

# Visceral Manipulation: Fact and Fantasy

Combined Sections Meeting 2015

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“All organs, muscles and body structures must be viewed in the context of the surrounding connective tissues and distant blood and lymphatic fluid flow; specific pathology cannot be fully understood or treated without talking those tissues into account”. (Findley 2011)

## Course Description:

This session will address

1. The history of visceral mobilization (VM) as a foundational technique within the realm of osteopathic manipulative therapy (OMT)
2. The anatomy of the visceral fascia, its attachment to and effect on the somatic frame
3. Efficacy for the treatment of the fascial network throughout the body as a component of manual physical therapy
4. Evidence as it exists for VM and the scientific rationale that would support the manual treatment of internal organs within the scope of physical therapy

## Objectives:

1. Identify the level of evidence in support of manual therapy for organ specific interventions in physical therapy
2. Apply critical thinking to the question: can we manually manipulate these structures and bring about a therapeutic effect with a reasonable degree of specificity
3. Discuss the application of visceral mobilization within the evidence/science based physical therapy practice

## ❖ Introduction

- Why the controversy?
  - Far reaching claims that visceral manipulation is the panacea for all ills
  - VM falls into the category of “manual therapy” whose specific mechanisms continue to be poorly understood and primarily based on theory
  - Paucity of higher levels of evidence to support VM
- Scientific facts to support VM
  - The internal organs are affixed to each other as well as the somatic frame through connective tissue and ligamentous attachments (Otcenasek, Hedley, Willard)
  - These structures carry a significant mass within the human body and are subject to the same laws of physics and trauma as the locomotor system (Cox, Hedley)
  - The visceral structures and their connective tissue attachments have an influence on the biomechanics of the somatic frame (Barral, Hedley)
  - Visceral structures have long been known to refer pain to the somato-sensory system to include the lumbo-pelvic region (Goodman, McMahon, Wesselmann)

- Visceral dysfunction contributes to central sensitization and pain states (Binnebösel, Goehler, McMahon, Rickenbacher, Wesselmann)

### ❖ **Visceral Osteopathic Manipulation**

- Visceral dysfunction defined:
  - Impaired mobility of a visceral structure and related fascial, neurological, vascular, skeletal and lymphatic elements which is reflected in abnormal motion testing via alteration in the distensibility of regional attachments
  - VMT is a soft tissue technique within the framework of osteopathic manipulative therapy OMT and is not practiced as a “stand alone” technique (GOsC, Orrock, Parsons, Ward)
- Historical application
  - A.T. Still writings describe manipulations of the visceral structures with a goal of auto regulation (Still)
  - European practitioners, Brandt, Stapfer and Glenard, began to develop this body of work in the 1800’s
  - Chapman’s Reflexes, start of the 20<sup>th</sup> century noted treatment of specific regions on the skin that improve function of the organs, these are the classical visceral pain referral patterns used today in western medicine
  - First textbook titled: Intra Pelvic Technique OR Manipulative Surgery of the Pelvic Organs by Percy H. Woodall MD DO was published in 1926
  - Barral and Mercier began in 1970s conducted observational trials utilizing OMT, ultrasound and fluoroscopy on the patients while staff in a pulmonary hospital and partnered with the pathologist to observe post mortem examination to correlate their clinical findings
  - Finet and Williame in the 1980s carried out extensive studies to investigate motion of the organs in relationship to diaphragmatic movement during respiration
  - Kuchera and Kuchera in 1990’s refined and published much of the original work of AT Still
  - The practice of osteopathy expounded on the use of manual therapy, MT is a system of treatment involving the application of manual force for therapeutic effect and is not exclusive to any single profession (Farrell, Hondras, McPartland)

### ❖ **The Visceral Structures Within The Fascial System**

- Embryologic development
  - Mesoderm
    - Somatic
    - Splanchnic
- Fascia is defined as: The soft tissue component of the connective tissue system that permeates the human body forming a whole body continuous three dimensional matrix of structural support (Fascia Research Congress 2007)
  - Need to move beyond the “myofascia”
  - “Packing material” that envelops every muscles, bone, gland and cell in the body, to include surrounding the nervous system, the circulatory vessels and all organs. It forms a continuous network throughout the entire body and plays an important role in transmitting mechanical forces between muscles (Willard)

