done to avoid the possibility of subjects having stretched or had mobilisations; prior to the testing.
  - o The room temperature was 25°C.
- *Testing*
  - o There were inter- and intra-tester reliability and reproducibility tests completed.
  - o Five subjects were randomly selected and measured following the method described, by two independent testers, within a time frame of two hours.
  - o The tests were repeated twice by the same testers and using the same subjects, with one day in between.
  - o This (limited) pilot study gave an inter-tester reliability factor of $r=0.78$ ($p<0.001$) for measurement of hip rotation with a standard deviation of 2.5°, and the inter-tester reliability factor of $r=0.70$ ($p<0.001$) for measurement of lumbar sidebending with a standard deviation of 3mm.
  - o This (limited) pilot study gave an intra-tester reliability factor of $r=0.68$ ($P<0.001$) for measurement of hip rotation with a standard deviation of 3°, and the intra-tester reliability factor of $r=0.65$ ($p<0.001$) for measurement of lumbar sidebending with a standard deviation of 3.4 mm.
  - o The value of this pilot study is limited as too few subjects were used, and was only intended as a guide.
- *Statistical analysis*
  - o The statistical analysis was done using an Apple Macintosh computer. Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) were employed. The results were taken as significant if the p value was 0.01 or lower.
  - o The Pearson correlation coefficient was calculated to correlate the restriction of hip internal rotation to the restriction of lumbar sidebending. Using the correlation coefficient the determination coefficient was calculated to best illustrate the impact of one variable upon the other.
  - o To test the difference between the sidebending measurements in the different positions, a variation analysis was completed. This was considered significant if the p value was 0.01 or lower.
  - o Differences between the sexes were analyzed using an unpaired student-t test, with the same value as above considered significant.

6.Results

Characteristics of the measurements

	Total	
	Ave	SD
N	63	
AGE	31,7	4,9
PIHSR	41,5	7,5
PIHSL	43,2	10,2
AIHSR	38,0	6,7
AIHSL	37,4	8,4
AIHBR	35,9	7,5
AIHBL	36,7	9,1
LLSLRR	4,84	1,1
LLSLRL	4,68	1,3
LLSHIR	4,39	1,3
LLSHIL	4,29	1,2
LLSR	6,05	1,1
LLSL	6,01	1,2

Ave = average
SD = standard deviation
PIHSR= passive internal hip rotation separate right
PIHSL= passive internal hip rotation separate left
AIHSR= active internal hip rotation separate right
AIHSL= active internal hip rotation separate left
AIHBR= active internal hip rotation bilateral right
AIHBL= active internal hip rotation bilateral left
LLSLRR= sidebending lumbar spine sitting legs relaxed right
LLSLRL= sidebending lumbar spine sitting legs relaxed left
LLSHIR= sidebending lumbar spine sitting hips in internal rotation right
LLSHIL= sidebending lumbar spine sitting hips in internal rotation left
LLSR = sidebending lumbar spine standing right
LLSL = sidebending lumbar spine standing left

