Session II

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Navicular Sustentacular Descent Taken from Leaf

Spinal Extensor Muscle Weakness

Gait Test

Lateral Gait Testing:

Metatarsalgia

Ligament Interlink
Cutaneous Receptors and Scars

Iliacus

Ileocecal Valve

Signs and Symptoms of ICV:

Diagnosis:

Treatment of the Closed Type of Valve:

Pectoralis Minor

Retrograde

Right Lymphatic Duct
Session II

“Miracles are not contrary to nature, but only contrary to what we know about nature.” St. Augustine

Review Session I

• Ocular lock
  • Neurological disorganization
  • Where to start with patients
  • Eye movements
  • Should not weaken a strong indicator
    • If does, check the correlations that we discussed

• Gait
  • Upper Gait
    • Ipsilateral upper trap
    • Contralateral SCM
    • Both should inhibit when stepping forward into a gait position
    • If it does not, this an abnormal state neurologically
      • TL to find the area that restores the normal inhibition
  • Lower Gait
    • Piriformis should weaken on the side of the forward leg
    • If it does not then TL to find the area that restores the normal inhibition of the piriformis

• Shearing Injury
  • Primary mover
    • Weak in the clear
    • Will strengthen to O/I, Spindle Cell, GTO
  • Synergist
    • Strong in clear but will weaken after a 3 second maximal contraction
      • This is the Jones type of trigger point
      • The correction is fold and hold
  • Antagonist
    • Strong in clear but weaken to a gentle stretch
      • This is the Travell type of trigger point
      • The correction is to fascial flush the muscle toward the heart

• 5 Factors
  • Nerve
  • Neurolymphatic (Chapman)
  • Neurovascular (Bennett)
  • CSF
  • AMC
  • Nutrition

• Adrenals
  • Medulla
  • Cortex
P. L. U. S. (non-Gait mechanism)

The Swiss chiropractor, Fred Illi, of the National College of Chiropractic wrote extensively on spinal biomechanics through dissection and X-ray. One of the more prominent discoveries he made was that if the spine did not rotate with lumbar flexion, there was excessive tension placed on the spinal cord. If there was no rotation, the vertebral bodies would jam into each other. This rotation occurs because of inhibition of the piriformis. Illi showed this with an inflated finger cot placed under the cauda equina with little pressure placed on the cauda. If the lumbar spine was not allowed to rotate on flexion, the finger cot would “separate” into two parts. When the spine was allowed to rotate normally, then little or no traction was placed on the cauda and the cot did not separate. In fact, very little pressure was applied to the cot.

This principal was further developed by Goodheart and became a technique for determining if there are any hidden problems that are restricting normal spinal mechanics. Everyone, in a normal condition, will have the right piriformis inhibit at approximately 20 degrees of lumbar flexion. The same inhibition pattern occurs in extension. This pattern of muscular inhibition continues up the spine. The left latissimus, the left upper trapezius and the right sternocleidomastoid muscles inhibit at the same degree of lumbar flexion and extension.

When the inhibition pattern fails to occur, have the patient therapy localize to problems in the pelvis and the upper cervical area. When an uncorrected problem is found, the muscles will inhibit and test weak. Correct all problems that you find, and then repeat the testing procedure. This is an excellent tool to find hidden problems in the spine.

Procedure:

1. Test any muscle related to this pattern for strength in the clear:
   - **Right Piriformis** - Not the best muscle as the muscle test may change with the changes in flexion and extension of the trunk
   - **Left Latissimus**
   - **Left Upper Trapezius**
   - **Right SCM**
   - **Right Iliacus**

2. Have the patient flex their lumbar spine to 35°. The amount depends on the flexibility of the patients spine.

3. Test the related muscle, it should inhibit
   - If they do not, TL to where the dura attaches and fix what you find
     - Upper cervical, pelvis and possibly TMJ are where faults are normally found

4. Test the related muscle with 20° lumbar extension, they should inhibit
   - If they do not, TL to where the dura attaches and fix what you find
     - Upper cervical, pelvis and possibly TMJ are where faults are normally found

5. This procedure should be done in all possible positions
   - Seated, standing and prone

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Repeated Muscle Activation (RMAPi)

Dr. Goodheart found that many muscles that would give the physical signs that they were weak would test strong. However, after having the patient activate the muscle 10 times, these muscles would then test weak. The weakness pattern that is found is treated using the original origin-insertion pattern that Goodheart first described in 1964. The golgi tendon organ and muscle spindle cells block nociceptor input into the spinal cord, directly and indirectly.

Dr. Goodheart also found that choline or vitamin E could negate this pattern. In his writings, he refers to research first published in 1954 in the Journal of Nutrition showing that pantothenic acid and vitamin E are essential for the synthesis of acetylcholine from choline and acetate. He believed that the presence of the RMAPi pattern indicates that there is not enough available acetylcholine in the presence of a micro-avulsion of the tendon from the periosteum.

Over 90% of the patients showing this muscle weakness pattern showed occipital or spinal fixation patterns and therapy localization findings that he relates to cerebellar activity.

Procedure:
1. If a muscle is suspected to test weak but does not
   • Have the patient contract the muscle 10 times
2. If the muscle weakens it is a possible indication for this technique
   • Differentiate from aerobic/anaerobic muscle testing if the weakness occurs
3. Test the nutrition against the weakening pattern: Water, Wheat Germ Oil and Choline and in difficult cases Melatonin
4. The correction for the inhibition pattern is usually origin/insertion to the muscle that inhibits to the exercise

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Compaction Injuries

According to Leaf, there are two main types of injuries. Shearing, which has been previously discussed, and compaction. A shearing injury is any rotational type of injury to a joint. A compaction injury occurs when the joint is compressed in one direction. This is typically seen from a fall on an outstretched hand or arm.

In the compaction type of injury, the presenting findings are marked weakness of almost all muscles surrounding the joint. One or two muscles will test strong. Further testing will show that the “intact” muscle will weaken to repeated muscle activation. Hypothetically, the continued contraction of this muscle strains the attachments of the muscle so that upon repeated use of the muscle through its normal range of activity, it will result in a weakening effect. Treatment is then directed to the origin and insertion of this muscle. The pain normally associated with this type of treatment can be dramatically reduced by placing the involved muscle in its shortened position while performing a circular massage over the myotendinous areas.

In the compaction type of injury, the trauma is directed mostly to the joint itself. The stress effects mechanoreceptors and nociceptors in the joint structures. Biedert, Stauffer and Friederich investigated the occurrence of free nerve endings in the knee joint. They found that the density of type IV free nerve endings (nociceptors) was highest in the medial and lateral retinacula and the patellar ligaments. They concluded that the presence of these proprioceptive fibers is important in the active control of the patella and the rotation of the tibia and that injury to the mechanoreceptors found inside the joint capsule, especially the anterior cruciate ligament, results in knee instability. Repeated joint distraction apparently normalizes the afferent discharge of these articular receptors re-establishing the normal tone of the muscles.

Goodheart wrote in 1994 about the repeated muscle activation procedure, expanding upon the observation of Leaf, that a way to find hidden weakness patterns was to have the patient actively use the extremity ten times. Goodheart then developed a treatment protocol for treating this induced weakness pattern. Finding these muscles’ weakness pattern was not always easy. The observation that these patterns will always be found when the injury has occurred due to a compression of the joint has dramatically sped up the recovery of these patients.

Care must be taken to consider the related spinal areas and their effects on the total locomotion of the patient. Imbalances in the extremities tend to alter the gait and through this mechanism, the dura. Dural stress patterns are common to all types of injuries, especially those that alter the normal motion of the extremities during the various phases of gait.

