"I am stunned at the amazing results I've been getting with L.A.S.T.!"

"L.A.S.T. is an invaluable set of techniques that have improved outcomes for my patients!"

"It was a great course…my patient said it was the best treatment he's ever had!"

L.A.S.T.

Ligamentous Articular Strain Technique

Canadian Massage Conference 2015

Techniques for the Leg & Foot Course

Presented by Robert Libbey, RMT

Note:

Knowledge and best practice in this field are constantly changing. As new research and experience broaden our knowledge, changes in practice and treatment may become necessary or appropriate. Readers are advised to check the most current information concerning the frequency, intensity, duration, precautions, indications, and contraindications concerning treatment of patients and their conditions. It is the responsibility of the practitioner, relying on their own experience and knowledge of the patient, to make diagnoses, to determine frequency, intensity and duration and the best treatment for each individual patient, and to take all appropriate safety precautions. To the fullest extent of the law, the author does not assume any liability for any injury and or damage.

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Editing assistance from Leslie Ste. Marie

"IN AN

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FS EY ES DT BE AM CK,

SMALL CHANGES

CAN RESULT IN

DISPROPORTIONATELY

LARGE

EFFECTS"

Contents

Techniques for the Leg & Foot

Workshop Agenda:

9am-12pm

9:00am Registration, Introduction & Scientific Theory

10:00am Foot and Leg

Relevant Anatomy, CIs, Indications, Precautions, Pathologies, Kinesiology

- Calcaneus Boot Jack
- Talus Anterior/Posterior
- Fibula Technique
- Interosseous Membrane

10:30am Student Exchange

11:30am Review, Common Mistakes, Do's & Don'ts

12:00pm End of Day

Forward Thinking

The information presented in this manual before you, is an opportunity to advance and update the original context first put forth by A.T. Still. This is a wholly different era where evidence informed techniques are sought after in an effort to advance the manual therapy profession to it's highest potential.

Presented here are the same timeless principles viewed through a modern lens. They are applied with the mindset of providing a simple, precise, principle based, evidence informed technique that can be incorporated into techniques already being utilized by the manual therapist.

At the time of writing this, after 20 years of practice and 16 years of research (both historically and scientifically informed), self development and education has lead me to this historically innovative manual therapy technique.

Although the techniques described in this manual seem separate, they are connected through the ability of the therapist to look locally and see systemically. We are an asymmetrical nonlinear feed back system. Everything is connected.

In the book "Movement, Stability & Lumbopelvic Pain", Andry Vleeming uses the term "*Ligamentous Stocking*" to describe the connectedness of fibrous soft-tissue structures of the lumbar vertebrae to the sacrum. In 2009, Jaap van der Wal stated that there is a joint stability system, in which muscular tissue and RDCT (regular dense (collagenous) connective tissue) interweave and function mainly in an "*in series*" situation rather than an "*in parallel*" situation. Thus, in vivo, the periarticular connective tissue is loaded and stretched both by the movement of related skeletal parts and by the tension of the muscle tissue inserting to this connective tissue. Ligaments are considered RDCT's.

I put it to you that this "*Ligamentous Stocking*" is organism wide, connecting not just the vertebral column to the sacrum, but also connecting the various appendicular interdigitations of membranous, capsular, ligamentous and periosteal fibrous tissues to the axial fibrous tissues.

The trend today is to treat separate tissue from other separate tissue with a disconnect from the whole organism. We treat carpal tunnel at the wrist with out looking systemically to find that the wrist was only the last in a chain of events and compensations for something that happened months years, decades ago in a completely different area.

Daily we see patients who seem to have been treated by everyone, everywhere, and some how have come to us. We are in most cases the "end of the road" before surgery or they come to us decades after surgery. Their physical body is screaming out information that many do not stop to hear or see. You can see it in their eyes.

We still utilize the ancient laying of hands to help someone in pain and discomfort. We are here to help, to serve, to listen with our hands, eyes, ears, heart, soul and intuition. We are here to connect with another organism.

Going forward, use todays evidence informed science to help you and your patient understand possibly what physiological process is currently occurring; but use your common sense, intuition and most importantly guidance from your patients physiology to dictate the rate, course and direction of the treatment.

Manual therapy is an ART and a science. Treat the organism rather than the segment. Change your perspective to treating densities and temperatures. Aim for "*ever-changing balance*" in an asymmetrical nonlinear feedback system.

Keep Forward Thinking!

LIGAMENTOUS ARTICULAR STRAIN TECHNIQUES

Global Pain Therapies

Ligamentous Articular Strain Techniques -
A manual treatment approach for ligamentous articular injuries and for the whole body

Robert Libbey, RMT

ABSTRACT

The scope of practice for the treatment of the ligamentous, capsular and fascial tissues by Manual Therapists (Massage Therapy) limits the therapist to utilizing their hands along with active patient participation. There is a wide range of research documenting the types of mechanoreceptors and their locations within the ligamentous/capsular tissues. A lesser-understood ligamento-muscular reflex has also been documented with limited research. The specific mechanoreceptors and ligamento-muscular reflex are responsive to manual stimulation techniques within the scope of practice for manual therapy. Utilizing specific manual techniques can have positive effects in attenuating the development of scar tissue, adhesions, inflammatory processes and proprioceptive and kinesthetic neurological deficits. Combining these specific manual techniques with therapies such as Prolotherapy minimizes the long-term effects from ligamentous articular injuries and accelerates the recovery period for patients.

Journal of Prolotherapy. 2012;4:e886-e890.
KEYWORDS: ACL, capsular tissue, fascial tissue, L.A.S.T., ligamentous tissue, massage therapy, Prolotherapy.

"It's not perverted function but a wrong environment that results in the distorted appearance of function. Function is always true to its environment. Function is dependent upon its environment. Therefore, any change in any part of the environment that is not in tune or balance, will distort the function of the matter so involved."
- Thomas Schooley, DO[1]

There is a wealth of information concerning the treatment of ligamentous, capsular and fascial tissues within the scope of practice of Medicine, Physiotherapy and Naturopathic Medicine. In the Massage Therapy (Manual Therapy) profession where our scope of practice only allows us to treat utilize our hands along with active patient participation; there is very little information or research.

In this article, I discuss a technique developed in the early 1900's to which I have applied today's current research. When combined with therapies such as Prolotherapy, this technique has the potential to accelerate the recovery period for patients suffering from ligamentous articular injuries.

The ligamentous system is part of the fascial tissue referred to as the **Multimicrovacular Collagenic Dynamic Absorbing System.** The role of this rubbery elastic shock absorbing system, found everywhere in our body, is to avoid reaching a threshold of resistance at which the collagen might shear resulting in injury.[2]

Ruptured or injured ligaments are a source of mechanical problems. These injuries cause deficiencies in fine and gross motor controls, lost, altered or impaired sensation, various types of pain/discomfort, joint laxity and can lead to articular surface injury. This dysfunctional state eventually leads to an increased risk of additional injury to surrounding capsules, tendons, neurovasculature and other nearby tissue, can cause a change in sensation thresholds, impaired sensation and impaired reflex muscular activation.[3]

If left untreated or if treated inefficiently, chronic inflammation develops and permanent disability of the affected tissues results. Patients suffer from continual pain, inflammation, neurological implications, muscle stiffness and instability of affected joints, deficient sensation and sensory perception, impaired motor performance, deficient synergy muscle activation, spasms and hyper excitability of the muscular system.[3]

MECHANORECEPTORS

Ligaments have significant input to sensation and contribute to the synergistic activation of muscles. Afferent mechanoreceptors are found everywhere throughout our connective tissues. They are responsible for kinesthetic and proprioceptive sensation.[3]

The four types of these sensory nerve endings or mechanoreceptors that manual therapists have influence on are:

- Golgi Receptors
- Ruffini Receptors
- Pacini Receptors
- Interstitial Receptors

We will briefly look at these four receptors and the effects manual treatment has on them and the body as a whole. (*See Table 1.*) [4, 5, 6, 7, 8, 9, 10, 11]

In a study presented at the Third International Fascia Research Congress, Viklund et al. concluded that specific myofascial receptor techniques might have a longer lasting effect than classical (Swedish) massage techniques. They suggested that "therapists might be encouraged to aim their soft tissue techniques to a lesser area where there is known to be high density of mechanoreceptors".[12]

Manual techniques that target these mechanoreceptors have been proven to affect both the local blood supply and the local tissue viscosity.[11] Research is now confirming the common clinical finding that slow, deep tissue techniques have both local and systemic effects.