Correlation coefficient

Correlation table													
				* < 0.01	** < 0.001								
	AGE	PIHSR	PIHSL	AIHSR	AIHSL	AIHBR	AIHBL	LLSLRR	LLSLRL	LLSHIR	LLSHIL	LLSR	LLSL
AGE	1	-0,0997	0,0197	-0,0812	0,058	-0,0411	0,0734	-0,0894	-0,1693	-0,0389	-0,0582	0,0189	-0,1279
PIHSR	-0,0997	1	.3135*	.8061**	0,2697	.6807**	0,2318	-0,1536	0,2516	-0,1539	0,1435	-0,1809	0,1483
PIHSL	0,0197	.3135*	1	0,1812	.8685**	0,1804	.8413**	.2977*	0,0701	0,26	0,1406	0,2871	.3204*
AIHSR	-0,0812	.8061**	0,1812	1	0,1995	.8203**	0,1294	-0,1202	.4034**	-0,0932	.3061*	-0,1401	.3168*
AIHSL	0,058	0,2697	.8685**	0,1995	1	0,1181	.9394**	.3748*	-0,0221	.3959**	0,0811	.3896**	.3250*
AIHBR	-0,0411	.6807**	0,1804	.8203**	0,1181	1	0,0785	-0,2223	.5309**	-0,2064	.4135**	-0,0838	.3784*
AIHBL	0,0734	0,2318	.8413**	0,1294	.9394**	0,0785	1	.3135*	-0,0907	.3445*	0,0402	.3988**	0,2244
LLSLRR	-0,0894	-0,1536	.2977*	-0,1202	.3748*	-0,2223	.3135*	1	.3136*	.7698**	0,2155	.7054**	.5193**
LLSLRL	-0,1693	0,2516	0,0701	.4034**	-0,0221	.5309**	-0,0907	.3136*	1	0,2003	.8160**	0,2778	.6975**
LLSHIR	-0,0389	-0,1539	0,26	-0,0932	.3959**	-0,2064	.3445*	.7698**	0,2003	1	0,2858	.6906**	.4895**
LLSHIL	-0,0582	0,1435	0,1406	.3061*	0,0811	.4135**	0,0402	0,2155	.8160**	0,2858	1	.3741*	.7499**
LLSR	0,0189	-0,1809	0,2871	-0,1401	.3896**	-0,0838	.3988**	.7054**	0,2778	.6906**	.3741*	1	.6383**
LLSL	-0,1279	0,1483	.3204*	.3168*	.3250*	.3784*	0,2244	.5193**	.6975**	.4895**	.7499**	.6383**	1

PIHSR= passive internal hip rotation separate right
PIHSL= passive internal hip rotation separate left
AIHSR= active internal hip rotation separate right
AIHSL= active internal hip rotation separate left
AIHBR= active internal hip rotation bilateral right
AIHBL= active internal hip rotation bilateral left
LLSLRR= sidebending lumbar spine sitting legs relaxed right
LLSLRL= sidebending lumbar spine sitting legs relaxed left
LLSHIR= sidebending lumbar spine sitting hips in internal rotation right
LLSHIL = sidebending lumbar spine sitting hips in internal rotation left
LLSR = sidebending lumbar spine standing right
LLSL = sidebending lumbar spine standing left.

**. indicates correlation coefficient differs significantly from zero at the 0.01 level*
***. indicates correlation coefficient differs significantly from zero at the 0.001 level.*

The table shows:

- A correlation between PIHSR and AIHSR (p value= 0.8061), between PIHSR and AIHBR (p value= 0.6807), between AIHSR and AIHBR (p value= 0.8203), all significant at 0.001 level.
- A correlation between PIHSL and AIHSL (p value= 0.8685), between PIHSL and AIHBL (p value= 0.8413), between AIHSL and AIHBL (p value 0.9394), all significant at 0.001 level.
- A correlation between LLSR and LLSLRR (p value = 0.7054), between LLSR and LLSHIR (p value= 0.6906), between LLSLRR and LLSHIR (p value = 0.7698), all significant at 0.001 level.
- A correlation between LLSL and LLSLRL (p value = 0.6975), between LLSL and LLSHIL (p value = 0.7499), between LLSLRL and LLSHIL (p value = 0.8160), all significant at 0.001 level.
- A correlation between LLSR and AIHSL (p value 0.3896) and between LLSR and AIHBL (p value = 0.3988), at 0.001 level; no correlation between LLSR and PIHSL.
- A correlation between LLSLRR and AIHSL (p value = 0.3748) and between LLSLRR and AIHBL (p value = 0.3135), at 0.01 level.
- A correlation between LLSHIR and AIHSL (p value = 0.3959) at 0.001 level and between LLSHIR and AIHBL (p value = 0.3445) at 0.01 level ; no correlation between LLSHIR and PIHSL .
- A correlation between LLSL and AIHSR (p value = 0.3168) and between LLSL and AIHBR (p value = 0.3784) at 0.01 level; no correlation between LLSL and PIHSR.
- A correlation between LLSHIL and AIHSR (p value = 0.3061) at 0.01 level and between LLSHIL and AIHBR (p value = 0.4135) at 0.001 level.
- A correlation between LLSLRL and AIHSR (p value 0.4034) and between LLSLRL and AIHBR (p value = 0.5309) at 0.001 level.