- Connects and disconnects
    - Mechanical support and communication
    - Allows gliding, making space for flow of fluid. (Huijing 2009 ,Schliep 2003b)
  - Highly innervated, associated with autonomic function (Schliep 2003b)
    - Nociceptors
    - Mechanoreceptors
      - ◆ Golgi
      - ◆ Pacini and ruffini (mylenated)
      - ◆ Interstitial (80%) free nerve endings, unmyelinated C-fibers (Yahia 1992, Schleip 2003a,2003b, Simmonds, Stecco)
  - Contains smooth muscle cells
    - Myofibroblast
      - ◆ Contractile behavior
      - ◆ Measurable response to stretch (Langevin 2005, Yahia 1993, Schliep 2005)
      - ◆ May contract in response to excessive sympathetic tone (Schliep 2006)
- Four primary layers of fascia
- Pannicular or subcutaneous
    - Within the adipose layer and surrounds the entire body
  - Axial or inventing
    - Covers the entire trunk and extends into the locomotor system
  - Meningeal or dural
    - Surrounds the nervous system
  - Visceral
    - Extends from the naso-oro-pharyngeal region to the anal aperture
    - Most extensive of all the fascial layers
- Hedley’s “Onion Tree” model of fascial attachment
- Visceral fascia
- Separates body cavities/compartmentalization
  - Provides the supportive tissue for the midline structures of the body, forming a column that extends from the cranial base, through the cervical region, into the thorax and down into the pelvic floor. (Hedley, Paoletti, Willard)
    - “Visceral ligaments” serve as conduit for neural, lymphatic and vascular structures
    - Creates sliding surfaces for to allow movement
      - ◆ Autonomic
        - Respiration, digestion, evacuation
      - ◆ Somatic
        - Sliding surfaces allowing for trunk motion
  - Articulates with adjacent visceral and somatic structures as well as extends into the axial framework (Barral, Paoletti, Helsmoortel)

- Highly innervated with proprioceptors and free nerve endings ( Schleip 2003a)
  - Contain contractile fibers, smooth muscle actin (Willard)
  - Responds to stretch and distention (Gershon)
- The response of fascia to adverse events
    - Due to trauma or inflammation – fascia may shorten, becoming painful and restricted as well as thickening (Langevin 2009)
    - Sustained ANS tone may cause increased myofibroblast contractility (Schliep 2005)
    - Binding may occur among layers, that should stretch and glide on each other, potentially impairing motor function (Fourie, Hedley)
    - Scars of the dermis and fascia may effect remote regions, restrict movement and contribute to pain (Bordoni, Kobesova, Lewitt)
- Causes of restrictions in visceral fascial structures
    - Trauma
      - Surgical
        - ◆ Adhesions (Menses, Monk)
      - Blunt force, falls, MVA
        - ◆ Greatest effect on solid structures (Cheynel, Rouhana)
    - Inflammatory (Wynn)
- Impact of visceral adhesions
    - Pain, local as well as referred (Binnebösel, Missmer, Suliaman, Stones, Troyer)
    - Infertility (Diamond, Gurol-Urganici, Kjeruiff)
    - Small bowel obstruction, constipation (Ellis, Menzies, ten Broek)
- ❖ **Visceral fascial anatomy with respect to the somatic frame**
- Layers of visceral fascia
    - Muscular-surrounds body cavity and attaches to visceral structures
    - Structural–suspensory and neurovascular conduits “ligaments”
    - Visceral-organ surface in pleura and peritonea
    - Parietal-lining and creating cavities in the pleura and peritonea
- Cervical Region
    - Surrounds the pharynx
    - Attachment to the cranial base
    - Visceral column
      - Pretrachial, retropharyngeal, alar
      - Thyroid structures
      - Pleuralvertebral and costopleural ligaments
      - Continues with esophagus and trachea into the thoracic cavity (Barral, Paoletti, Willard)
- Thoracic Cavity
    - Pleural cavities (endothoracic fascia)
      - Mediastinum
        - ◆ Attachment to anterior vertebral bodies, posterior sternum, diaphragm