LIGAMENTO-MUSCULAR REFLEX

Ligaments are not passive tissue. Ligaments are highly dynamic and non-stationary predictable organs. Afferent mechanoreceptors in ligaments trigger a ligamento-muscular reflex activation of associated muscles. It has been suggested that a reflex might exist between these sensory receptors in the ligaments and surrounding associated muscles. This Ligamento-muscular reflex may directly or indirectly alter the load inflicted on to a ligament.[3]

Table 1. The four types of sensory nerve endings or mechanoreceptors and the effects manual treatment has on them and the body as a whole.

Receptor:	Golgi
Location:	• all dense connective tissues • peripheral joints ligaments • joint capsules • myotendinous junctions • attachment areas of aponeurosis
Responds to:	slow stretch techniques
Results in:	a decrease in active muscle tone
Receptor:	**Ruffini**
Location:	• tissues associated with regular stretching • outer layer of joint capsules dura mater • peripheral joints ligaments • muscle fasciae • the deep dorsal fascia of the hand
Responds to:	constant, slow and deep pressure slow shear forces
Results in:	a lowering of sympathetic nervous system activity
Receptor:	**Pacini**
Location:	• deep portions of joint capsules • deeper spinal ligaments • investing muscular fasciae of antebrachial, crural, • abdominal fasciae, masseter, lateral thigh, plantar and palmar tissues & peritoneum
Responds to:	• rapid changes in pressure • vibratory/oscillatory techniques • HVLA's
Results in:	an increase local proprioceptive attention and self-regulation
Receptor:	**Free/Interstitial Nerve Endings**
Location:	• all fascial tissue • periosteum • interosseous membranes • tendons • fascial connections to bones
Responds to:	• deep, slow or steady manual pressure • Treatment to periosteum, interosseous membranes, and fasciae connected to bones
Results in:	• autonomic functions: changes in heart rate, blood pressure, respiration, increase or decrease blood pressure, sensation of position and movement, increased vagal activity, global muscle relaxation, alterations in local fluid dynamics and tissue metabolism • plasma extravasation

The Ligamento-muscular reflex has been shown to exist in most joints of the extremity and in the spine. Muscular activity elicited by this reflex allows muscles and ligaments to work together as a unit in maintaining joint stability. This reflex may play a role in the preservation of joint stability, inhibiting muscles that destabilize the joint or increasing antagonist co-activation to stabilize the joint.[3]

For many years we learned in our anatomy classes that ligaments and muscles were separate entities. Even many of our most popular anatomy texts still portray ligaments and muscles as separate tissues running from one bone to another, not connected to any surrounding tissues. In reality though, these and the surrounding tissues are inseparable. In 2009, van der Wal published a paper in which he determined that ligaments are mostly arranged in series with the muscles, not parallel.[13] When you contract a muscle, the ligaments are automatically engaged, assisting in the stabilization of a joint, no matter what its position, during both concentric and eccentric contractions.[14]

INJURIES

A state of hypertonicity is created in muscles when a ligament has been injured, or replaced. For example, ACL ruptures and replacements can cause one or all of the quadriceps, hamstring and gastrocnemius muscles to become hypertonic as a result of a lack of the ligamento-muscular reflex. This hypertonic state is also due to the removal of the mechanoreceptors of the original ACL. A large percentage of the receptors are located near the ends of the ligaments as they attach into the sub-chondral layer. This remnant is often removed in order to attach the substituted tissue. Although the stability of the joint has been re-established, patients regularly complain of not only having an increase in tonicity of the muscle groups, but also a deficiency in both proprioception and kinaesthetic awareness. The manual therapist is then charged with the task of attempting various treatment techniques to reduce this hypertonicity. Their efforts are rarely successful and both the patient and therapist become frustrated and discouraged. Thus begins the circle of referral from one therapist to another.[5, 15, 16, 17, 18]

HISTORY OF L.A.S.T.

Ligamentous Articular Strain Technique (L.A.S.T.) was developed to be primarily an Indirect Osteopathic technique. The technique is based on principles and techniques developed by Andrew Taylor Still, DO. The majority of the techniques initially developed were called traction methods, known as "Indirect Techniques." Several of these techniques were Ligamentous Articular Strain Techniques and some of them also formed the basis of myofascial release techniques. Many of the techniques in the early 20th century were modified by therapists that wanted to focus on a quicker, more direct method of treating. These "Direct Techniques," became known primarily as high velocity-low amplitude techniques.[1, 19]

The author has re-defined the techniques to suite the Scope of Practice for Massage Therapists. "Indirect Techniques" follow the permitted motions of the dysfunctional tissues into the direction of ease. "Direct Techniques" match the reciprocal tension of the dysfunctional tissues taking the tissues only to the first tissue resistance barrier.

USING L.A.S.T. IN TREATMENT

L.A.S.T. affects the connective tissues of the body, mainly ligaments, joint capsules, fascia, muscles, tendons and indirectly, lymphatic and blood flow and the autonomic nervous system.[11, 20]

L.A.S.T. is a principle-based technique. The basic principles consist of disengaging the dysfunctional tissues from their protective position. The practitioner follows the affected tissues into a position of exaggeration of the injury. This exaggeration leads to a state where all movement within the affected tissues halts. A release of tension within the tissue is felt, allowing the ligaments to draw the articulations back into a more normal balanced relationship.[19]

After an assessment of the affected articular structures, the practitioner palpates for areas of dysfunction or an increased densification within the injured tissues. Slowly disengaging the tissues, (direct or indirect techniques) the therapist exaggerates the permitted motions of the tissues to their end barrier. The reciprocal tension is a tension that is developed between the practitioner loading into the tissue and the tissue reciprocally loading back into the practitioner. The therapist now waits at this point of tissue exaggeration until he or she feels the ligaments draw the articulations back into a normal balanced position. A re-assessment of the permitted motion in the tissues should confirm more suppleness and mobility along with an improvement in kinaesthetic and proprioceptive awareness. (*See Figures 1-4.*)

L.A.S.T., TGF-B1 AND THEIR POTENTIAL ROLE IN PREVENTING EXCESSIVE SCAR TISSUE DEVELOPMENT

Solomonow states that the acute inflammation in ligaments sets in within several hours may last several weeks and up to 12 months! Only up to 70% recovery

Figure 1. Hand placement for treatment of Annular Ligament.

Figure 3. Hand placement for treatment of ASIS attachment for Inguinal Ligament.

Figure 2. Sidelying position for treatment of Illiolumbar ligament.

Figure 4. Hand placement on patient for treatment of C1 dysfunction.

has been documented. Chronic inflammation can build up over several weeks, months or years depending on dose-duration levels. Rest and recovery of as long as two years only allows partial recovery, full recovery has never been reported.[3]

Bouffard et al. published a study documenting the effects of brief static tissue stretch on TGF-ß1. TGF-ß1 plays a key role in connective tissue regulating the response of fibroblasts to injury, remodelling, scarring, and pathological production of fibrosis.[22] Langevin et al. stated that in cases of minor sprains and repetitive motion injuries, scarring is mostly detrimental since it can contribute to maintaining the chronicity of tissue stiffness, abnormal movement patterns, and pain. Reducing scar and adhesion formation using stretch and mobilization is especially important for internal tissue injuries and inflammation involving fascia and organs.[21]

The results of the Bouffard and Langevin studies showed that brief, moderate amplitude (20–30% strain) stretching of connective tissue decreases both TGF-ß1 and collagen synthesis.

Langevin et al. proposed that therapies which briefly stretch tissues beyond the habitual range of motion (eg, massage) locally inhibit new collagen formation for several days after, and thus, prevent and/or ameliorate soft tissue adhesions.[6,7,19,23,24]

Thomas Schooley, DO stated, "Function is dependent upon its environment." I believe that by utilizing the principles of L.A.S.T. in various stages of injury, practitioners have the potential to profoundly affect the course of tissue healing. By changing the neuromuscular physiological environment and decreasing the SNS response to injury, a response of decreased TGF-ß1

could lead to decrease in fibrosis and decrease in fascial stiffening of the surrounding and injured tissues. This approach could overall positively affect the functionality of the patient.

MY EXPERIENCE WITH L.A.S.T.