Determination coefficient

Coefficient of determination													
	AGE	PIHSR	PIHSL	AIHSR	AIHSL	AIHBR	AIHBL	LLSLRR	LLSLRL	LLSHIR	LLSHIL	LLSR	LLSL
AGE	1	0,00994	0,00039	0,00659	0,00336	0,00169	0,00539	0,00799	0,02866	0,00151	0,00339	0,00036	0,01636
PIHSR	0,00994	1	0,09828	0,6498	0,07274	0,46335	0,05373	0,02359	0,0633	0,02369	0,02059	0,03272	0,02199
PIHSL	0,00039	0,09828	1	0,03283	0,75429	0,03254	0,70779	0,08863	0,00491	0,0676	0,01977	0,08243	0,10266
AIHSR	0,00659	0,6498	0,03283	1	0,0398	0,67289	0,01674	0,01445	0,16273	0,00869	0,0937	0,01963	0,10036
AIHSL	0,00336	0,07274	0,75429	0,0398	1	0,01395	0,88247	0,14048	0,00049	0,15674	0,00858	0,15179	0,10563
AIHBR	0,00169	0,46335	0,03254	0,67289	0,01395	1	0,00616	0,04942	0,28185	0,0426	0,17098	0,00702	0,14319
AIHBL	0,00539	0,05373	0,70779	0,01674	0,88247	0,00616	1	0,09828	0,00823	0,11868	0,00162	0,15904	0,05036
LLSLRR	0,00799	0,02359	0,08863	0,01445	0,14048	0,04942	0,09828	1	0,09834	0,59259	0,04644	0,49759	0,26967
LLSLRL	0,02866	0,0633	0,00491	0,16273	0,00049	0,28185	0,00823	0,09834	1	0,04012	0,66586	0,07717	0,48651
LLSHIR	0,00151	0,02369	0,0676	0,00869	0,15674	0,0426	0,11868	0,59259	0,04012	1	0,08168	0,47693	0,23961
LLSHIL	0,00339	0,02059	0,01977	0,0937	0,00858	0,17098	0,00162	0,04644	0,66586	0,08168	1	0,13995	0,56235
LLSR	0,00036	0,03272	0,08243	0,01963	0,15179	0,00702	0,15904	0,49759	0,07717	0,47693	0,13995	1	0,40743
LLSL	0,01636	0,02199	0,10266	0,10036	0,10563	0,14319	0,05036	0,26967	0,48651	0,23961	0,56235	0,40743	1

PIHSR= passive internal hip rotation separate right
PIHSL= passive internal hip rotation separate left
AIHSR= active internal hip rotation separate right
AIHSL= active internal hip rotation separate left
AIHBR= active internal hip rotation bilateral right
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LLSHIR= sidebending lumbar spine sitting hips in internal rotation right
LLSHIL= sidebending lumbar spine sitting hips in internal rotation left
LLSR = sidebending lumbar spine standing right
LLSL = sidebending lumbar spine standing left

The table shows:

- that 15% of the variation in factor LLSR is explained by variation in factor AIHSL and that 16% of the variation in factor LLSR is explained by variation in factor AIHBL.
- that 16% of the variation in factor LLSHIR is explained by variation in factor AIHSL and that 12% of the variation in factor LLSHIR is explained by variation in factor AIHBL.
- that 14% of the variation in factor LLSLRR is explained by variation in factor AIHSL and that 10% of the variation in factor LLSLRR is explained by variation in factor AIHBL.
- that 10% of the variation in factor LLSL is explained by variation in factor AIHSR and that 14% of the variation in factor LLSL is explained by variation in factor AIHBR.
- that 9% of the variation in factor LLSHIL is explained by variation in factor AIHSR and that 17% of the variation in factor LLSHIL is explained by variation in factor AIHBR.
- that 16% of the variation in factor LLSLRL is explained by variation in factor AIHSR and that 28% of the variation in factor LLSLRL is explained by variation in factor AIHBR.