As pointed out with RMAPi technique you must evaluate the occiput for a lesion if this pattern shows. Also, nutritionally you must evaluate for need of water, wheat germ oil, choline and in difficult patients, melatonin.

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Procedure:
1. Patient presents with a history of a compaction type of injury
   • Most muscles around the joint that is involved will test weak
   • Usually there is only one muscle that will test strong but there could be two
2. Traction the joint in the opposite direction of the compaction injury
   • This will turn on the previously inhibited muscles
   • This is the differential diagnosis from vascular insufficiency technique
3. Have the patient activate the previously strong muscle through its range of motion 10 times
   • If the muscle weakens this is further conformation that there is a compaction injury to this joint.
     • If the muscle weakens, differentiate from aerobic/anaerobic muscle weakness patterns
4. If weakness pattern after contraction is present, test nutrition for negation of the pattern
   • Nutrition: Water, Wheat Germ Oil, Choline and in difficult cases, Melatonin
5. The RMAPi (contraction of the previously strong muscle 10 times) will most likely be negated by O/I technique
6. Test for lesions in the spine at the occiput and sacrum. Also, check the nerve roots associated with the joint that is compacted.

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Pelvic Biomechanics

The bony pelvis creates the base of the spine and trunk. It provides support to the abdomen and acts as a linkage between the vertebral column and the lower limb. The pelvis is made up of three bony parts and three joints.

According to Kapandji, the bony anatomy consists of two iliac bones that are paired and symmetrical and the sacrum which normally consists of 5 fused sacral vertebrae. For clarification's sake, I will add in the ischium and pubic bones that make up the entire pelvis. The joints include two sacroiliac joints and a pubic symphysis. The pelvis as a whole resembles a funnel, with the wider base of the funnel superior and made up of the pelvic brim that is an attachment point for the abdominal muscles and forms the link between the pelvis and the abdomen. There is significant differences between the bony pelvis of the sexes. The female pelvis is broader, shorter and has a larger pelvic brim than that of the male pelvis. This is due to the fact that women are child-bearing and that human fetuses have large heads. Thus making the joints of the pelvis important in regards to the weight bearing spine.

The weight bearing nature of the spine transmits forces from the vertebral column to the lower limb. The weight supported by L5 is distributed equally along the ala of the sacrum and through the ischial tuberosities toward the acetabulum. Part of the reaction to striking of the ground is transmitted to the acetabulum with the other part being transmitted across the pubic ramus of the pubic bone. Interestingly, the forces from the femur meet at the symphysis pubis to counterbalance each other. If these forces aren’t equal, for example when the arch of the foot has fallen, then there will be a distortion of the pelvis. Meaning a subluxation in the pelvis is caused by a subluxation of the foot!

One of the most important parts of the pelvic structures for chiropractors or any one trained in the art of manipulation of the spine are the sacroiliac joints. The picture to the right comes from Kapandji, as do many of the pictures of biomechanics in this workbook. It is one of the best at describing the motion of the SI joint I have ever seen and describes perfectly why the listing of a PIEX and ASIN are normal.
This can be seen when we look at the conformation of the joint between the iliac bone and the sacrum. If we use the black X as the attachment of the sacroiliac ligament and the center of rotation for the SI joint and study the cross sections at the levels marked by Kapnadji, we can see at level (a), the upper SI is where a posterior subluxation normally occurs. We also see that the iliac portion is more like a rail and the sacrum is more like a divot this indicates that the PSIS will have to move into external rotation for normal biomechanics to hold true. If we look at level (c), where the anterior subluxation takes place, the PSIS must go into internal rotation!

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Category II/ Heel Lifts

Dr. Dejarnette classified three different types of sacroiliac problems. The Category II is an osseous misalignment between the ilium and sacrum. Dr. Dejarnette was a contemporary of Dr. Goodheart Sr. and this led Dr. Goodheart Jr. to be very interested in the SOT Categories. The Category II lesion may be corrected with an osseous adjustment or blocking procedure.

**Indications:**
- The patient may have lateral sway
- Can be associated with a spheno-basilar fault

**Therapy Localization:**
- With the patient in a supine position, the patient contacts first one sacroiliac joint and then the other and a strong muscle is tested for weakening (one hand to one joint)
- In SOT technique, they talk about the arm fossa test. This is a test of a straight arm and therapy localization to the inguinal ligament,
  - The upper portion (fossa) of the ligament (by the ASIS)
  - The lower portion (fossa) of the ligament (by the pubic bone)

**Pl ilium**
- Will show tenderness at the insertion of the sartorius and gracilis as well as the first rib head
- Will also show a short leg
- Weakness of the sartorius, gracilis or rectus femoris should be expected
- Upper fossa weakening on the arm fossa test
- Involves the upper SI joint
- Flexion malposition of the pelvis

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**AS ilium**
- Will show tenderness on the lower IT band above the knee, as well as the first rib and obturator foramen.
- Weakness of the biceps femoris and the vastus lateralis and occasionally abdominal weaknesses
- Lower fossa weakening on the arm fossa test
- Will show long leg
- Involves the lower SI joint
- Extension malposition of the pelvis

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• **In Ilium**
  - Weakness of the transverse and oblique abdominals
  - The weakness of the arm fossa test will be negated by a breath held **out**

• **Ex Ilium**
  - Weakness of the gluteus medius/minimus
  - The weakness of the arm fossa test will be negated by a breath held **in**

**Correction:**
  - May be done osseously with a high velocity adjustment or with blocks
  - Osseously: Challenge and adjust as normal

**Blocking Procedure:**
1. TL the entire SI joint against a strong indicator muscle. This finds the side of lesion.
2. With weakening of indicator muscle
   - Test possible associated muscle for AS or PI
   - Perform arm fossa test to determine upper or lower fossa weakness
     - UMS: Upper fossa, Medial knee pain, Short Leg = PI
     - LLL: Lower fossa, Lateral thigh pain, Long Leg = AS
   - If all aspects correlate then continue to the correction
3. Osseously adjust in the normal fashion
   - If a breath held on inspiration negates the arm fossa test then an EX is indicated
   - If a breath held on expiration negates the arm fossa test then an IN is indicated
4. SOT blocking procedures are powerful non-traumatic way to correct this problem
   - Place the involved side block first
     - PI side: the block will be placed at the level of the PSIS at 90° to the spine
     - AS: side the block will be paced at the level of the ischial tuberosity at approximately 45° to the spine “facing” the opposite block
   - This should negate the arm fossa test
5. The procedure is complete when all arm fossa test are weak
   - Both blocks should be removed simultaneously

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Neck Extensors
Meridian: Stomach (Sinus)

Origin:
- Splenius capitis: Mastoid & lateral nuchal line
- Splenius cervicis: Transverses C1 to C4
- Semispinalis capitis: Between the superior and inferior nuchal lines
- Semispinalis cervicis: Spinouses of C2 to 5

Insertion:
- Splenius capitis: Spinouses C7 to T3
- Splenius cervicis: Spinouses of T3 to 6
- Semispinalis capitis: Transverses C7 to T6 & the articular processes C4 to 6
- Semispinalis cervicis: Transverses T1 to 6

Nerve Supply:
- Splenius Capitis: C4-6
- Splenius Cervicis: C5-8
- Semispinalis Capitis: C1-6
- Semispinalis Cervicis: C6-8

Neurolymphatic Reflexes
- Anterior: First intercostal space three inches lateral to the sternum
- Posterior: Lamina of the axis

Neurovascular Reflexes: Ramus of the mandible

Action: Bilaterally, these muscles extend the cervical spine and the head. Unilaterally, they cause rotation and lateral flexion of the neck

Indications: Hyperextension/hyperflexion type injuries. Peripheral nerve and vascular entrapments. Numbness of the arm. Decreased cervical range of motion. Bilaterally, the head is carried in a forward position.