In our office, we treat a variety of injuries ranging from acute to chronic. These injuries lead to the symptoms described earlier in this article. Optimally, I prefer to treat in the acute stages of an injury. By attempting to create as optimal an environment for tissue healing as possible, patients have reported being less symptomatic. Combining L.A.S.T with Prolotherapy treatment, administered by our Naturopathic Physician, creates an opportunity to prevent chronic issues from occurring thereby improving the quality of life for the patient. ■

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Breathing

Utilizing breathing as a technique when performing manual techniques is greatly underutilized by a majority of todays therapists. Therapists that utilize concepts from techniques such as CST are familiar with incorporating breath into their treatments; but why not more of us.

Evidence supports a link between breathing difficulties and back pain. Since trunk muscles perform both postural and breathing functions, disruption in one function can negatively impact the other.

Altered breathing mechanics changes respiratory chemistry causing smooth muscle constriction, altered electrolyte balance and decreased tissue oxygenation. These changes can profoundly impact any body system. Increased excitability in the muscular and nervous systems may be most relevant to a manual therapist. (McLaughlin L, et al., Breathing evaluation and retraining as an adjunct to manual therapy, Manual Therapy (2010), doi:10.1016/j.math.2010.08.006)

Breathing is unquestionably a key function of the human body; it sustains life by providing oxygen needed for metabolism and removing the by-product of these reactions, carbon dioxide. Breathing, however, has other functions apart from the ventilation of air and the maintenance of oxygen and carbon dioxide. Breathing affects motor control and postural stability and plays several roles in physiological and psychological regulation. Breathing can influence homeostatic functions in other system including the autonomic nervous system, the circulatory system, chemical regulation and metabolism.

Breathing becomes dysfunctional when the person is unable to breathe efficiently or when breathing is inappropriate, unhelpful or inefficient in responding to environmental conditions and the changing needs of the individual.

Impairment of the functions of breathing affects people's lives, challenging homeostasis, creating symptoms and compromising health. The efficiency with which breathing fulfills its various functions can be diminished because of musculo-skeletal dysfunction, disease, chronic psychological stress or other factors that affect respiratory drive and respiratory control. The neurological control of breathing shows high levels of neuroplasticity as shown by its ability to adapt to a wide range of internal and external conditions.

Breathing therapy generally aims to either correct dysfunctions of breathing or enhance its functions. Breathing, unlike most physiological functions, can be controlled voluntarily and it can serve as an entry point for physiological and psychological regulation. (International Journal of Osteopathic Medicine Volume 12, Issue 3 Pages 78-85, September 2009)

Quite simply, with diminished function of breath, our physiological systems cease to function at their maximum potential. As this process becomes chronic, the physiological environment becomes more acidic, functioning in a more sympathetic, fight, flight state slowing the recuperative processes of our immune system.

There are an abundance of instructional books, videos and classes educating us on the importance of breath and its physiological effects on all our systems.

Simply put, without it, we cease.

Breathing Techniques

There are various opinions on how, when and where to breath. As always, L.A.S.T. primarily looks to change the environment that the dysfunctional tissues are attempting to function within. There are 2 ways that we change the environment with LAST, holding of inhalation or exhalation by the patient.

Inhalation Instruction:

Once you have disengaged and exaggerated the injured tissue(s) from their dysfunctional holding position, instruct the patient to breath in as deep as possible utilizing as much of their lungs and diaphragm as they can. Once they reach the top of the breath, they are to hold this breath as long as comfortably possible before exhaling. This process can be repeated if necessary to create the effected change.

Exhalation Instruction:

Once you have disengaged and exaggerated the injured tissue(s) from their dysfunctional holding position, instruct the patient to breath out as deep as possible. Once they have comfortably forced all the air out of their body to their fullest extent, they are to hold this as long as comfortably possible before inhaling. This process can be repeated if necessary to create the effected change.

"The quieter the mind
The stiller the hands
The less movement we make
The more we are able to perceive involuntary movement"
- James Jealous, DO

"It's not perverted function but a wrong environment that results in the distorted appearance of function. Function is always true to its environment. Function is dependent upon its environment. Therefore, any change in any part of the environment that is not in tune or balance will apparently distort the function of the matter so involved."

- Thomas Schooley, DO

Clinical Principles

Contraindications

acute fracture, acute instabilities - dislocations, immediate acute sprain/strains, acute periosteal tears, acute RA, infection, acute systemic conditions

Precautions

general health of the patient, stages of healing post-injury, medications, recent injectable medications, plates/pins, degeneration of various stages, fractures, various degrees of sprains/strains, fusions, instabilities, periosteal tears

Indications

decreased AROM/PROM, pain, tension, stiffness, discomfort, acute/sub-acute/chronic sprain/strains, carpal tunnel, numbness, tingling, vascular changes

Direct and Indirect Techniques

Through manual manipulation, we can perceive changes in patients' tissues that originate in the afferent mechanoreceptors within the tissue. By gently, yet firmly loading into the specific tissue, we feel for the reciprocal tension of the tissue pressing back into our hands. Instead of forcing through the barrier of tissue directing a release as we see fit, we come to just before the barrier and allow the tissue to release in the direction of ease (Indirect Technique).

In some circumstances, however, the tissue requires that we match the reciprocal tension in the tissue and wait for the balance to occur (Direct Technique).

When do we use one or the other? The tissue determines the course of treatment and in many cases; both indirect and direct techniques are utilized in order to bring balance to the tissue/system.

The Application of L.A.S.T.

L.A.S.T. is a principle-based technique: Disengage, Exaggerate, and Balance.

Find the reciprocal tension and motion permitted within the membranes.

Disengage the tissue (using direct or indirect techniques, or a combination of both) through all planes of motion, not on any particular axis, within a joint in the direction of ease. This is known as an *Exaggeration.*

Hold the position until you come to a point of suspension: a neutral position or *Balance*. Wait in that position until a softening of the tissues occurs.

Once the tissue has completed balancing, re-assess the motion permitted within the joint.

)