7. Discussion

- **Introduction:** Various researchers have found that a relationship exists between the lumbar spine and the hips (Kapenji 1982, Vleeming, et al 1995, Gracovetsky 1990, Porter and Wilkinson 1997, Dolan and Adams 1993, Cornelius, et al 1992, Mc Clure & Pratt 1996, Paquet, et al 1988, Esola, et al 1996). The described and examined relations were mechanical, specifically muscular and found in the sagittal plane. No studies were found that investigated the unilateral relationship between lumbar sidebending and hip rotation.
- **Correlation:** In this study unilateral restriction of hip rotation was compared to unilateral restriction in the lumbar spine. It was found that a moderate correlation exists between restriction of active hip internal rotation and heterolateral restriction of lumbar sidebending. The fact that a clear difference exists between the active and passive hip rotation can indicate that this relation is muscular. In this context, there are two muscles that deserve special attention, the m.gluteus maximus and the m.iliopsoas. They seem to be the only two muscles that can influence both the lumbar spine and the hips. The m.iliopsoas attaches directly into both regions and the m.gluteus maximus attaches into the hip and the sacrum; a direct bond to the axial system via the fascia thoracolumbalis. The fact that the relation was moderate can be explained by the muscle chains m.gluteus maximus/m.latissimus dorsi (Vleeming, et al (1996) and Gracovetsky (1990)). Vleeming (1996) found that the mechanical relation between m.gluteus maximus and m.latissimus dorsi via the fascia thoracolumbalis only involved the lower fibres of m.latissimus dorsi, meaning the upper lumbar spine will be less influenced. The measurements included sidebending of the entire lumbar spine. Therefore, the upper lumbar levels could compensate for the mobility restriction in the lower levels. An electromyographical study could possibly provide insight into this mechanism. If the relation between hip and lumbar spine was predominantly via the m.iliopsoas, the lower lumbar levels would be able to compensate as m.iliopsoas does not attach onto L5 or the sacrum. The moderate correlation can also be explained due to the subjects having no hip or lower back complaints. Mellin (1986) compared the mobility in the lumbar spine and the hip, in different directions, of 151 male subjects with lower back pain both before and after treatment. He found a correlation between the intensity of the complaint and the mobility of the lumbar spine in the frontal plane (more pain - less mobility). He found no correlation between lower back pain and any combination of the measured mobility restrictions. For this reason a study could be made using subjects with lower back complaints. Mellin, et al (1995) examined the asymmetry of lumbar sidebending and the treatment results of patients with lower back pain. They found that an improvement of left sidebending after three months of treatment gave an improvement of symptoms ($p<0.05$-0.001). The results showed that a relation exists between low back pain and asymmetrical spinal function. Kang, et al (1995) completed a study investigating the correlation between the grade of spinal mobility restriction and the intensity of the chronic low back pain. The study involved 44 female subjects who had a history of at least six months of low back pain. The correlation between the range of sidebending and seriousness of the chronic pain was found to be significant ($p<0.05$); more pain - less mobility. They found no correlation with hip rotation as it was not tested. Ellison et al (1990) compared the range of hip rotation between healthy subjects (n=100) and subjects with low back pain (n=50). The study showed that a correlation exists between mobility restriction in the hips and low back pain (more back pain - less hip mobility)
- Correlation between the hip measurements: The study showed a clear correlation between the active, passive and bilateral hip measurements. This was expected.
- Correlation between the lumbar measurements: The study showed a clear correlation between the lumbar measurements in standing and sitting positions. The general mobility in the lumbar spine is greater standing than sitting. This phenomenon can be explained by the fact that m.gluteus maximus is stretched more when sitting than standing. This idea is supported by the reduced sidebending while sitting with both hips rotated internally.
- Determination factor: 14.75% of the variation in the unilateral sidebending is explained by the variation in the heterolateral internal rotation of the hip. This means that the more the lumbar sidebending is restricted the more the heterolateral hip internal rotation is restricted.
- Sex differences: There is a clear difference in the range of hip mobility between men and women, with a mean difference of 4.3°. The mean internal rotation (men and women) is 38.8°. Roach and Miles (1991) tested 433 subjects between the ages of 25 and 39, finding a mean of 33°, as measured with the subjects supine. Kapandji (1982) suggests a normal range of between 30° - 40° internal rotation and sees no difference between measurements done supine, prone or sitting.
- The study also showed a clear difference in the measurements of the lumbar sidebending. Male subjects presented more right sidebending than the females. The same finding was not apparent for left sidebending. This

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finding does not seem logical. One possible explanation could be the total subject number. No measurement error was found. Porter (1986) reported that of 100 subjects with low back pain, a clear majority presented with left spinal sidebending, as compared to right. He linked this to a leg dominance.