Body part position: The neck is extended and then the head is extended on the neck. To test both sides, the head is kept in a neutral position. To isolate each side, the head is rotated fully left and right.

Stabilization: The non-testing hand is placed in front of the head to catch it in case of weakness

Vector of Force: Pressure is applied against the occipital bone at a tangent to the arc created by the motion of the head and neck

Nutrition: B6-Niacinamide

Notes:__________________________________________________________________________
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Popliteus

Meridian
- Gall Bladder

Origin:
- From the lateral condyle of the femur, the joint capsule of the knee, the lateral meniscus and the head of the fibula

Insertion:
- Into the medial posterior surface of the tibia superior to the soleal line

Nerve Supply:
- L4 & 5; S1

Neurolymphatic Reflexes
- Anterior: Fifth intercostal space from the mid-mammillary line to the sternum on the right
- Posterior: Intertransverse space between T5 & 6 on the right

Neurovascular Reflexes
- Medial aspect of the knee over the medial meniscus

Action:
- Rotates the tibia medially when the femur is fixed. Rotates the femur laterally when the lower leg is fixed. On heel strike, the muscle contracts to unlock the knee to absorb shock. When the knee is flexed, the muscle pulls the lateral meniscus, withdrawing it.

Indications:
- Chronic knee instability. Hyperextension of the knee. Pain or instability on rotation on the knee. The subject will stand with the knee in hyperextension or with the knee flexed.

Body part position:
- The knee is flexed at 90 degrees and the foot is maintained at 90 degrees in relation to the tibia. The tibia is then fully medially rotated.

Stabilization:
- None actively provided

Vector of Force:
- Pressure is applied to the foot to rotate the tibia laterally.

Nutrition:
- AF-Betafood, Betafood, Zypan, Betaine Hydrochloride, Cataplex A, Cholaplex

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Deltoid
Meridian: Lung
Origin:
  • Anterior: Lateral ⅓ of the clavicle
  • Middle: Acromion process
  • Posterior: Lateral aspect of the spine of the scapula
Insertion: Deltoid tubercle of the humerus
Nerve Supply: C5 & 6, (Axillary nerve)
Neurolymphatic Reflexes
  • Anterior: Third intercostal space at the costal - sternal junction
  • Posterior: Intertransverse space between T3 & 4
Neurovascular Reflexes: Located over the bregma
Action:
  • Abduction of the humerus. Anterior and posterior portions aid in flexion and extension. The anterior and posterior sections can function synergistically with each other or in an antagonistic fashion.
Indications:
  • Shoulder instability. Decreased shoulder range of motion. Acromioclavicular strain.
Body part position:
  • The arm is abducted 90 degrees and the elbow is flexed
Stabilization:
  • The hand is placed over the shoulder joint
Vector of Force:
  • Force is applied to adduct the arm
Nutrition:
  • Cataplex C, Pneumotrophin PMG, Emphaplex, Beta carotene, RNA
Deltoid, Anterior
Body part position:
  • The arm is abducted 90 degrees and the elbow is flexed.
  For the anterior section the humerus is rotated externally 45 degrees and then flexed 20 degrees.
Stabilization:
  • The hand is placed over the shoulder joint
Vector of Force:
  • Force is applied posterior inferior along forearm
Deltoid, Posterior
Body part position:
  • The arm is abducted 90 degrees and the elbow is flexed.
  The humerus is placed in 45 degrees internal rotation and 15 degrees extension.
Stabilization:
  • The hand is placed over the shoulder joint
Vector of Force:
  • Force is applied anterior inferior along forearm
Serratus Anterior

Meridian
- Lung

Origin:
- Arises from the lateral and superior surfaces of the upper nine ribs

Insertion:
- Inserts into the costal surface of the vertebral border of the scapula from the superior angle to the inferior angle

Nerve Supply:
- Long thoracic nerve. Upper fibers from C5, middle fibers from C5 & 6, lowest fibers from C6 & 7.

Neurolymphatic Reflexes
- Anterior
  - Third, fourth, and fifth intercostal space at the costal - sternal junction
- Posterior
  - Intertransverse space between T3 & 4, 4 & 5 and 5 & 6.

Neurovascular Reflexes
- Bregma

Action:
- Stabilizes the scapula during flexion and abduction. The lower fibers rotate the scapula around the glenoid fossa.

Indications:
- Instability of the shoulder. Difficulty raising the arm. Pains on forced inspiration. Patient may breath with short shallow breaths. In raising or lowering of the arm, there is rapid quick aberrant motion of the scapula at 30 - 40 degrees of elevation.

Body part position:
- The elbow is extended and the arm is flexed between 100 to 160 degrees and abducted 30 degrees. Contact over the lower arm just superior to the wrist.

Stabilization:
- The inferior angle of the scapula is cupped with the thumb and the index finger. These are used to feel for any motion of the scapula that occurs during the test.

Vector of Force:
- Pressure is applied against the forearm in an inferior direction. Movement is felt for at the inferior angle of the scapula.

Nutrition:
- Cataplex C, Pneumotrophin PMG, Emphaplex, Beta carotene

Notes:
Coracobrachialis

Meridian:
- Lung

Origin:
- Arises from the tip of the coracoid process of the scapula
  Insertion: Inserts into the medial border of the humerus
  opposite the deltoid tubercle

Nerve Supply:
- C6 & 7, Musculocutaneous nerve

Neurolymphatic Reflexes
- Anterior: Second, third and fourth intercostal space
  at the costal - sternal junction
- Posterior: Intertransverse space between T3 & 4

Neurovascular Reflexes
- Bregma

Action:
- Contraction causes flexion and adduction of the arm. It aids in stabilizing the head of the humerus in the glenoid cavity. Indications: The subject will complain of difficulty combing the back of the head

Body part position:
- The person is asked to place the arm so as to comb the back of their head

Stabilization:
- The shoulder is supported with a broad contact

Vector of Force:
- Pressure is applied at a tangent of the arc created by moving the humerus. The force will carry the humerus in a posterior and inferior direction.

Nutrition:
- Cataplex C, Pneumotrophin PMG

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Teres Major

Meridian
- Governing Vessel (Spine)

Origin:
- Arises on the scapula from an oval area starting near the inferior angle running up the lower \( \frac{1}{3} \) of the axillary border

Insertion:
- Inserts into the lesser tubercle of the humerus along with the fibers of the latissimus dorsi

Nerve Supply:
- C5,6, lower scapular nerve

Neurolymphatic Reflexes
- Anterior: Second intercostal space 2 inches from the sternum
- Posterior: Intertransverse space between T2 & 3

Neurovascular Reflexes
- Temporal bone just posterior to the greater wing of the sphenoid

Action:
- The teres major assists in internal rotation, adduction and extension of the humerus

Indications:
- The patient may complain of pain in the posterior aspect of the shoulder when raising the arm up and forward. Weakness can cause the arm to rotate so that the palm is facing forward.

Body part position:
- The elbow is flexed 90 degrees; the arm is internally rotated. The dorsal surface of the hand is placed over the posterior iliac crest. The arm is then maximally extended.

Stabilization:
- Unilateral test, pressure is applied over the opposite rib cage. Bilateral test, the opposing muscle test serves as the stabilization.