- ◆ Pericardium
  - ◆ Diaphragm
    - Crural attachment to anterior vertebral bodies
    - Blends with endothoracic fascia superiorly
- Surrounds bronchi
- Continues with the esophagus and aorta as they pass into abdominal cavity
- Abdominal Cavity
  - Surrounds the entire peritoneal space
    - Transversalis fascia as outer connection to muscles
      - ◆ Anterior parietal peritoneum
    - Visceral peritoneum
      - ◆ Triangular ligaments of the liver
        - Attach to thoracic wall
      - ◆ Mesentery of small intestine
        - Attachment to anterior vertebral bodies
      - ◆ Mesentery of colon
        - Attachment to iliacus
  - Retroperitoneal
    - Endoabdominal fascia posteriorly
      - ◆ Blends with the diaphragm superiorly
        - Falciform ligament of liver attaches to the urachus
      - ◆ Surrounds great vessels and lymphatic structures
      - ◆ Abdominopelvic plexus of autonomic nerves
      - ◆ Crus of diaphragm attachments to vertebral bodies
    - Perirenal fascia
      - ◆ Blends with psoas and quadratus lumborum
      - ◆ Anteriorly blends with parietal peritoneum
    - Fascia of Toldt
      - ◆ Posterior to ascending and descending colon
      - ◆ Attaches to quadratus lumborum
- Pelvic Cavity
  - Endopelvic fascia (layer 4 of the pelvic floor)
    - Surrounds the midline organs: rectum, uterus and bladder
      - ◆ Broad ligament
      - ◆ Round ligament
      - ◆ Transverse cervical ligament
      - ◆ Uterosacral ligament
    - Blends in to the pelvic floor and pelvic wall
      - ◆ Levator ani, coccygeus, piraformis, obturator internus
      - ◆ Bends into perineal membrane
    - Median and medial umbilical ligament of bladder
      - ◆ Run superiorly to the umbilicus to attach with falciform ligament (Barral, Otcenasek, Paoletti, Willard)

## ❖ The Clinical Application of Visceral Manual Therapy

- Systematic approach in physical therapy incorporating all structures (Lee, Robertson)
- Mechanisms of Manual therapy
  - Majority of work is joint based HVLA and joint mobilization (Bialosky, Clark)
  - Soft tissue based fascial therapies are shown to have comparable mechanisms and should be considered as a continuum (Simmonds)
  - Hypothetical mechanisms behind effect of fascial based manual therapy
    - Mechanical loading (Threlkeld)
    - Neurophysiologic (Henley, Gay, Schliep 2003a,b)
    - Non-neurologic (Barnes, McParland 2008)
    - Placebo or change from touch alone (Bialosky, Gay)
- Systematic Review of efficacy behind soft tissue based therapies (Ajimsha)
  - 19 studies reviewed on “myofascial release”
  - The quality of the RCT varied greatly
  - The literature regarding the effectiveness of MFR was mixed however deemed to be encouraging
- VMT treatment techniques
  - Fascial induction component of OMT (Fernandez de las Penas, Parsons)
  - VMT is a specialized fascial manual therapy focusing on the connective tissue surrounding the organs in the body
  - VMT is not a systematic method for manipulating organs “back into place”
- Current models for visceral system in pain states
  - Mechanical perspective, based on local tissue restrictions
    - Changes in biomechanics of the trunk and fascial irritation (Barral)
    - Tensions resulting from abnormal adhesions (Barral, Hedley, Sulaiman)
  - Referred pain from visceral nociceptive afferent
    - Reflex activity (McMahon, McSweeney, Wesselmann)
    - Neural convergence (Cervero)
  - Central sensitization from autonomic dysregulation (Binnebösel, Goehler, McMahon, Rickenbacher, Wesselmann)
- VMT application, usually as a part of combined OMT practice
  - Systemic pathology
    - Pneumonia, constipation, infertility, cystitis, asthma,
  - Somatic dysfunction
    - Musculoskeletal dysfunction of the axial framework

## ❖ Evidence Supporting VMT:

- Musculoskeletal: Low Back Pain
  - Systematic Reviews
    - Licciardone & Brimhall, 2005
      - ◆ OMT for LBP
      - ◆ 6 studies reviewed, all English language
      - ◆ No specific mention of visceral technique

- Franke & Franke, 2014
  - ◆ OMT for LPB
  - ◆ 15 studies reviewed, multiple languages
  - ◆ No specific mention of visceral technique
- Randomized controlled trials
  - Tozzi et al., 2012
    - ◆ 24 subjects, measured kidney excursion during respiration with RTUS
      - 14 complaining of nonspecific LBP
      - 10 asymptomatic controls
    - ◆ Subjects with non-specific LBP demonstrated a reduced range of kidney mobility compared to that found in asymptomatic subjects
    - ◆ Mobilization to the lumbar fascia and renal fascia improved kidney mobility and decreased reported pain per McGill pain questionnaire
    - ◆ Controls received sham treatment
  - Panagopoulos 2013
    - ◆ Rationale and proposed protocol for addition of VMT in treatment of LBP
- Case report
  - Lalonde, 2014
    - ◆ 51 y/o female presented with right gluteal pain following running half marathon
    - ◆ 1 month treatment with muscle stretching and strengthening exercises by PT without substantial improvement
    - ◆ Osteopathic evaluation demonstrated multiple somatic dysfunction to include sacral, right ilial and L3-L5 vertebral restrictions, spasm of the right psoas associated with dysfunction in the kidney fascia
    - ◆ Initial treatment utilized OMT to address the muscle and articular issues only
    - ◆ Patient returned with no significant improvement, the kidney and its articulating structures were then addressed the second treatment
    - ◆ Patient returned in one week reporting she could now run 15 km without pain
- Observational studies
  - McSweeney & Thompson, 2012
    - ◆ N=15 asymptomatic patients exposed to each intervention on different days
    - ◆ VMT at the sigmoid colon
    - ◆ Sham treatment and no treatment
    - ◆ Pressure pain thresholds were measured at the L1 musculature and dorsal interossei before and after each intervention
    - ◆ A statistically significant improvement in pressure pain threshold the L1 paraspinal musculature was observed immediately following the treatment
  - Lewitt & Olsanska, 2004 – Effect of scar treatment
    - ◆ N=51 patients with variety of musculoskeletal pain, predominantly spinal
    - ◆ Scars were all surgical in nature on the abdomen, chest and perineum
    - ◆ Manual treatment to superficial and deep fascial structures