8. Conclusion

- A moderate correlation exists between restriction of active unilateral hip internal rotation and restriction of heterolateral lumbar sidebending. The greater the restriction of lumbar sidebending on one side, the greater the heterolateral restriction of hip internal rotation.
- The nil hypothesis can therefore be rejected.
- The range of lumbar sidebending decreases from standing to sitting with legs hanging relaxed to sitting with hips rotated internally. Women have a greater range of hip internal rotation than men, with a mean difference of 4.3°.

9. Implications for the osteopath and test

This study has implication for the osteopath. In cases of both low back pain and hip complaints, the osteopath should endeavor to improve the mobility in the involved joints, as well as other factors. The associated combination of restriction in these two areas must be remembered.

For this reason the test below is suggested.

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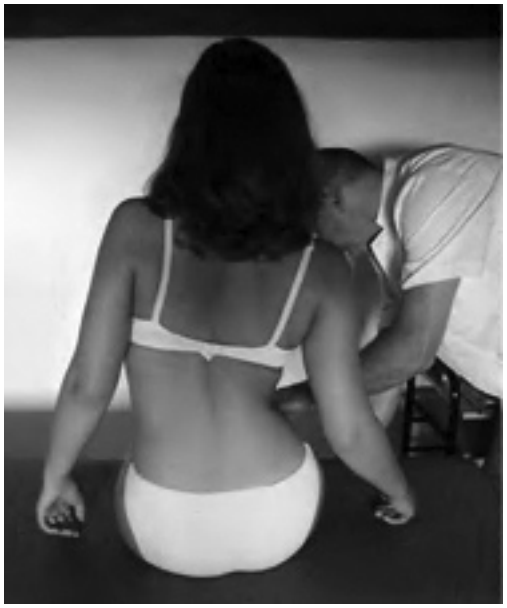

The patient is sitting on a flat table with normal lordosis. Both legs are hanging over the edge of the table with the knees together. The osteopath asks the patient to actively and maximally rotate both hips internally; knees remaining together. If unilateral restriction of the internal rotation is seen, the osteopath bring this hip passively into equal internal rotation range as seen on the other side. While this position is held a sidebending to the side of hip restriction may be seen in a certain region of the lumbar spine as compensation for loss of sidebending in another region.
Treatment of hip and/or lumbar spine will only be successful if this test is neutralized

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Special Communication

Adam's Rib

Kathryn E. Calabria

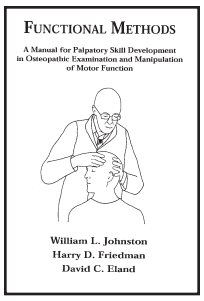
Some insist that the story of Adam and Eve is truth. Others insist it is allegory. Still others believe it is myth. Archeological findings continue to show that myth is truth waiting to be unearthed. Historically, we have often been unable to decipher those truths until we have had the technology to so. Could the story of Adam and Eve be based on truth? Most people, regardless of their education, religious or cultural background, would concede that it is.

As a medical student sitting in anatomy lecture, I can recall the giggle that rippled through the lecture hall, as our instructor assured us that men have 12 ribs on each side of their thorax. As a practicing physician, discussing this issue with a colleague, we both have had, over the years several male patients who have asked if they have "all" of their ribs. I remember one young man who asked if his back pain was due to "that rib". So deeply ingrained in our culture is the story of Adam and Eve, that young boys can sometimes grow into adulthood believing they are missing a piece of themselves and entire cultures have held woman accountable. Indeed, even in our language "to rib" someone means to poke fun at, or to tease them, i.e. to point out their "weak spot". The spoken words "I'm just ribbing you" is usually accompanied by the gesture of poking in the lower right side of the rib cage--not the upper ribs and not the left side. The biblical story has man as the giver, and woman as the receiver. This is a natural law, and natural laws deal with reproduction and therefore survival of the species. Since the X & Y chromosomes have been discovered there has been playful banter that "The problem with men is" that their 'Y' chromosome is an'X' with a piece missing.

Playful banter aside, could the "missing rib" of myth be a reference to the shape of the Y-chromosome compared to the X-chromosome? Was the story of a donation of a rib a simplified explanation of genetic differences between the sexes, to a people who did not have the technology to understand? Certainly, when considering the X- and Y-chromosomes, the effect of structure on function is both obvious and profound.❐

Book Review

Reviewer: Anthony G. Chila



Johnston, WL; Friedman, HD, Eland, DC: *Functional Methods.* Second Edition, 2005. American Academy of Osteopathy®; Indianapolis, IN pp. 306 including Index.