Vector of Force:
- Pressure against the elbow in a direction of abduction and flexion

Nutrition:
- (Alkaline and acid imbalances = Kelp, Zinc, Magnesium, Potassium), Organically bound Minerals, Zinc liver chelate, Chezyn, Trace minerals B12

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**Mid Trapezius**

**Meridian:**
- Spleen

**Origin:**
- Arises from the spinous processes of the sixth cervical to the third thoracic vertebrae

**Insertion:**
- Into the acromion process and into the spine of the scapula

**Nerve Supply:**
- C2, 3 & 4 (ventral ramus), Spinal accessory nerve

**Neurolymphatic Reflexes**
- Anterior: Seventh intercostal space at the rib cartilage junction on the left
- Posterior: Intertransverse space of T7 & 8 on the left

**Neurovascular Reflexes**
- 1 inch or 2 cm above the lambda

**Action:**
- Assists in flexion and abduction of the humerus by rotating the glenoid cavity. Assists in maintaining the normal upper thoracic posture. Along with the latissimus, it supports the scapula inferiorly.

**Indications:**
- In the standing position, the person will have a forward rotation and elevation of the scapula causing a rounded shoulder appearance. The thoracic spine may appear to have an increased kyphotic curve. Protraction of the scapula.

**Body part position:**
- The arm is abducted to 90 degrees with the elbow extended and the humerus externally rotated. Head rotates to the test side.

**Stabilization:**
- Against the scapula

**Vector of Force:**
- Pressure is directed anteriorly

**Nutrition:**
- Cataplex C, Calcium Lactate, SpleenPMG, Whole desiccated Spleen, Immune support: Congaplex, Immuplex

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Lower Trapezius

Meridian
• Spleen

Origin:
• Arises from the spinous processes from the third thoracic to the twelfth

Insertion:
• Inserts into medial aspect of the spine of the scapula

Nerve Supply:
• C2, 3 & 4 (ventral ramus), Spinal accessory nerve

Neurolymphatic Reflexes
• Anterior: Seventh intercostal space at the rib cartilage junction on the left
• Posterior: Intertransverse space of T7 & 8 on the left

Neurovascular Reflexes
• 1 inch or 2 cm above the lambda

Action:
• Assists in flexion and abduction of the humerus by rotating the glenoid cavity. Assists in maintaining the normal upper thoracic posture. Along with the latissimus it supports the scapula inferiorly.

Indications:
• In the standing position, the person will have a forward rotation and elevation of the scapula causing a round shoulder appearance. The thoracic spine may appear to have an increased kyphotic curve. Protraction of the scapula.

Body part position:
• The arm is extended until the scapula closely approximates the spine. The arm is abducted to 130 degrees with the elbow extended and the humerus externally rotated. Head rotates to the test side.

Stabilization:
• Against the scapula

Vector of Force:
• Pressure is directed anteriorly in a direction that would end up with the arm in front of the face

Nutrition:
• Cataplex C, Calcium Lactate, SpleenPMG, Whole desiccated Spleen, Immune support: Congaplex, Immuplex

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Fixations

In general, we may say that a subluxation is a vertebra that is stuck out of place and a fixation is a group of vertebra that are stuck in place. When comparing fixations to subluxation:

Subluxation:
- Involves one specific vertebra
- Has no reliable muscle weakness pattern
- TL will weaken a strong indicator
- Will challenge with a single point of contact
- Can be observed on static X-Ray
- Can be adjusted with a single point contact

Fixation:
- Minimum of two structures involved with restricted movement between them
- Specific bilateral weakness patterns can be found
- Will only TL with motion to a strong indicator muscle. Will strengthen the associated bilateral muscle with TL to the associated area.
- Two vertebra should be challenged at the same time
- Requires a two handed contact for correction

There are specific muscle weakness patterns that can indicate fixations at different spinal levels. These muscle correlation are:

- Bilateral Psoas: Occipital Fixation
- Bilateral Gluteus Maximus: Upper Cervical Fixation C1-3
- Bilateral Popliteus: Mid-Cervical Fixation C3-6
- Bilateral Deltoid: Cervical-Thoracic Fixation C6-T1
- Bilateral Teres Major: Thoracic Fixation T1-12
- Bilateral Lower Trapezius: Thoacolumbar Fixation T11-L2
- Bilateral Neck Extensors (tested Together): Lumbar Fixation L1-5
- Bilateral Neck Extensors (tested Individually): Sacral Fixation
- Unilateral Neck Extensors: Sacoiliac Fixation
- Unilateral Teres Major: Lumbosacral fixation
- Bilateral Toe Flexors: Rib Head Fixation
- Unilateral Hamstrings tested supine: Occiput Atlas Fixation
Diagnosis:
- When you discover one of the weakness patterns, have the patient TL the area of the spine that is possibly related to the weakness
- If the pattern strengthens then the fixation pattern is confirmed
  - A fixation will weaken a strong indicator muscle but the TL must be done with motion induced into the fixation complex

Treatment:
- The fixation complex requires a two point contact for correction
- To correct the fixation, find the top vertebrae of the fixation complex through motion palpation
  - There may be 2-10 vertebra associated with the complex (it is usually just 3)
  - Since a fixation requires a two contact correction we must determine whether to correct the complex from the “top” or “bottom” of the stack
- Using the top vertebra as our indicator we use our motion palpation skill to determine where to adjust
  1. Push the spinous process R → L and L → R
     - This will help to determine which way the vertebra is rotated
  2. If the vertebra moves easily R → L and is hard L → R
     - The spinous is rotated left and the body is posterior on the right
  3. Next push P → A on the right and left facets
     1. The facets that are most stuck are the side we use to determine which end of the complex to use to adjust
     2. If the facets are more stuck on the side of the posterior rotation of the BODY then you adjust from the top of the complex
     3. If the facets are more stuck on the side opposite the posterior rotation of the body rotation we must use the bottom of the complex
        - We must go to the bottom of the stack because we cannot push the stuck side more anterior
     4. If the motion palpation indicates that the complex must be adjusted from the top, then the superior vertebra is contacted with one hand and the vertebra just inferior to this is contacted with the other hand. A sharp thrust is given using both hands. This breaks the fixation pattern.
     5. The bottom of the stack will be corrected in a similar fashion with the exception that the bottom vertebra and the one above will be contacted

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**Sacral Fixation:**

**Discussion:**

A sacral fixation is a bilateral sacroiliac fixation. It is easily found by its bilateral weakness pattern of the neck extensors when tested in rotation. When this bilateral muscle weakness pattern is found, the muscles will test strong if the patient is asked to therapy localize to the sacral/iliac articulation.

The fixation is challenged by contacting the anterior ilium and applying pressure to the sacrum against the sacral tubercles. The pressure should be done so that your two hands are pulling towards each other.

There will usually be an involvement of the piriformis and/or iliacus on the side of the correction or possibly bilaterally.

**Procedure:**

1. Test for the weakness pattern of a bilateral neck extensor weakness when tested in full rotation
2. If found, have the patient therapy localize to the sacral/iliac articulations and retest for strengthening
3. Apply pressure against the sacral tubercles in a lateral direction. There will be more motion or a feeling of motion either left to right or from right to left. The opposite direction will feel firm with no motion.
4. As in the spine, apply anterior pressure over the sacrum on the left and right sides. Remember that the sacrum will move easily towards the side of fixation and resist motion away from the side of fixation. The side that resists anterior pressure is the side that will need correction.
5. If the side of correction is the side that the tubercles moved easily towards, place the patient in a side lying position with the involved side down. The adjustment is made against the lower side of the sacrum (the table holds the ilium in position) by making a firm contact and rolling the patient’s shoulder to apply torque through the spine to the sacroiliac joint.
6. If the resistance to anterior pressure is on the side opposite the one that the tubercles easily move, the patient is kept prone on the table. A contact is made of the sacrum over the areas that resisted the anterior pressure thrust is given along the line of the sacroiliac articulations.
7. Retest on weight bearing. If the fixation returns, it may indicate the need for octacosanol (wheat germ oil), an antigravity factor.

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C7/1st Rib Fixation (Limbic Fixation)

A limbic fixation is a common fixation pattern between C7 and the 1st rib, that can cause the return of other fixations.