Post Treatment

No change

Better

Worse

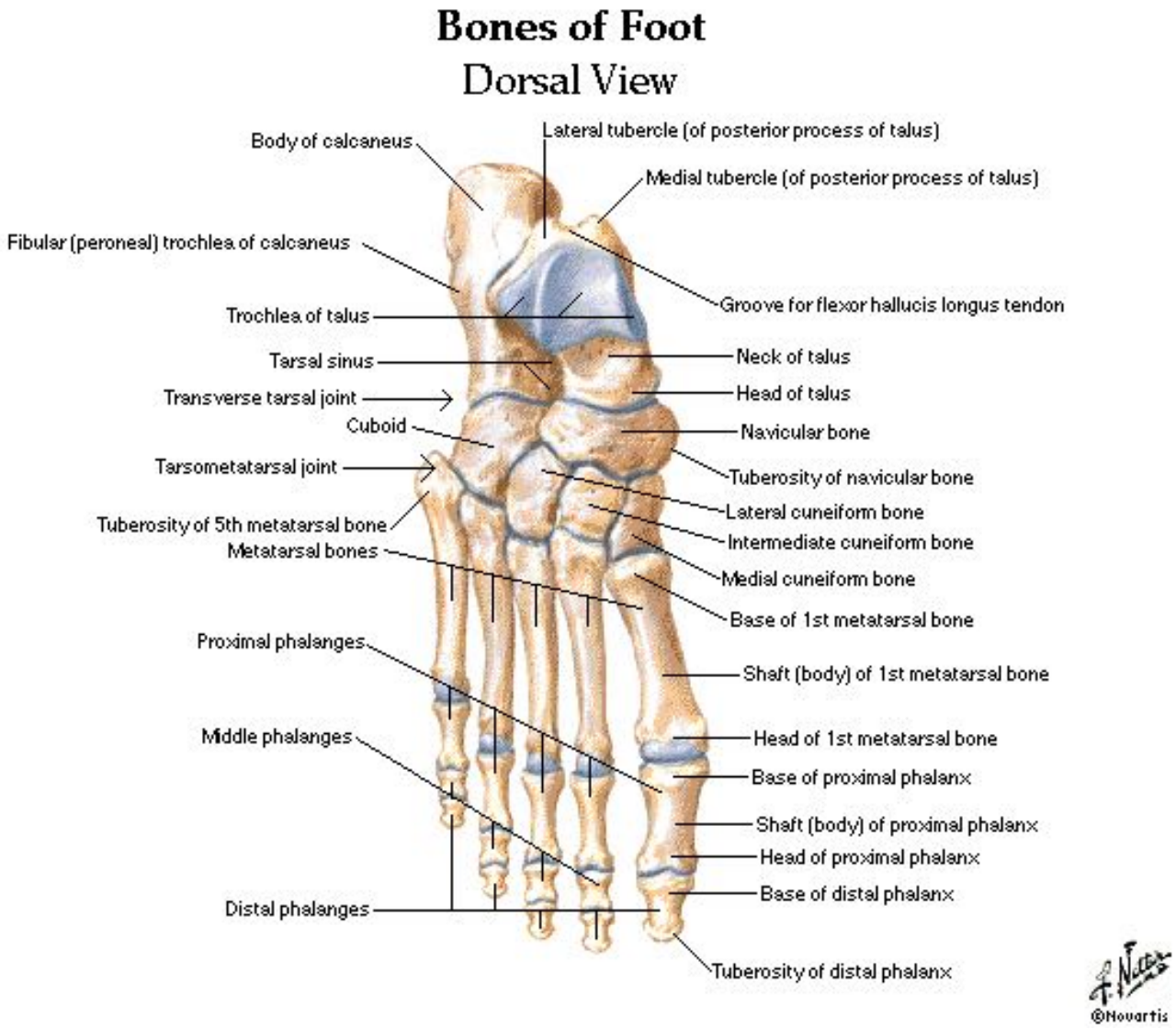
No better

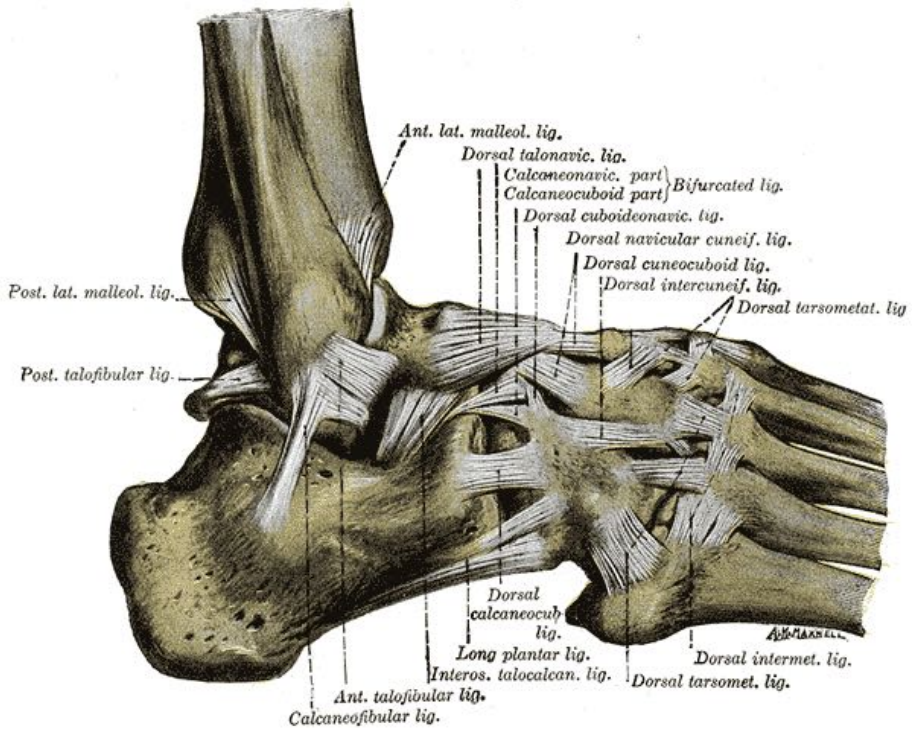
No worse

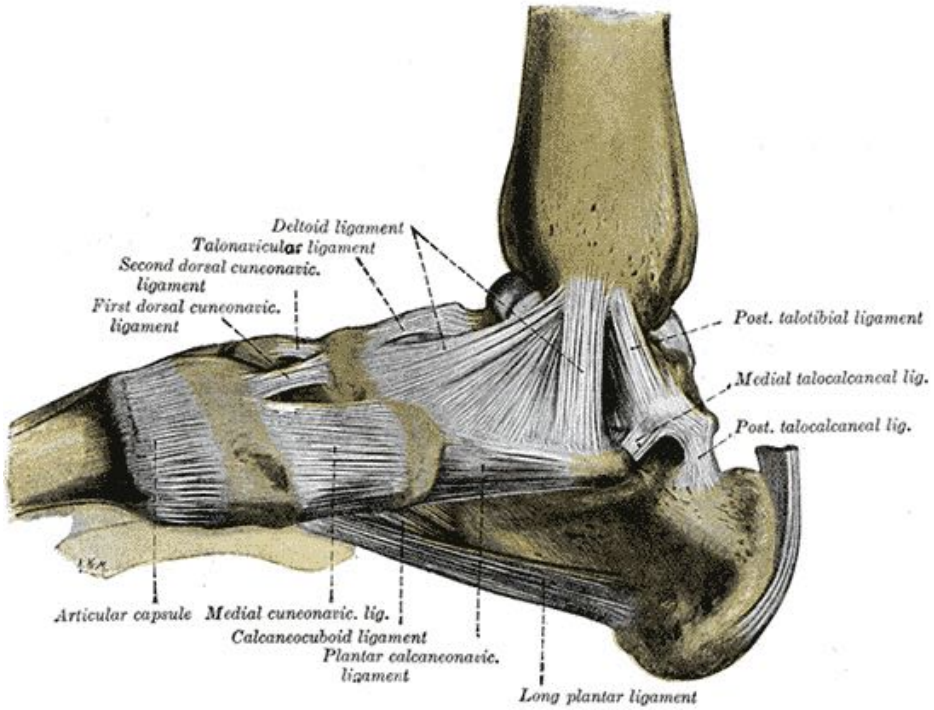
Better later

Worse later

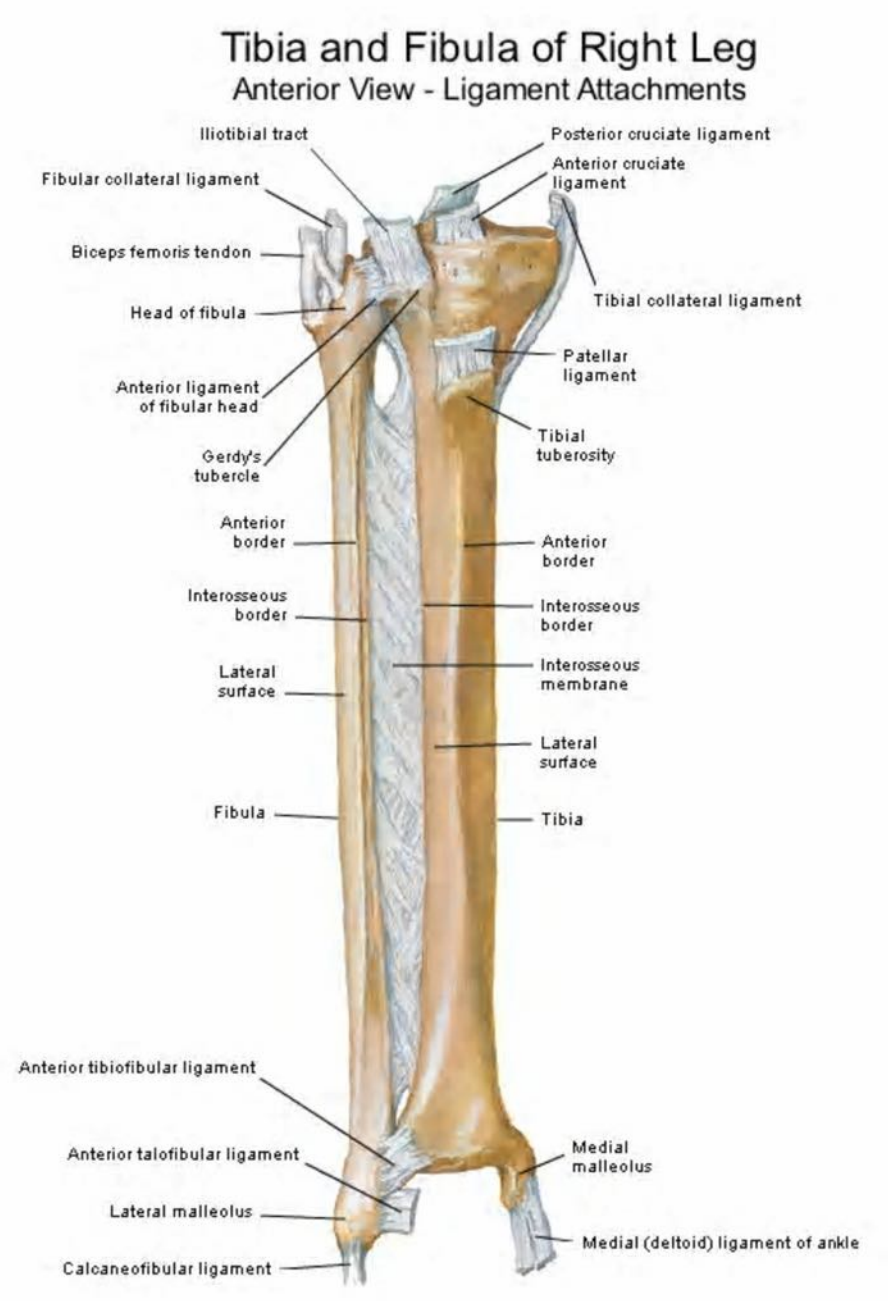
Foot Anatomy




Ant. lat. malleol. lig.
Dorsal talonavic. lig.
Calcaneonavic. part
Calcaneocuboid part
Bifurcated lig.
Dorsal cuboideonavic. lig.
Dorsal navicular cuneif. lig.
Dorsal cuneocuboid lig.
Dorsal intercuneif. lig.
Dorsal tarsometat. lig
Post. lat. malleol. lig.
Post. talofibular lig.
Dorsal calcaneocub lig.
Long plantar lig.
Interos. talocalcan. lig.
Dorsal intermet. lig.
Dorsal tarsomet. lig.
Ant. talofibular lig.
Calcaneofibular lig.


Deltoid ligament
Talonavicular ligament
Second dorsal cuneonavic. ligament
First dorsal cuneonavic. ligament
Post. talotibial ligament
Medial talocalcaneal lig.
Post. talocalcaneal lig.
Articular capsule
Medial cuneonavic. lig.
Calcaneocuboid ligament
Plantar calcaneonavic. ligament
Long plantar ligament

Leg Anatomy

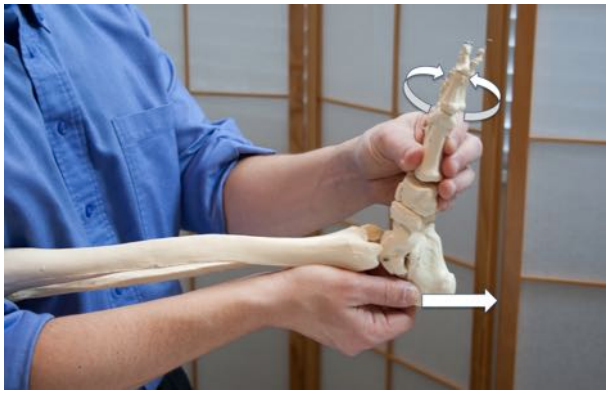

Tibia and Fibula of Right Leg
Anterior View - Ligament Attachments
Iliotibial tract
Fibular collateral ligament
Biceps femoris tendon
Head of fibula
Anterior ligament of fibular head
Gerdy's tubercle
Anterior border
Interosseous border
Lateral surface
Fibula
Anterior tibiofibular ligament
Anterior talofibular ligament
Lateral malleolus
Calcaneofibular ligament
Posterior cruciate ligament
Anterior cruciate ligament
Tibial collateral ligament
Patellar ligament
Tibial tuberosity
Anterior border
Interosseous border
Interosseous membrane
Lateral surface
Tibia
Medial malleolus
Medial (deltoid) ligament of ankle

Techniques

Calcaneus (Boot Jack) Technique

Patient position:
Supine on a table

Therapist position:
Standing next to the patient on the same side as the affected heel, facing the foot of the table

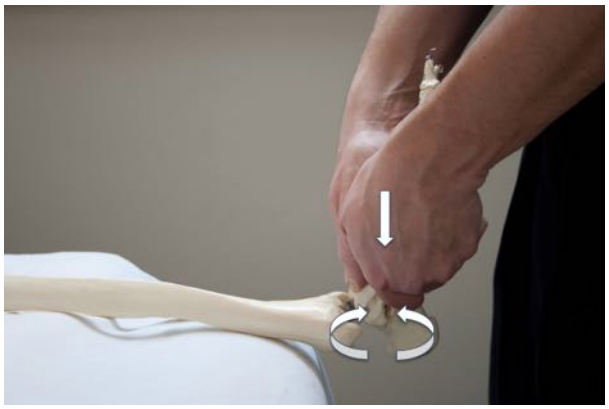


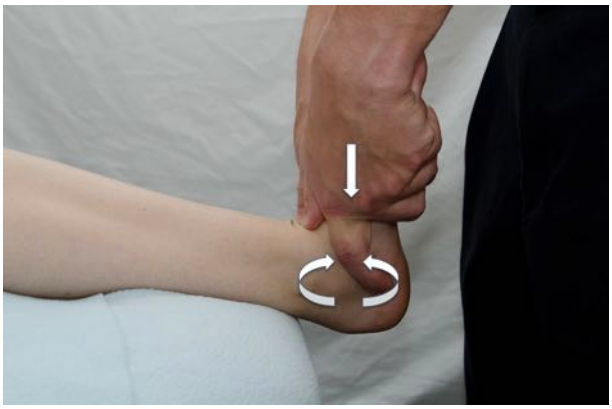
Technique:
Working with the leg closest to you, flex your patients' hip and knee to 90 degrees. Lock your flexed elbow into the popliteal space. Grasp the patient's calcaneus with your thumb placed on the supramedial aspect of the calcaneus, and your proximal interphalangeal joint of the bent index finger of the same hand on the lateral aspect of the calcaneus. Grasp the metatarsals with your opposite hand. Using the hand contacting the calcaneus, load your elbow posteriorly into the patient's knee. Balance the tension in the metatarsals and tarsals between your two hands while you carry the calcaneus distally, away from the knee. Match the reciprocal tension of the tissues at this point until a release occurs. When the release at the heel occurs, it feels like your thumb and index finger slip off the calcaneus. You will also feel a softening in the forefoot when it releases. Both releases may occur at the same time or independently. Slowly release your pressure. Reassess for suppleness of the tissues.

Anterior Talus

Patient position:
Supine on a table

Therapist position:
Standing at the foot of the table



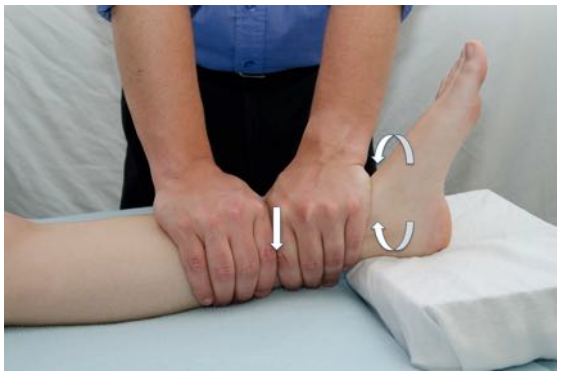


Technique:
Position the foot off the end of the table so that the table supports the leg. Place both thumbs onto the anteriorly positioned talus. Wrap your fingers around the plantar aspect of the foot. Position the foot into dorsiflexion while loading your thumbs down towards the floor. Feel for areas of maximum reciprocal tension in the ligaments and joint capsule. Maintain steady, balanced pressure until you feel a softening of the tension. Once a release has occurred, the talus will shift posteriorly allowing the ankle to re-center itself into a more neutral position.

Posterior Talus

Patient position:
Supine on a table

Therapist position:
Standing at the end of the table near the patient's feet



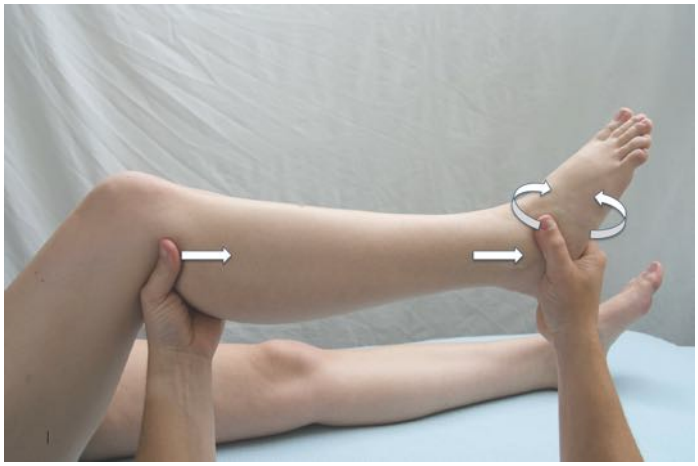
Technique:
Position the leg with a firm block under the posteriorly positioned talus. Place the palm of your distal hands across the distal tibia just superior to the talus. Compress the tibia directly down into the table. You will feel tension develop directly in the tibiotalar joint. Feel for areas of maximum reciprocal tension in the ligaments and joint capsule. Maintain steady, balanced pressure until you feel a softening of the tension. Once a release has occurred, the talus will shift anteriorly allowing the ankle to re-center itself into a more neutral position.