William L. Johnston, DO, FAAO passed away on June 9, 2003. An admirable summary of his work and contribution is provided by **Joseph Vorro, PhD**, his colleague for 30 years in clinical research:

> "This functional expansion of the traditional osteopathic structural concept also provides an additional revolutionary development. The information gained from Functional Methods generates the opportunity to identify reliable, detailed, objective documentation for the location and nature of segmental or regional dysfunction. This documentation can then be used to create much needed evidence-based data regarding objective signs of altered human motor system behaviors and treatment interventions, thus creating a credible scientific basis for osteopathic practice."

Doctor Johnston's legacy is now continued in this second edition by his co-author in the first edition, Harry D. Friedman, DO, FAAO and a new author, David C. Eland, DO, FAAO. The concentration of focus on motor function emphasizes passive gross movements utilized as tests to appreciate and gain palpable information about regional and segmental information expressed by the human body. A reorganization of instructional sections strengthens the text by applying newer clinical knowledge which permits earlier attention to the differential diagnosis of spinal reflex activity. The explicit articulation of palpable findings continues to be the primary goal of the text. The need to describe such findings within the context of tests used to elicit them requires that the reader recognize the sequential nature of the learning steps provided. Appendices enlarge on the concepts presented, without interfering with the flow of the text. Doctor Johnston's collected papers were published in 1998 by the American Academy of Osteopathy® (MC Beal, editor). Associated research and references since 1998 can be accessed at www.williamljohnstondo.com.

In 1994, on publication of the First Edition of this manual, Doctor Johnston acknowledged the memory of Charles H. Bowles and Harold V. Hoover. These two clinicians were credited with the creation of intellectual excitement about palpable responses to motion tests. In this edition, also, Doctor Johnston provided a significant historical review of the use of "direct" and "indirect" terminology in diagnosis and treatment. This review is found in the Second Edition as *Appendix 5:* Indirect Method in Osteopathic Manipulation; Historical Development (pp. 267-274). This appendix should be carefully reviewed by today's teachers of osteopathic principles and practice. It is of great value in understanding the strengths and weaknesses underlying teaching strategies. Emphasis is placed on the continuing need for improvement of teaching strategies through research endeavor to address, above all, reproducibility. In working toward that goal, Doctor Johnston was one of the osteopathic profession's giants.

The authors of the Second Edition recognize the significance of Doctor Johnston's contribution as given in the following remarks, briefly excerpted:

Harry D. Friedman, DO, FAAO: "I invite you into the amazing world of Dr. Johnston. In the pages that follow we will explore fundamental concepts (some to embrace and some to abandon) in the practice of Osteopathy. For each region we will cover in detail, the tests used to discern and the criteria for making the diagnosis of somatic (motor system) dysfunction. We will present learning modules for palpatory skills development to directly perceive motor system disturbances and to introduce therapeutic forces to resolve them…and we will come back again and again to the basic question that Bill asked, 'What is theory and what is fact?' " (p.xi).

David C. Eland, DO, FAAO: "The changes in the second edition present the reader/practitioner with a coherent progression that has evolved from the first edition. We believe these changes will facilitate the learning process. The early focus is on the diagnostic process in the thoracic region. The process of sequential localization and definition of somatic dysfunction is followed by the organized collection of palpatory information directed toward the interactions between the neuromusculoskeletal system and the internal organs. The intent is to focus the practitioner upon the larger picture, not the isolated neuromusculoskeletal system. Thus, the tone for the second edition is set from the outset, an invitation for the practitioner to explore his/her understanding and experience of the osteopathic concepts expressed in inter-related function and motion from a Functional Methods perspective." (p.xiii-xiv).