Therapy Localization

As with other fixations, this fixation this pattern will weaken a strong indicator muscle only with motion induced into the fixation complex.

Therapy localize to the first rib head and the seventh cervical. Testing should be negative.

Have patient rotate the head fully and retest. Positive therapy localization should be found if the fixation pattern exists.

Related Muscle Weakness

Many times all the muscles of one ankle will test weak
- Peroneus longus/brevis
- Peroneus tertius
- Tibialis posterior
- Tibialis anterior

Challenge

- Contact the spinous of the seventh cervical with one hand and the first rib with the other hand. Pressure is applied as to separate them. A strong muscle is tested for weakening.

Correction

- The two structures need to be separated. This can be done with a two hand thrust. This is sometimes difficult, but can be accomplished by quickly thrusting the seventh cervical away from the rib head and then quickly thrusting the rib away from the seventh cervical.
- I typically find that is perfectly acceptable to adjust the rib and 7th vertebra individually.

Lower Limbic Fixation

Apply the same procedure to the 12th rib and 1st lumbar using the same TL, challenge, and correction.

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Weight Bearing

Muscle testing may have to be done in a standing position. If symptoms tend to be present only on sitting or standing, then test the patient while they are in the specific position. Care must be taken to establish that the patient is not just showing a need for octacosanol in the diet. Supine and prone positions are the easiest positions to test most patients in as they are better supported for the muscle testing. Standing or weight bearing tests will uncover many nerve entrapment, disc or imbrication type problems. These patients will say that they feel better when they lie down. Placing the patient in a gait position is a way of torquing the dura mater. Testing in these positions can uncover hidden problems where the dura is firmly attached to the skull and pelvis. An easy way to do this in the supine position is to use blocks under the opposite shoulder and acetabulum. A variation of these types of tests is to ask the patient what they do for a living, and test them in their work positions. This is extremely useful in uncovering hidden structural problems.

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TMJ (part one: without TL)

Penfield and Rasmussen, in mapping the homunculus, demonstrated that 35-40 percent of the nerves in the body are related to the face and head. Imbalances in the temporomandibular joint (TMJ) have far reaching symptom patterns due to this large neurological importance. According to Jenkelson, the normal and ideal relationship of the jaw in a resting position is called the myocentric position. This is defined as when the mandibular muscles are in equilibrium and no contact between the opposing teeth occurs until closing is terminated with a solid simultaneous contact of all opposing teeth.

The joint is composed of the condyle of the mandible. An articular disc is found above this and this is held in the mandibular fossa. On opening of the jaw, the condyle of the mandible moves forward as the ramus moves posterior and the disc moves anterior. Alterations in this normal fluid action leads to clicking jaws. The articular disc is composed of collagen fibers and is between the head of the condyle and the temporal bone.

The surfaces of the temporal bone and the condyle are covered with collagen fibers not articular cartilage. This covering gives the articulation great pliability as the condyle moves from the concave fossa to the convex anterior portion of the temporal eminence. The disc is securely fastened to the condyle on the medial and lateral aspects. The disc is then carried with the condyle as it moves through its range of motion. The anterior portion of the disc is vascular and is the posterior attachment of the superior division of the external pterygoid.

The normal opening of the mandible occurs due to relaxation of the closing muscle. These include the masseter, the temporalis and the internal pterygoid. The inferior division of the external pterygoid pulls the condyle and causes rotation of the mandible about its axis. During the last one third of opening, the fibers of the anterior digastric muscle functions to aid in pulling the mandible inferior.

The clicking of the jaw on opening is due to a slight anterior displacement of the disc. As the condyle translates forward it must ride over this thickened portion of the disc and creates a snapping or clicking sound as it does. If the disc has moved anteriorly enough to stop the normal translation of the condyle, blocking has occurred, and the degree of opening will be diminished. Clicking or popping sounds on motion are caused by either disc displacements, altered joint surfaces or muscular imbalances of the mandible. The most common cause of clicking will be a shortening of the superior division of the external pterygoid. This can be treated using the strain counterstrain technique. The muscle is palpated placing the examining finger into the pterygoid pocket and moving straight superior. If involved, the muscle should be quite tender.
**Masseter**

**Origin:**
- Superficial: Zygomatic arch
- Deep: Zygomatic arch

**Insertion:**
- Superficial: External surface of the angle of the mandible and the inferior half of the ramus
- Deep: External surface of the superior half of the ramus of the mandible

**Action:**
- Aids to closing the mandible
- Deep masseter: fibers aid in retraction of the mandible

**Synergists:**
- Closing: Temporalis, superior division of the external pterygoid, internal pterygoid
- Lateral deviation: Contralateral superior external pterygoid and internal pterygoid, ipsilateral temporalis
- Retraction: Posterior temporalis

**Antagonists:**
- Closing: Inferior division of the external pterygoid, anterior digastric, suprahyoid muscles

**Nerve Supply:**
- Massenteric nerve which is derived from the anterior branch of the mandibular division of the trigeminal nerve (Cranial V)

**Referred Pain:**
- Pain may radiate over the maxilla, the mandible, over the eye or to the ear

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**Temporals**

**Origin:**
- Attaches to the rim of the temporal fossa which is composed of parts of the frontal, sphenoid, and parietal bones

**Insertion:**
- Attaches to the mandible at the coronoind process as well as the anterior, superior edge of the ramus

**Action:**
- Aids in closing the mouth (elevation of the mandible)
- Clenching of the incisors is accomplished by the anterior fibers
- The posterior fibers function to retract the mandible
- Lateral deviation to the side of contraction is performed by the middle and posterior sections of the muscle

**Synergists:**
- Closing: Masseter, internal pterygoid, superior division of the external pterygoid
- Lateral deviation: Ipsilateral superior external pterygoid, contralateral masseter and temporalis

**Antagonists:**
- Closing: Inferior division of the external pterygoid, anterior digastric, suprhyoid muscles

**Nerve Supply:**
- Anterior and posterior deep temporal nerves which are derived from the mandibular division of the trigeminal nerve (Cranial V)

**Referred Pain:**
- Anterior: above the eye and an area around the central incisors
- Middle: over the greater wing of the sphenoid and the premolars
- Posterior: over the parietal bone and along the molars

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**Internal Pterygoid**

**Origin:**
- Attaches to the inner aspect of the lateral pterygoid plate of the sphenoid

**Insertion:**
- Attaches to the lower border of the ramus near the angle of the mandible
- The masseter and the internal pterygoid form the mandibular sling. The combination of these muscles acts to hold the mandible and stabilize the condyle squarely in the fossa.

**Action:**
- Aids in closing the mouth. Unilateral contraction causes lateral deviation of the mandible to the side opposite that of the contracted muscle. Most responsible for lateral deviation of the mandible.

**Synergists:**
- Closing: Masseter, temporalis, superior division of the external pterygoid
- Lateral deviation: Ipsilateral superior external pterygoid, contralateral masseter and temporalis
- Protrusion: Superior division of the external pterygoid, superficial masseter, anterior fibers of the temporalis

**Nerve Supply:**
- Medial pterygoid nerve which is derived from the anterior division of the mandibular branch of the trigeminal nerve (Cranial V)

**Referred Pain:**
- Localized pain over the TMJ joint with mild radiation over the ramus of the mandible extending into the suprahyoid muscles

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External Pterygoid

Origin:
- Superior: Attaches to the infratemporal crest and to the inferior lateral surface of the wing of the sphenoid
- Inferior: Lateral surface of the pterygoid plate of the sphenoid

Insertion:
- Superior: Ligament of the TMJ joint capsule, the articular disc, superior one third of the neck of the condyle
- Inferior: Attaches to the neck of the condyle and the ramus of the mandible just inferior to the TMJ joint

Action:
- Superior: Anterior traction on the disc during closing
- Inferior: Opening the mouth, protrusion of the mandible when contracted bilaterally, unilateral contraction aids in lateral deviation of the mandible to the side opposite contraction. Pulls the head of the condyle inferior and anterior during opening.