- ◆ 36 cases the scars were deemed the primary cause of pain
- ◆ 13 cases, partially contributory to the pain
- ◆ 3 cases treatment of the scar yielded no improvement
- Michallet, 1986 - Doctoral thesis
  - ◆ Experiment utilizing ultrasound to measure alteration of kidney mobility post treatment in patients with various symptoms
  - ◆ Successful treatment in 23/25 patients
  - ◆ Average gain in amplitude was 17.2mm
  - ◆ 8/23 cases were re-measured 2-6 months post manipulation, now showing an average gain of 25.8mm
- Musculoskeletal disorders: Chronic pelvic pain
  - Case Series
    - Rice & King, 2013 - Small bowel obstruction
      - ◆ N=2
      - ◆ Patient 1, one laparotomy for SBO with radiographic evidence of current SBO
      - ◆ Patient 2, seven abdominal surgeries for adhesion related pain
      - ◆ Extensive VMT to abdomen x 14 hours in one 5 day period for both patients
      - ◆ Elimination of further SBO and visible changes on radiographs with 90% pain reduction
  - Experimental studies
    - Bove & Chapelle, 2011- Treatment of peritoneal adhesions/animal model
      - ◆ Surgically induced abrasion of the cecum and abdominal wall in rats
      - ◆ Prevention and treatment group with visceral mobilization to abdominal wall
      - ◆ Control group, no treatment
      - ◆ Post-mortem evaluation showed significant reduction in adhesion formation in the preventative group as well as clear signs of disrupted adhesions in treated groups
- Systemic disorders: Chronic constipation, GI motility
  - Systematic Reviews
    - Earnst, 1999 - Chronic Constipation “abdominal massage”
      - ◆ Only found four controlled clinical trials
      - ◆ All had methodological flaws, only one had control group
      - ◆ Nonetheless the results of these trials collectively imply that massage therapy could be a promising treatment for chronic constipation
    - Sinclair, 2011 - Abdominal massage for chronic constipation /post-operative ileus
      - ◆ 2 RCT met inclusion criteria, N=85
        - 6 observational studies
        - 4 case reports
      - ◆ Inconsistent methodology
      - ◆ Needs to be performed repeatedly to see results
      - ◆ Shown to stimulate peristalsis, increase the frequency of bowel movements, improve first passage of flatus in post-operative patients and



decrease the feelings of discomfort and pain that accompany these conditions.

- Randomized controlled trials
    - McCurg, 2011- Multiple sclerosis and chronic constipation
      - ◆ N=30 adults with MS
      - ◆ Treatment group given bowel management advice and care provider was instructed in abdominal massage to be performed once daily
      - ◆ Control group was given bowel management advice alone
      - ◆ Outcomes were measured at 4 and 8 weeks
      - ◆ Treatment group demonstrated significant improvement in outcomes measures over the control
      - ◆ Currently multi –centered clinical trial is taking place in the UK
    - Tarsulu & Bol, 2009 - Pediatric population
      - ◆ N=13 children with cerebral palsy and chronic constipation
      - ◆ Group 1 was treated with osteopathic methods, to include VMT
      - ◆ Group 2 underwent both medical and osteopathic treatments
      - ◆ Constipation Assessment Scale scores decreased significantly in both groups
      - ◆ Post treatment follow-ups at 3 and 6 months results revealed no difference between the groups
  - Case Report
    - Harrington & Haskvitz 2006 - Chronic constipation and urinary incontinence
      - ◆ 85 year old patient, reported QOL impact 9/10 GI
      - ◆ Failed to respond to conventional medical treatment to include multiple medications, GI work up and 5-6 previous PT session of biofeedback
      - ◆ Intervention: instruction in proper toileting technique, pelvic floor strengthening and “abdominal massage” to include self-treatment
      - ◆ 5th visit, 13 weeks after initiation of care, patient reported resolution of constipation and return of normal rectal sensory awareness for need to defecate
      - ◆ 3 month follow up reported continued resolution of constipation
  - Experimental studies
    - Chapelle & Bove, 2013 - Prevention of post-op ileus
      - ◆ Peritoneal incision and surgically “ran the bowel” in rats
      - ◆ Treatment group with visceral mobilization to abdominal wall
      - ◆ Control group, no treatment
      - ◆ Reduction of post-operative ileus and increase in fecal pellet formation (2013)
- Systemic disorders: Irritable bowel syndrome IBS
- Systematic Reviews
    - Muller & Franke 2014 - OMT for adults with irritable bowel syndrome
      - ◆ 5 RCT met inclusion criteria N=204
      - ◆ Variety of outcome measures used
      - ◆ All demonstrated short-term improvements superior to sham treatment or standard care alone