Elsewhere in Print

THE ACTIVE KNEE EXTENSION TEST AND SLUMP TEST IN SUBJECTS WITH PERCEIVED HAMSTRING TIGHTNESS

Kate Elissa Kuilart , Melanie Woollam, Elizabeth Barling, Nicholas Lucas
School of Exercise and Health Sciences, University of Western Sydney Penrith South, NSW 1797, Australia **Received 30 May 2005; received in revised form 15 June 2005; accepted 12 July 2005;**

ABSTRACT:

Background: Reduced hamstring extensibility is commonly assumed to be due to stiffness or decreased length of the hamstring muscle group. The first aim of this study was to collect data on the results of the active knee extension test in subjects with perceived reduction in hamstring extensibility. The second aim was to establish the prevalence and location of symptoms induced by the Slump test in those subjects with perceived hamstring tightness.

Methods: Forty-two asymptomatic subjects (M = 21, F = 21, mean age 23.6, range 18-35) with perceived right hamstring tightness performed the active knee extension test followed by the Slump test. A goniometer and digital photography were used to measure the knee flexion angle of the active knee extension test. A body chart was used to record the location of pain or discomfort produced or relieved during the active performance of the Slump test.

Results: Subjects had an average knee flexion angle of 35.2 0(SD 14.2; range 15.6-70 0) During the Slump test 66.7% (n = 28) of the subjects reported symptoms in the posterior knee, 35.7% (n = 15) reported symptoms in the posterior thigh and 33.3% (n = 13) reported symptoms in the posterior leg. Combined prevalence of cervical and thoracic symptoms was 14.2%, with only 7.1 % experiencing symptoms in the thoracic region. At the last stage of the Slump test 12.0% (n = 5) of subjects had no change in symptoms, whilst 83.3% (n = 35) of subjects had either partial relief (n = 19) or complete relief (n 16) of symptoms.

Discussion and conclusion: Subjects with perceived hamstring tightness did not appear to have reduced hamstring extensibility when compared to the available normative data. Only 7.1 % of subjects reported thoracic symptoms during the Slump test, compared to other reports of thoracic symptoms in approximately 50% of asymptomatic subjects. The high prevalence of posterior lower extremity symptoms induced by the Slump test amongst asymptomatic subjects, which are relieved by cervical extension, suggests that neural structures may contribute to perceived hamstring tightness and the sensation of discomfort produced during hamstring stretches.

THE CRANIO-CERVICAL FLEXION TEST USING PRESSURE BIOFEEDBACK: A USEFUL MEASURE OF CERVICAL DYSFUNCTION IN THE CLINICAL SETTING? SUE HUDSWELL*, MICHAEL VON MENGERSEN, NICHOLAS LUCAS School of Exercise and Health Sciences, University of Western Sydney, Penrith South, NSW 1797, Australia **Received 26 May 2005; received in revised form 7 July 2005;**

ABSTRACT:

Aims.' The cranio-cervical flexion test (CCFT) was developed to indirectly measure the strength of the deep cervical flexor muscles. This pragmatic study was designed to analyse the reliability and discriminative validity of the test as used by osteopaths in the clinical setting.

Methods: Forty subjects were categorised into groups according to two different sets of criteria. Firstly they were divided into three groups who had either current neck pain, a history of neck pain but no current pain, or no history of neck pain. Secondly they were divided into three groups according to their level of neck disability, which was either no disability, mild disability, or moderate disability. The intra-rater and inter-rater reliability of the CCFT was calculated. Four practitioners performed the CCFT on each of the 40 subjects and CCFT scores were analysed in terms of pain intensity, pain history and neck disability.

Results: Intra-rater reliability (ICe) was 0.78 (95% CI 0.47, 0.92) for performance index (P1), and 0.78 (95% CI 0.47, 0.92) for activation score (AS). Inter-rater reliability (ICe) was 0.54 (95% CI 0.36, 0.70) for P1, and 0.57 (95% CI 0.37, 0.72) for AS. A significant correlation was found between the intensity of current pain and P1 (r = -0.37, P = 0.02), but not for AS (r = -0.29, P = 0.16). No statistically significant difference in the CCFT score was found between groups for either pain history or neck disability. This result is in contrast to previous studies.

Conclusion: The practitioners in this study demonstrated good inter-rater reliability and 'excellent' intra-rater reliability when using the CCFT. However, the discriminative validity of the CCFT was not demonstrated in this study as the CCFT failed to discriminate between those with current neck pain, those with a history of neck pain but no current pain, and those without neck pain.