Synergists:
- Superior division: Masseter, temporalis, medial pterygoid
- Inferior division: Digastric, suprahypoid muscles
- Lateral deviation: Ipsilateral internal pterygoid, contralateral masseter and temporalis
- Protrusion: Internal pterygoid, superficial masseter, anterior fibers of the temporalis.

Antagonists:
- The divisions are basically antagonistic to each other

Nerve Supply:
- Lateral pterygoid nerve which is derived from the anterior division of the mandibular branch of the trigeminal nerve (Cranial V)

Referred Pain:
- Severe pain over the TMJ itself with radiation anterior to the ear. Localized pain over the maxilla with radiation under the eye.

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Temporomandibular Examination

- The examination of the TMJ begins with observation of the motion of the mandible
  - Patients with TMJ problems usually talk with very limited motion of the mandible
  - They will often be gum chewers
- Palpation will reveal multiple trigger points in the muscles of mastication
  - Begin by palpating for trigger points in both the superficial and deep fibers of the masseter. Then palpate the different section of the temporalis. Palpate the suprahyoid muscles for tenderness. You will usually find tenderness on the side of involvement.
- This examination is followed by palpating and feeling the motion of the condyle
  - Classically, this is done by placing your finger in the external acoustic meatus. Anterior pressure is applied against the wall of the canal. While the patient opens and closes the mandible, you compare the motion of the condyle against your finger.
  - Another procedure is to place your finger horizontally under the zygomatic arch. The advantage of this test is that you can feel the motion of the condyle as it moves through translation.
    - Translation is the motion that the condyle undergoes as it moves anterior and rotates in the temporal fossa. You are able to easily diagnose blocking of the condyle, lateral shifting as well as degree of anterior motion.
  - It is easy to assess the motion of the condyle by placing your fingers just inferior to the zygomatic arch and having the patient open and close the mandible. Note the difference in the motion of the condyle.
  - You should feel simultaneous rotation with translation
  - The doctor should also observe the motion of the jaw watching for deviation
    - The jaw will deviate to the side of the WEAK external pterygoid
    - The tight pterygoid will be opposite the weak side
  - The TMJ and the coccyx take up the slack the dura, like a “rod and reel” system
- Check TMJ in every possible position
  - Think of the brain as a head and the cranium as a football helmet, if you lie supine the straps at the front will be stretched, if you lie on your right ear the left straps will be stretched…. 
- Generalities:
  - If a weak muscle strengthens to jaw opening this indicates an opening problem, if the weak muscle strengthens to jaw closing then it is a closing problem
  - There are only three tools you need to fix a TMJ
    - Neurologic tooth, fascial flush, spindle cell
  - When using spindle cell technique always take the head into flexion
    - This diminishes the pain for the patient

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**Strong muscle weakens with opening (no therapy localization)**

- Fascial flush to the jaw closing muscles:
  - TL masseters, if weakness is negated, localize the side then fascial flush that muscle
  - TL anterior, medial and posterior temporalis. If weakness is negated fascial flush division of temporalis (could be multiple divisions).
  - TL internal pterygoid. If weakens, fascial flush.
- Remember that fascial flush technique is ironing out the muscle towards the heart

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**Neurologic Tooth**

When you bite down all of your teeth should contact simultaneously. If this doesn’t occur then the periodontal ligament will not be stimulated properly. This improper stimulation of the ligament may create an engram or habit pattern of the nervous system.

The periodontal ligament is composed of fibers, blood vessels, lymphatics and nerves. It anchors the tooth in the other structures of the jaw. The ligament has 4 main functions it is:
1. Supportive
2. Nutritive
3. Formative
4. Sensory

As the ligament tightens with axial compression there is a reciprocal inhibition of the jaw closing muscles. If the tooth is slightly misaligned (subluxated) there may be aberrant stimulation to the nerves in this ligament, creating an engram in the nervous system.

Histologic slide of tooth erupting into the mouth.

A: tooth
B: gingiva
C: bone
D: periodontal ligaments

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Indications / Testing:
- Strong muscle weakens with biting (no therapy localization)
- Weakness showing after trauma to the mouth or jaw or after any dental work
- Chronically weak muscle, see chart of tooth muscle correlations

Procedure:
1. Find a strong indicator muscle, have the patient lightly contact their teeth together
2. If the strong indicator weakens this is an indication that this technique is needed
   - Have the patient TL the tooth gum line 5-7 teeth at a time using the strong indicator muscle
   - The TL that weakens the strong indicator is the tooth or one of the teeth that needs therapy
3. Once the tooth has been located, gently challenge the tooth lingually and buccally
4. Go in the challenge direction on the phase of respiration that negated the challenge

Nutrition: If neurologic tooth returns, check patient’s zinc status

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Tooth-Muscle Associations

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35
Neurological Disorganization: (part one)

Definition

Many times, a patient will show indications of a specific muscular weakness, TS line, postural sign, etc. However, on testing, the weakness is found on the opposite side of the body. This condition is termed switching.

This is possibly one of the most important topics we will cover here in this course. Most of the patients that you will see in your practice are going to be switched. If a person were to not be switched then they would not hurt themselves, others or the environment intentionally. These things are not logical events and detrimental to life. Vithoulkas states, “As with all things, the human organism was originally designed to function harmoniously and compatibly in the environment… Any imbalance inevitably leads to destruction, which diminishes both the human being and the universe in which he or she lives… Ideally, the human race should have enough consciousness and awareness to live within and contribute to the order of the universe, and therefore be freed to achieve the highest possibilities of evolution.”

Switching can occur when someone pushes themselves past their current limits. This can occur in athletics when someone is trying to decrease the time they run a distance. When pushing hard attempting to overcome their personal barrier, is when they will normally injure themselves. This phenomena can also be seen when someone pushes themselves past their scholastic comfort zone. This is why it is so important as students to keep yourselves un-switched. Blaich, with the aid of a speed reading course, would have students read as fast as they could. Then un-switch them, have them read again and they would be reading faster with higher retention.

Switching is not necessarily a bad thing. Creative states (composing, writing, poetry, painting, etc.) tend to be certain form of switching pattern. The problem occurs when the patient is unable to pull themselves out of the switching pattern.

Notes:
Diagnosis:
- Therapy localization of the acupuncture points Kidney 27 with palm up or palm down. K-27 is located at the junction of the 1st rib, clavicle and sternum. Remember that Cat II & Cat I have relationships to that location.
- This is the home of all the associated point for the acupuncture system
- Suspect switching with any neurologic symptoms
- These will be your difficult patients
- If you treat the correct things but the patient gets worse

Associated Reflexes for Treatment of Switching
- The patient therapy localize K-27 and the umbilicus
- Correct by stimulating the positive therapy localized points vigorously
  - This will temporarily reorganize the patient so that you will be able to treat the patient without putting them deeper in the switching hole
- Crossed K-27 therapy localization (right hand to left K-27) is associated with homolateral crawl
- Therapy localize CV-24, and GV-27
- Correct with firm pressure at CV-2 and CV-24 while holding GV-1, the tip of the coccyx

Problems Associated with Switching
- Gait imbalances
- Synchronization - cloacal reflexes
- Cranial respiratory mechanism imbalances
- Pelvic imbalances
- Hyoid imbalances
- Developmental problems: Dyslexia, Reading difficulties, dysgraphia, stuttering, clumsiness, schizophrenia...