Fibula Technique

Patient position:
Supine on a table

Therapist position:
Seated, facing the side of the table, at the level of the affected knee

Technique:



Treatment described is for the right leg. With your patients' right hip flexed, bring their knee to approximately 90°, slightly externally rotating the femur. With your left arm, rest your elbow flexed at 90° on to the table, allowing your thumb to contact the posterior superior portion of the fibular head. With your right hand, grasp the calcaneus. As your right hand slowly inverts the foot and rotates the foot medially, the left thumb feels for tension in the connective tissues surrounding both ends of the fibula and the interosseous membrane. The left thumb draws the proximal head of the fibula inferiorly and anteriorly towards the foot with the actions of the right hand. Feel for areas of maximum reciprocal tension in the connective tissues. Once an area of tension has been identified, maintain steady, balanced pressure until you feel a softening of the tension. Once a release has occurred, the tissues will feel more relaxed and move more freely.

Interosseous Membrane

Patient position:
Side lying on a table

Therapist position:
Standing, facing the side of the table, at the level of the lower leg

Technique:

Strains in the interosseous membrane between the tibia and fibula affect both the knee and ankle. Position your patients' leg onto a pillow, so that the fibula is directly overtop of their tibia, the foot should be in neutral position. Using your perceptive palpation assessment, gently compress your hands down into the table through the fibula, into the interosseous membrane. Feel for areas of maximum reciprocal tension in the interosseous tissues. Once an area has been identified, gently compress through your hands into the interosseous membrane, compressing the fibula closer to the tibia. Not a lot of pressure is required to disengage the tissue. Maintain steady, balanced pressure until you feel a release of the tension.

Common Mistakes/ Do's and Don'ts

Don't

Do not think that this is a cure.

We are just changing the environment of the body to increase it's functioning.

"It's not perverted function but a wrong environment that results in the distorted appearance of function. Function is always true to its environment. Function is dependent upon its environment. Therefore, any change in any part of the environment that is not in tune or balance will apparently distort the function of the matter so involved."

– Thomas Schooley, DO

Do

Remember your principles:

Disengage, Exaggerate, Balance

Acute, Sub-acute, Chronic

Listen and follow the tissues/body

Don't

Over treat your patients with this technique tomorrow.
Risk of harm
Can be too much change for the patient in one session

Don't

Rush through the barrier.

Do

Direct and Indirect Techniques
Listen and feel for the RECIPROCAL TENSION in the tissues.

Don't

Work quickly.

Do

Slow down!

"The quieter the mind
The stiller the hands
The less movement we make
The more we are able to perceive involuntary movement"
– James Jealous, DO

Don't

Treat on hardware you have never seen before
get x-rays, CT/MRI reports

Don't

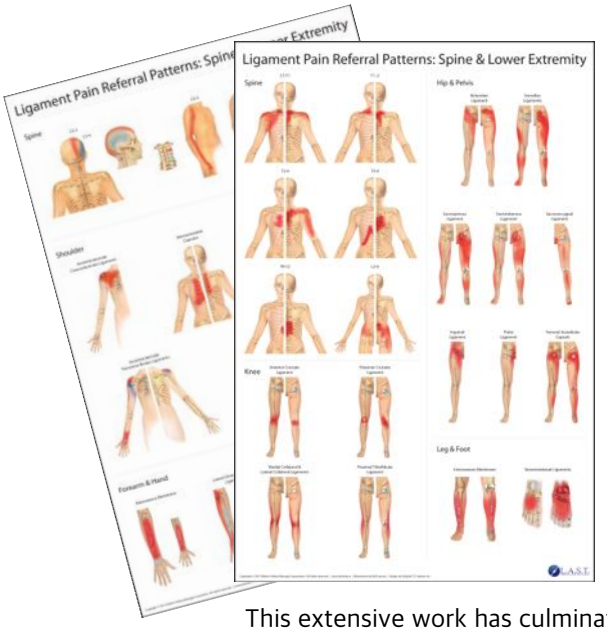
Think you will be proficient in this technique immediately!
It takes time and Patients! LOTS of patients - 500-1000!

Do you feel Overwhelmed?

1st Thing to do!

Incorporate 1-2 techniques/patient/treatment to start.
Don't over treat - It can be too much for the patient to handle!

Ligament Pain Referral Pattern Posters



These visually stunning, full-color posters are an invaluable diagnostic and educational tool for you and your patients.

Over the last 20yrs I've recognized a distinct, immediate and ongoing problem. My patients were complaining of pain referral patterns that didn't seem to match up with the standard trigger points, dermatome or sclerotome patterns.

For years I researched scientific journals and resources all the while continually charting the referral patterns described to me by my patients.

This extensive work has culminated in my creation of this set of LIGAMENT PAIN REFERRAL PATTERN posters!

This stunning artwork is original and doesn't exist anywhere else!

These 2 posters graphically demonstrate over 40 ligament pain referral patterns
for: Spine & Upper Extremity, Spine & Lower Extremity

Multiple referral patterns are displayed for each region of the body; Spine, Shoulder, Forearm & Hand, Hip & Pelvis, Knee, Leg & Foot.

If you have patients complaining of referred pain that you just can't figure out, if you treat joint dysfunction and want to explain more in depth the discomfort your patients are feeling, if you want to a add more value to your practice and your patients… these posters will be an asset!

These visually stunning, full-color, high glossy charts are an invaluable diagnostic and educational tool for you and your patients.

Help your patients visually see the cause of their complaints!

To order now simply go to www.lastsite.ca.

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Thorax Techniques

Techniques for Shoulder

Techniques for Hip & Pelvis

Techniques for Foot, Leg & Knee

Techniques for Sternum

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Techniques for Knee

Techniques for Hip & Pelvis

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The clinical observation of muscle energy techniques and ligamentous articular strain in 2 cases of cervical disc herniation with thoracic outlet syndrome

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CASE REPORT

The clinical observation of muscle energy techniques and ligamentous articular strain in 2 cases of cervical disc herniation with thoracic outlet syndrome

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KEYWORDS
Thoracic outlet syndrome;
Cervical disc herniation;
Muscle energy technique;
Ligamentous articular strain

Abstract This case report presents two successful treatment outcomes of cervical disc herniation (CDH) with thoracic outlet syndrome (TOS) treated using manual therapy technique of the muscle energy technique (MET), ligamentous articular strain (LAS) and additional herbal medicine intake, acupuncture and pharmacopuncture sessions. Significant improvements were reported in the outcome measures at admission and at discharge for Visual Analogue Scale (VAS) and Neck Disability Index (NDI) scores and physical examinations followed by approximately three weeks of hospital admission. The successful outcomes suggest that integrative conservative management focused on muscle energy techniques (MET) and ligamentous articular strain (LAS) are effective in contributing to the conservative management of cervical disc herniation (CDH) with thoracic outlet syndrome (TOS).