EFFECTIVENESS OF CERVICAL SPINE MANIPULATION AND PRESCRIBED EXERCISE IN REDUCTION OF CERVICOGENIC HEADACHE PAIN AND FREQUENCY:A SINGLE CASE STUDY EXPERIMENTAL DESIGN *;

ABSTRACT:

Introduction: Patients commonly present to osteopaths with a complaint of headache. There is a clear rationale for osteopathic manipulative treatment in management of headaches that involve cervical spine dysfunction such as cervicogenic headache. Recent evidence suggests that deficits in muscle performance of the deep neck flexor muscles may be linked to cervicogenic headache, and that specific exercise prescription may play an important treatment role. Evidence also suggests that combining both manipulative treatment and specific exercise may be an effective treatment approach.

Methods.' A prospective case study utilising an A-B-C design was used to evaluate the effectiveness of osteopathic treatment and specific exercise of the deep cervical flexor muscles in reducing cervicogenic headache pain and frequency in a 26-year-old female, with a 16-year history of cervicogenic headache. The diagnosis of cervicogenic headache was based upon clinical examination, medical history and fulfillment of cervicogenic headache diagnostic criteria. The study consisted of a three-week baseline data collection phase, a three-week osteopathic manipulative treatment phase and a three-week home based exercise phase. Outcome measures included the quadruple visual analogue scale, a headache diary, and data recorded from a pressure biofeedback device. Osteopathic treatment involved high velocity low amplitude (HVLA) thrust techniques and a low load exercise programme targeting the deep cervical flexor musculature.

Results: Visual analysis of plotted outcome measure data indicated a reduction in both intensity of headache pain and frequency. Conclusions: The findings of this single case study are limited in their general isability, but are consistent with the results of other similar studies investigating cervicogenic headache using similar interventions.

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Clinical Jones Strain-Counterstrain II:

Pelvic floor and extremities. Learning to work with these common daily injuries

February 10-12, 2006

Tucson Osteopathic Medical Foundation

Tucson, AZ

Edward K. Goering,DO, Program Chair, Co-author of *Jones Strain-Counterstrain*

Enrollment Limited – Register Early

Course Description: Level II

During the 20-hour course, participants will discuss the theory of somatic dysfunction and manipulation of the pelvis and extremities. A very specific presentation of the classic Jones Strain-Counterstrain will be provided as it impacts common clinical problems in those areas. The applications of this technique will be demonstrated in multiple clinical examples upon which the student can build an evaluation and treatment. There will also be hands-on laboratory time for participants to practice their newly acquired knowledge as they develop skills with each other. A brief review of documentation and coding will be provided.

Learning Objectives:

- Understand the basic mechanism of somatic dysfunction in the Strain-Counterstrain Model.
- Be able to treat common musculoskeletal dysfunctions of the pelvic floor and the upper and lower extremities.
- Understand the pathophysiology of the thoracic outlet syndrome.
- Understand the pathophysiology of common lower extremity ailments such as the jumpers knee, trick ankle and piriformis syndrome.

Prerequisites:

Functional Anatomy; (1) Level I course or equivalent

CME:

The program anticipates being approved for 20 hours of AOA Category 1-A CME credit pending approval by the AOA CCME.

Program Time Table:

Friday, February 10 ..... 8:00 am - 5:30 pm
Saturday, February 11 ..... 8:00 am - 5:30 pm
Sunday, February 12 ..... 8:00 am - 12:30 pm

(Friday & Saturday include (2) 15 minute breaks and a (1) hour lunch; Sunday includes a 30 minute break)

Course Location:

Tucson Osteopathic Medical Foundation
3182 North Swan Road
Tucson, AZ 85712
www.tomf.org

Hotel Accommodations:

Hotels near course site: Extended Stay America, 520/795-9510; Sheraton, 520/323-6262; Lodge on the Desert, 520/325-3366; Residence Inn, 520/721-0991.

For other hotel possibilities, visit: www.expedia.com; www.travelocity.com; www.priceline.com; or www.BizRate.com

REGISTRATION FORM

Clinical Jones Strain-Counterstrain II

February 10-12, 2006

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Nickname for Badge _____

Street Address _____

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City _____ State_____ Zip_____

Office phone # _____

Fax #: _____

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(AAO makes every attempt to provide snacks/meals that will meet participant's needs. But, we cannot guarantee to satisfy all requests.)

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AAO Member	$550	$650
Intern/Resident/Student	$450	$550
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