- Randomized controlled trials
  - Attali & Bouchoucha 2013 - VMT for treatment of irritable bowel syndrome
    - ◆ N=31 patients with IBS
    - ◆ Placebo vrs osteopathic treatment
    - ◆ Short term improvement in symptoms except constipation
    - ◆ 1 year FU improvements in diarrhea, rectal sensitivity and pain
  
- Systemic disorders: LUTS
  - Systematic Review
    - Franke & Hoesele 2013 - OMT for lower urinary tract symptoms
      - ◆ 5 records met inclusion criteria N= 230
      - ◆ Pediatric (Nemett) thrown out
      - ◆ Nonspecific about treatment technique “OMT” included visceral treatment
      - ◆ Findings of statistical significant and clinically relevant improve over controls
  - RCT
    - Nemett et. al., 2008 - Pediatric voiding dysfunction
      - ◆ N=21 Pediatric patients with dysfunctional voiding symptoms were randomly assigned to manual PT group plus standard treatment or control group of standard treatment alone
      - ◆ MT: consisted of cranial, visceral, vascular and lymphatic techniques
      - ◆ ST: consisted of timed voiding, pelvic floor retraining and treatment of constipation
      - ◆ Outcomes measured by VCUG and bladder ultrasound
      - ◆ MT group exhibited greater improvement in DV symptoms
  
- Systemic disorders: Reproductive tract
  - Case series
    - Kramp, 2012 - Mechanical infertility
      - ◆ N=10 women with diagnosed with mechanical infertility
      - ◆ Findings of lymphatic congestion, sacral dysfunction and restrictions in uterine mobility were treated with a variety of manual therapy techniques
      - ◆ 6 out of 10 women (60%) conceived and delivered at full term
      - ◆ A multi-center trial (MISS) is currently underway
    - Wurn et. al., 2004 - Mechanical infertility
      - ◆ N=53 infertile patients received a series of visceral manual physical therapy treatments
      - ◆ Documented changes in histosalpingograms following manual interventions
      - ◆ Natural conception group:10/14 that completed the study became pregnant within one year
      - ◆ IVF group: 25 patients completed the study, clinical pregnancies in 22/33 embryo transfers
  - Observational studies
    - Kassolik & Andrzejewski, 2007 - Benign prostatic hypertrophy
      - ◆ N=43 men diagnosed with BPH and reporting LUTS
      - ◆ Prostate symptom score (PSS) was utilized pre and post treatment
      - ◆ Treatment consisted of external manual treatment deemed ”medical

massage” to the integument of the small pelvis

- ◆ 53% improvement on PSS scale for mean score of all subjects
- ◆ 30 subjects reporting a 40% improvement
- ◆ 1 subject reported no improvement

❖ **Evidence Negating VMT:**

- Respiratory Dysfunction
  - Multiple studies on decreased pulmonary function to include Cochrane review on asthma have provided no statistical improvement or in the case of COPD, a worsening of peak flow. (Bockenbauer, Hondras, Noll)

❖ **Conclusion:**

- VMT is a manual therapeutic technique for mobilizing the fascia of the visceral structures with the goal of improving local tissue motion, fluid exchange and decreasing nociceptive input.
- The concept of a visceral restriction contributing to mechanical pain is based on the knowledge of fascial anatomy of the central structures as well as the scientific theory of these anatomical structures having an influence on the locomotor system and the physiology of visceral nociceptive afferent pathways.
- The current evidence to support VMT is limited by a minimum of RCT in this field

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