Introduction

Thoracic outlet syndrome (TOS) is a relatively rare condition prevalent in 8% of the general population[1,2] whereas cervical disc herniation (CDH), a leading medical concern in the adult population,[3–5] has a prevalence of over 3.3 cases per 1000.[6] In CDH, neurological symptoms typically present concurrently with TOS,[2] making diagnosis difficult and demands both objective and subjective examinations.[7–9] CDH causes structural anomalies and medical imaging is often beneficial

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1746-0689/

in establishing the diagnosis. TOS is defined as a complex condition involving the compression of either neurological or vascular elements passing through the thoracic outlet. The subclavian vein, artery and lower part of the brachial plexus are often involved[10–13] manifesting symptoms including pain, numbness and other related symptoms.[10] These symptoms are often aggravated by movement of the shoulder, cervical spine and head or by raising the upper limbs.[10]

Anatomically, the subclavian artery, subclacian vein and the lower part of brachial plexus travel through the thoracic outlet[14] and different clinical signs are observed depending on the affected site. Neurogenic TOS mostly presents with neurological symptoms, such as paraesthesia, weakness in the upper extremities, and pain. In cases where vascular elements are involved, symptoms of pallor, paraesthesia and coldness are often present due to arterial ischaemia in arterial TOS, and swollen upper extremities and cyanosis due to subclavian vein obstruction are observed in venous TOS.[15]

The overlapping signs and symptoms of CDH and TOS lead to issues with the differential diagnosis in many cases, as well as issues with the selection of treatment approaches. No reports have been presented on the effect of Muscle Energy Technique (MET)[16] and LAS (Ligamentous Articular Strain)[17] for the treatment of CDH with associated TOS. The two cases in the present paper had previously undergone injection therapies, medications and other medical treatments for their CDH with associated TOS. Although no improvement was reported with these medical approaches, significant improvement was observed with manual therapy using MET and LAS. This case report presents two cases of the management of CDH with TOS using these two techniques.

Clinical history

Case 1

A 49-year-old female presented complaining of posterior cervical pain with right arm pain and numbness (Fig. 1) following an accident that

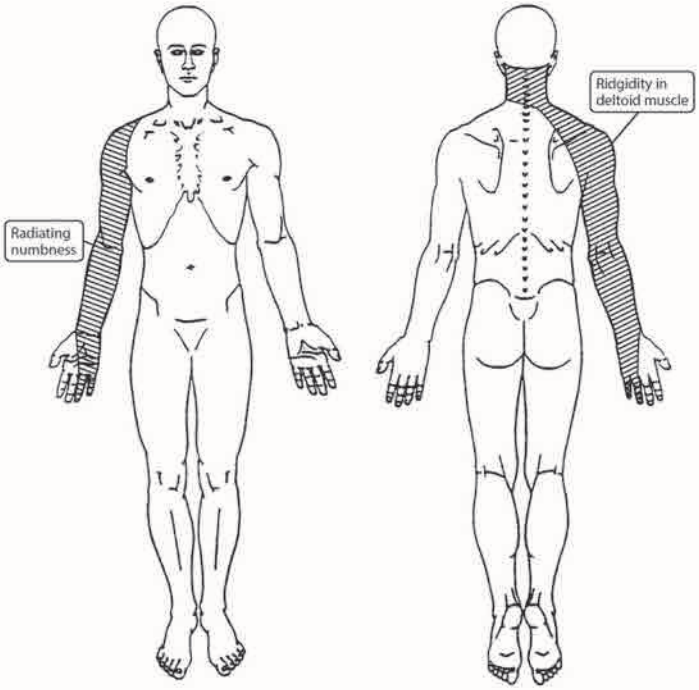

Fig. 1 Body chart – case 1.

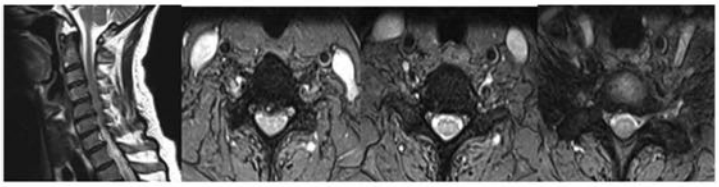

Fig. 2 C-spine MRI: C3/4/5/6/7 HIVD & stenosis.

involved bumping into a glass door which occurred 10 months prior to her initial visit. The cervical spine x-ray, CT and MRI scans revealed CDH with stenosis at C3/C4, C4/C5, C5/C6 and C6/C7 (Fig. 2). She was hospitalised at a local hospital for 3 days where she received traction therapy, injections, medications and nerve block injection therapy. Some improvements were observed initially but the pain remained. The patient was subsequently admitted to Jaseng Hospital of Korean Medicine[36] for 21 days. At admission, the patient reported a VAS score of 10 and a NDI score of 30. Cervical spine range of motion (ROM) testing revealed restrictions in right lateral bending of 20° (normal >45). She complained that her pain was worse at night and indicated on the NDI that she was averaging 4 h of sleep per night. Positive findings in all three physical examinations were reported (Spurling test, Adson's test and Roos test). Cervical spine x-ray (Fig. 3) revealed a narrowing of the disc space, posterior marginal spurring and degenerative endplate change at C4/5, C5/6 and C6/7. At discharge, the patient reported a VAS score of 2 and a NDI score of 21. Normal c-spine ROM and negatives in all physical examinations were reported. At discharge, she reported significant reduction in pain and her sleep was no longer affected. The c-spine ROM was reported as normal and all physical examinations reported negative.

Case 2

A 35-year-old male patient presented with posterior cervical pain left arm numbness and pain (Fig. 4) which was worse at night. The symptoms were initially triggered spontaneously from daily life, three months prior to his first visit to a local hospital. C-spine MRI revealed CDH and he received physiotherapy for 20 days, three times at the hospital. Then he was hospitalised and received 3 sessions of nerve block injection therapy and traction therapies. The pain remained and he was admitted to Jaseng Hospital of Korean Medicine[36] and received the treatment for 24 days.

At admission, the patient reported a VAS score of 10 and a NDI score of 30. C-spine ROM reported a limitation in left lateral bending of 35° (normal <45°). A positive Spurling test, Roos test and a positive on the left side in Adson's test were also reported. C-spine x-ray (Fig. 5) revealed straightening of the c-spine. The c-spine MRI scan (Fig. 6)

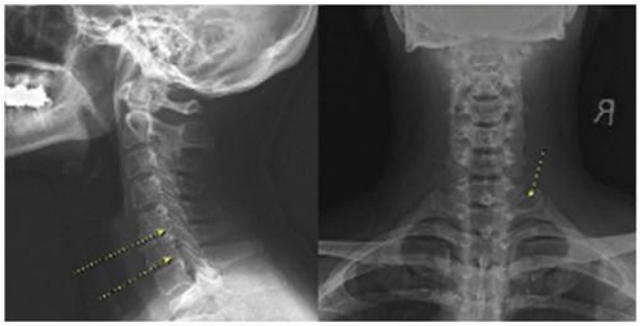

Fig. 3 C-spine x-ray (lateral): disc space narrowing, posterior marginal spurring and degenerative endplate change at C4/5, C5/6 and C6/7.

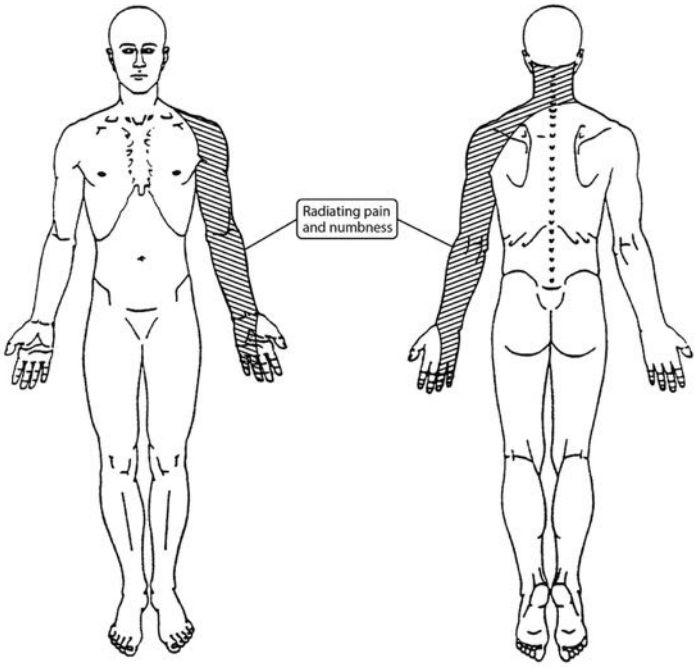

Fig. 4 Body chart – case 2.

revealed disc herniations at C-2/3, C3/4, C4/5 and C5. At discharge, the patient's VAS score was 2 and the NDI score was 27. Negatives were reported in all three physical examinations (Spurling test, Adson's test, and Roos test).

Examinations

There are no definitive guidelines for the diagnosis of TOS and as such, a combination of both physical examination and diagnostic imaging may be

Fig. 5 C-spine x-ray (lateral): straightening in c-spine.