Ocular Lock (classic):
The eyes should be able to tract together in any right to left, left to right, up or down, or any oblique direction. Failure to be able to perform this is another form of switching.

Testing is accomplished by either having the patient read out loud using the eyes in both the normal left to right pattern and backwards in a right to left pattern. While the patient is reading, a strong muscle is tested for weakening. An alternative test is to have the patient turn the head as far as possible to one side and rotate the eyes in the opposite direction and test for weakening of a strong muscle. Occasionally, weakness will be demonstrated by looking in a very specific direction. This may be screened for by having the patient follow the examiner’s finger first clockwise, then counterclockwise while testing for any irregularities in the smoothness of the circular pattern.
Ocular Lock* (Francis)

Ocular lock correlations*

Bilateral inferior C0
Apex Posterior Sacrum

C0
C2
Sacrum

Base posterior sacrum

*C Timothy Francis, DC, DIBAK

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Extremity Subluxation/Challenge

In the spine, there exists a rebound mechanism that causes the bone to be pulled back opposite the direction that it was challenged in.

In the extremities, this rebound phenomenon does not exist. Here, the direction that the bone is challenged in is the direction that the bone stays. Therefore, if a muscle is weakened by pushing a bone in a specific direction, then the bone should be adjusted in the opposite direction. If a subluxation is not present in a joint, then the bones composing that joint should be able to be challenged in any direction with no neurological upset demonstrated by the body.

If you begin with a weak muscle that is related to the area being challenged, then the direction that strengthens the muscle determines the direction that the bone should be adjusted. Here, the movement of the bone alleviates the neurological disorganization at the joint allowing the associated muscle to function properly.

If there is no muscle that is weak associated with the joint in question or pain is a limiting factor, test for a strong indicator muscle. Challenge the joint and find the direction that causes the greatest degree of weakness. This is the direction that further subluxates the joint and therefore the exact opposite direction is the direction that the bone must be corrected.

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Gastrocnemius

Meridian
• Circulation Sex (adrenal)

Origin:
• Medial head:
  • Medial condyle of the femur
• Lateral head:
  • Lateral condyle of the femur

Insertion:
• Both heads join to the achilles tendon which attaches to the posterior surface of the calcaneus

Nerve Supply:
• S1 & 2

Neurolymphatic Reflexes
• Anterior: One inch lateral and two inches superior to the umbilicus
• Posterior: Spinous and transverse process of T11 & T12.

Neurovascular Reflexes
• Lambda

Action:
• Plantar flexes the foot. Aids in posterior knee support. Relaxation begins the walking process by allowing the center of gravity to move anterior. Contraction of the muscle assists in flexion at the knee.

Indications:
• The subject will stand with an anterior lean to the body. There is a hyperextension of the knee standing. Inability to rise on the toes.

Body part position:
• The subject is supine with the knee flexed and the toes and foot plantar flexed. The subject is asked to pull the foot superiorly.

Stabilization:
• At the knee, making sure not to have the patient medially or laterally rotate the knee

Vector of Force:
• Pressure is applied in a superior to inferior direction attempting to extend the knee
• Medial head: Toes pointed medial
• Lateral head: Toes pointed lateral

Nutrition:
• Adrenal extracts and cofactors

Notes: __________________________________________________________
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Soleus

Meridian
• Circulation Sex (adrenal)

Origin:
• To the posterior surface of the head of the fibula and to the proximal ⅓ of the posterior surface of the fibula

Insertion:
• Joins to the achilles tendon with the fibers of the gastrocnemius which attaches to the posterior surface of the calcaneus

Nerve Supply:
• Tibial, L4, 5, S1, 2

Neurolymphatic Reflexes
• Anterior: One inch lateral and two inches superior to the umbilicus
• Posterior: Spinous and transverse process of T11 & T12

Neurovascular Reflexes
• Lambda

Action:
• Plantar flexes the foot. Begins the walking process by relaxing to allow the center of gravity to move anterior. Aids in the stabilization of the tibia on the talus.

Indications:
• Person stands with an anterior lean. Inability to rise on the toes.

Body part position:
• The subject is prone with the knee flexed at 90 degrees

Stabilization:
• Due to the strength of the muscle none is needed unless the muscle is tested in a standing position, then the tibia will need support

Vector of Force:
• Pressure is applied to dorsiflex the foot

Nutrition:
• Adrenal extracts and cofactors

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Peroneus Longus/Brevis

Meridian
- Bladder

Origin:
- Longus: From the fibular head, the superior \( \frac{2}{3} \) of the lateral surface of the fibula and the intermuscular septa
- Brevis: Distal \( \frac{2}{3} \) of the fibula lateral surface; intermuscular septa

Insertion:
- Longus: Into the ventral and lateral aspects of the 1\textsuperscript{st} metatarsal and the medial cuneiform
- Brevis: Into the tuberosity on the lateral aspect of the 5\textsuperscript{th} metatarsal

Nerve Supply:
- L4, 5 & S1

Neurolymphatic Reflexes
- Anterior: Pubes at the lower margin of the symphysis
- Posterior: Transverse process of L5 and the posterior superior iliac spine

Neurovascular Reflexes
- Frontal eminence

Action:
- Non-weight-bearing, these muscles evert and plantar flex the foot. Weight-bearing they stabilize the foot and leg in mid-stance by aiding in the medio-lateral control of weight balance.

Indications:
- Ankle weakness and instability. Decreased inversion. Foot calluses under metatarsal arch. Entrapment of common peroneal nerve. Adduction (toe in) walking. Loss of lateral stability when the weight shifts forward over the foot. Excess inversion of the foot during the swing phase of gait.

Body part position:
- Grasp the lower leg above the malleoli. Fully plantar flex the and then fully evert the foot. The toes are then flexed fully to prevent contraction of the toe extensors.

Stabilization:
- Pressure is applied above the malleoli with one finger over the tendon of the tibialis anterior to feel for elevation of the tendon indicating recruitment

Vector of Force:
- Direction of inversion. Force is inferior to superior and lateral to medial in an arc.

Nutrition:
- Calcium Lactate, Vitamin B, G

Notes:_________________________________________________________________
Peroneus Tertius
Meridian
- Bladder

Origin:
- Distal ½ of the anterior margin of the fibula and the inter-muscular septa. Insertion: Tubercle of the fifth metatarsal, the medio-dorsal surface of the fifth metatarsal and the base of the fourth metatarsal.

Nerve Supply:
- L4, 5 & S1, Peroneal Nerve.

Neurolymphatic Reflexes
- Anterior: Pubes at the lower margin of the symphysis
- Posterior: Transverse process of L5 and the posterior superior iliac spine

Neurovascular Reflexes
- Frontal eminence

Action:
- Non-weight-bearing, the muscle everts and dorsiflexes the foot. Weight-bearing, it stabilize the foot and leg after heel rise as the weight starts to shift anterior and thus aids in the medio-lateral control of weight balance.

Indications:
- Ankle weakness and instability. Decreased inversion. Foot calluses under the metatarsal arch as well as the medial aspect of the distal phalanx of the first toe. Adduction (toe in) walking. Loss of lateral stability when the weight shifts forward over the foot

Body part position:
- Fully dorsiflex the foot and then fully evert the foot. The toes are then flexed fully to prevent contraction of the toe extensors.

Stabilization:
- Pressure is applied above the malleoli with one finger over the tendon of the tibialis anterior to feel for elevation of the tendon indicating recruitment.