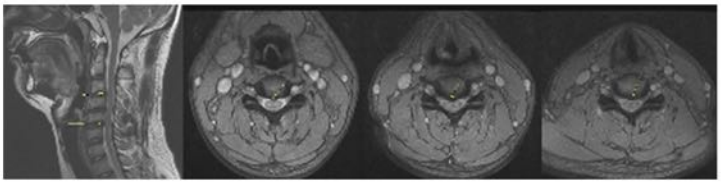

Fig. 6 C-spine MRI: C2/3, C3/4, C4/5 and C5/6 mild central disc protrusion.

required.[18] In the two cases, the physical examination included Spurling's test, Adson's test, and Roos test. All tests were positive in both patients at admission[19] and negative responses at discharge. Spurling's test involves a combination of cervical rotation and flexion with compression and a positive response is generally suggestive of CDH.[2,20] Positive responses with both Adson's test and Roos test are suggestive of TOS.[15,21] Adson's test[2] requires the rotation and extension of the cervical spine towards dysfunctional side while the assessor laterally rotates, abducts and extends the patient's shoulder monitoring the patient's radial pulse. Positive indication was observed with the changes in the pulse. Roos test required the patient to open and close both hands repeatedly with the arms positioned in abduction and extension for 30 s–3 min. Aggravation of the existing symptoms was observed in both cases presented here therefore both tests were considered positive.[2]

Outcome measurements

The Visual Analogue Scale (VAS)[22,23] and Neck Disability Index (NDI)[24] were administered both at admission and discharge to measure the degree of pain and evaluate functional changes. The VAS is the most commonly used self-report subjective scale for measuring the degree of pain experienced by a patient.[22–24] VAS scores range from 0 to 10, with 0 being no pain and 10 being the severest.[22] The NDI assesses the impact of cervical spine pain on a number of activities of daily living.[25,26]

Treatments

Manual therapy

The two cases that are the subject of the current report presented at the Jaseng Hospital in Korea. The hospital provides both western and Korean medical services. Patients are offered a standardised treatment package that consists of manual therapy, and additional Korean medicine treatments on a regular basis. Upon the diagnosis of a patient's condition, the treatment approach is specifically tailored for the patient.

Both patients received manual therapy sessions every two or three days a week for approximately 20 minutes per session. MET and LAS were performed as the main techniques with additional treatments including herbal medicine, acupuncture and pharmacopuncture. MET and LAS were applied specifically targeting the scalene muscles, ascended first rib and the cervical vertebrae. The following techniques were repeated throughout the entirety of the patient's hospital stay.

Muscle energy technique (MET)

MET is a manual therapy technique[16] that has been practiced by many physicians in different clinical fields, and is often used for treating muscle weakness and shortening, restricted joint range of motion, and other related problems.[28] MET requires accuracy and precision in the diagnostic process, and is based on a biomechanical system that assesses restriction of functional movement.[28]

MET for the treatment of neck related symptoms was performed targeting the scalene muscles and it was repeated for 3–5 times at each session until no further increase in range of motion (ROM) were observed.[29]

Ligamentous articular strain (LAS)

Ligamentous Articular Strain (LAS) is an osteopathic manipulative technique intended to restore normal functional and physiological movement of the tissues.[17] LAS targets the somatic dysfunction utilising compression or decompression of the joints and fascia to achieve this balance.[24]

To assess and treat the ascended first rib, the outer surface of the patient's cervical vertebrae and the costal surface of the first rib were palpated using the tips of both thumbs. Constant pressure was applied to the first rib until a sense of 'giving way' was achieved.[30]

For the cervical spine, the practitioners hands were placed under the both sides of the patient's base of the skull for support. The middle fingers were removed by approximately 0.5 inches and were placed on the patient's cervical dysfunctional site so that the tips of the fingers remained in contact with the area while moving the operator's fingers to the anterior and superior direction. Finally, the hands were bent slightly to pull the fingers towards the thumbs. Constant pressure was applied on the contact areas of the fingers until full relaxation was achieved.[30]

To address the anterior cervical fascia and the scalene muscle, the tips of both thumbs were placed on the patient's lateral side of supraclavicular fossa and pressed downwards towards the patient's legs. Constant pressure was applied and once the tissue had released, the thumbs were pulled outwards, towards acromioclavicular joint. Due to the sensitivity of this area, only minimal pressure is required to release the muscle. The release of the anterior cervical fascia also contributes to the release of the scalene muscle.[30]

Other treatments

Herbal medicine

120 ml of Chungpa-jeon (named GCSB-5) in decoction form was prescribed and taken three times daily. Chungpa-jeon is traditionally indicated for spinal disorders for the effects of anti-inflammatory[31] and nerve protection.[32]

Acupuncture

Acupuncture treatment was conducted daily on the local area to relieve tension in the muscles, and ligaments in the anterior and posterior neck and shoulder area. The selected acupoints were LI18, LI17, SI17, SI16, TE16, GB20, GB21, LI16, ST12, TE15. LI18 is between the anterior and posterior parts of the sternocleidomastoid muscle (SCM), at the level of the superior border of the thyroid cartilage, and LI17 is directly inferior to LI18, just posterior to the SCM. SI17 is posterior to the mandibular angle, in the depression directly anterior to the SCM, and SI16 is posterior to the SCM, at the level of the superior border of the thyroid cartilage. TE16 is posterior to the mandibular angle, in the depression directly posterior to the SCM. GB20 and GB21 are in the posterior neck and shoulder region; GB20 is inferior to the occiput, and between the origins of the SCM and trapezius, and GB21 is at the midpoint between the C7 spinous process and the lateral end of the acromion. LI16 is located in the depression between the acromial end of the clavicle and scapular spine, lateral to the suprascapular fossa. ST12 is situated in the depression superior to the clavicle, and TE15. TE15 is in the posterior scapular region, directly superior to the superior scapular angle.[33]

Pharmacopuncture

2 cc of Hwangryunhaedok-tang (HRHD-T) pharmacopuncture[34] was injected on the same selected acupuncture points three times daily. HRHD-T pharmacopuncture is used as an anti-inflammtory.[35]

Discussion

In both cases that are the subject of the current paper, CDH was confirmed by MRI scans. The common symptom across these two cases was interrupted sleep due to pain and numbness in the arm and hand. Neurological symptoms in CDH are frequently related to the neurological dysfunction around the central spinal structures, whereas in TOS, the symptoms are typically produced by compression of neurovascular structures in the periphery. Furthermore, TOS often causes the pain and numbness to continue throughout the night and day[38] and 'relaxation symptoms' are manifested when the compressed soft tissues are released.[39] Differentiating between CDH and TOS is difficult using the clinical history alone, and there are cases where CDH and TOS have concurrently occurred. Thus, careful consideration of the incidence of both CDH and TOS is required when the clinical symptoms are present in the upper extremities.

The two cases were diagnosed with CDH prior to their admission to Jaseng hospital of Korean Medicine. They both received standard medical treatments for CDH (nerve block therapy, medications, injections etc.) but no improvement was observed. We were able to speculate that TOS could be the cause of the presenting complaints due to the lack of response to the standard medical interventions, rather than identifying TOS according to the patients' clinical signs and symptoms. Orthopaedic examination suggested a diagnosis of TOS, and significant improvement was achieved through application of MET and LAS for the treatment of this condition.

MET and LAS were considered to be effective treatments for these two cases. MET was used to release the shortened scalene muscle to obtain

balance and relieve pain. The LAS[30] was specifically used to release the ascended first rib back and to release anterior cervical fascia. In the first case, a total of 11 sessions of MET and LAS were conducted once every two days for 21 days. In case 2, a total of 12 sessions of MET and LAS were conducted once every 2 days for 24 days. The interventions resulted in significant improvements in the VAS, NDI and in the three orthopaedic tests for TOS.

This report investigates only two successful treatment cases of CDH with TOS. Given this, as well as the use of other interventions, it is difficult to draw conclusions as to the effectiveness of MET and LAS. However the successful outcome presented here suggests that non-surgical approaches for CDH with TOS are worthwhile pursuing, because patients often respond to conservative treatments well enough to achieve significant improvement.[40]

Conclusion

Surgical approaches in the treatment of spinal disorders, particularly with symptoms in the upper extremities, are frequently observed in many practices. As a result, there are a number of published reports available discussing the surgical indications and approaches for cervical disc herniations, persistent cervical spine pain and persistent neurological changes in the upper extremity. There are however, few reports on the outcomes achieved through manual therapy approaches for the treatment of CDH with TOS. Further research is required into this area and the current case reports suggest that manual therapy may be a useful treatment approach when these conditions occur concurrently.

Conflict of interest

None declared.

Ethical approval

None declared.

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