Vector of Force:
- Grasp the lower leg above the malleoli

Nutrition:
- Calcium Lactate, Vitamin B, G

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**Tibialis Anterior**

**Meridian**
- Bladder

**Origin:**
- Lateral condyle and upper ⅔ of the lateral surface of the tibia, the interosseous membrane, the crural fascia and the intermuscular septum

**Insertion:**
- Medial plantar surface of the medial cuneiform and the base of the first metatarsal

**Nerve Supply:**
- L4, 5, S1, deep peroneal nerve

**Neurolymphatic Reflexes**
- Anterior: ¾ of an inch above the symphysis
- Posterior: Lamina of L2

**Neurovascular Reflexes:**
- Frontal eminence

**Action:**
- Elevates the foot during the swing phase of gait
- Dorsiflexes the foot at the talocural joint
- Supinates the foot at the subtalar and transverse tarsal joints

**Indications:**
- Disc protrusion. Chronic weakness creates foot drop. Shortening with localized pain in gastrocnemius/soleus muscle groups. Foot drop or slapping of foot at heel strike. Tripping over objects.

**Body part position:**
- The subject is asked to pull their foot towards their nose. If shortening of the gastrocnemius is suspected, bend the knee 90 degrees to allow full dorsiflexion.

**Stabilization:**
- Pressure is applied above the malleoli grasping the lower leg

**Vector of Force:**
- Pressure is applied through the broad contact in the direction of plantar flexion and slight eversion

**Nutrition:**
- Vitamin A

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Tibialis Posterior

Meridian
- Circulation Sex (adrenal)

Origin:
- Medial surface of the fibula, the interosseous membrane, the lateral portion of the posterior surface of the body of the tibia, the deep transverse fascia and the intermuscular septa

Insertion:
- Mainly to the plantar surface of the navicular but also to the plantar surfaces of the calcaneus, cuboid, all cuneiforms and to the base of the second to fourth metatarsals

Nerve Supply:
- L5 & S1

Neurolymphatic Reflexes
- Anterior: One inch lateral and two inches superior to the umbilicus
- Posterior: Spinous and transverse process of T11 & T12

Neurovascular Reflexes
- Lambda

Action:
- Inversion, plantar flexion and adduction of the foot. Supports the arch by elevating the navicular and prevents excessive pronation. Aids in the even distribution of weight across the metatarsals.

Indications:
- Excessive pronation, bunion formation, heel spurs, balance problems, pain running or walking, knee, acetabulum, lumbar, cervical and TMJ pains relieved by reducing the foot pronation, foot turned out during walking

Body part position:
- The subject is asked to fully plantar flex the foot and then fully invert the foot

Stabilization:
- Pressure is applied above the malleoli with one finger over the tendon of the tibialis anterior to feel for elevation of the tendon indicating recruitment

Vector of Force:
- In the direction of eversion. From inferior to superior and medial to lateral.

Nutrition:
- Adrenal extracts and cofactors

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Flexor Hallucis Longus:

Nerve Supply:
- L5, S1 & 2

Neurolymphatic Reflexes
- Anterior: One inch lateral and two inches superior to the umbilicus
- Posterior: Spinous and transverse process of T11 & T12

Neurovascular Reflexes
- Lambda

Body part position:
- The foot is placed in a neutral position, or the muscles can be tested in a standing posture. The patient is instructed to flex the great toe.

Stabilization:
- Stabilize the proximal phalanx

Vector of Force:
- Pressure is exerted to extend the distal phalanx on the proximal phalanx

Flexor Hallucis Brevis

Nerve Supply:
- L5, S1 & 2

Neurolymphatic Reflexes
- Anterior: One inch lateral and two inches superior to the umbilicus
- Posterior: Spinous and transverse process of T11 & T12

Neurovascular Reflexes
- Lambda

Body part position:
- The foot is placed in a neutral position, or the muscles can be tested in a standing posture. The patient is instructed to flex the great toe.

Stabilization:
- Stabilize the joint between the distal and proximal phalanges is straightened

Vector of Force:
- Pressure is applied to extend the proximal phalanx on the first metatarsal

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Extensor Hallucis Longus/ Brevis

Origin:
- Longus:
  - Inferior 3/3 of the fibula, the intermuscular membrane and the intermuscular septa
- Brevis:
  - Adjacent surfaces of the cuboid and lateral cuneiform and the adjacent fibers of the tibialis posterior

Insertion:
- Longus:
  - Base of the terminal phalanx of the great toe
- Brevis:
  - Medial and lateral surfaces of the base of the proximal phalanx of the great toe

Nerve Supply:
- Longus: L5 to S2, tibial nerve
- Brevis: L5 and S1, medial plantar nerve

Action:
- Longus:
  - Flexion of the distal phalanx. Assists in plantar flexion and inversion of the foot. Aids in stabilization from mid stance on in walking.
- Brevis:
  - Flexion of the proximal phalanx

Indications:
- Failure to "toe off" when walking. Claw formation of the great toe. Lack of stability as the weight is transferred to the front of the foot. Formation of a "bunion".

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Feet: Lecture and Workshop

The Ankle and Foot

Anatomy:

The mortise joint is made up of the talus, tibia and fibula. Through ligamentous and muscular connections the ankle joint may also include many if not all of the tarsal bones.

The foot contains many complex and varied joints that may be classified into two main groups. The intertarsal joints and the tarsometatarsal joints. The most important joints are the talocalcaneal or subtalar joint, midtarsal or transverse tarsal joints, cubonavicular joints and the cuneonavicular joint. These joints orient the foot with respect to the other axes in space, so that the plantar surface is presented to the ground properly, irrespective of the position of the leg or the slope or shape of the ground. They also, alter and maintain the shape of the arches of the foot. These two features of these joints allow the foot to adapt to the irregularities of the ground and become a shock absorber between the ground and the foot.

Therefore these joints play a vital part in the stability of the foot and every other joint in the body. The third type of joint in the foot is the metatarsophalangeal joint which plays an important roll in the gait mechanism, especially the 1st MTP joint. Dr. Goodheart felt that this was the most important joint in gait.

Articulations of the Ankle:

The superior surface of the talus (forming the inferior portion of the joint) is convex anteriorly to posteriorly with raised medial and lateral boarders, a central depression that forms a longitudinal groove and its surface is larger (wider) anteriorly than posteriorly. This groove doesn’t lie in a strict sagittal plane but has a slight lateral to medial direction, that corresponds to the longitudinal axis of the foot. The medial surface is mostly a plane joint between the tibia and talus. The lateral joint, however, runs obliquely anteriorly and laterally and at the tibiofibular joint which is padded by a synovial fold.
Biomechanics of the Ankle and Foot:

The ankle or tibiotarsal joint, is the most distal joint of the lower limb. The joint is a hinge joint and has therefore only “one degree of freedom.” It controls the movement of the foot in relation to the leg. This occurs on the sagittal plane. This motion is integral in all forms of gait. The joint is tightly interlocked and must transmit extreme amounts of force and mechanical stresses when the entire weight of the body is placed on one leg. The foot and ankle must also dissipate the enormous amounts of kinetic energy generated when the foot rapidly makes contact with the ground during walking, running or jumping.

It becomes easy to imagine if these joints aren’t in proper juxtaposition, then these forces will not be distributed and dissipated and will be transmitted to other parts of the body that are much less capable of dealing with the stresses generated by locomotion of the body. These aberrant stresses transmitted from the foot and ankle can lead to many other distant and varied health problems.

In actuality, the ankle mortise joint is a very complex and hugely important joint in the body. When coupled with the axial rotation of the knee it has three degrees of freedom. This freedom of motion allows us to walk on varied and uneven ground. These three main axes of movement intersect roughly in the posterior half of the foot. These three axes are perpendicular to each other, with the $x^1$ and $x^2$ axes traveling through the medial and lateral malleoli and can be used as the axis for the ankle proper. It controls the flexion and extension of the foot. The second axis is the $y$ axis (along the long axis of the leg) that corresponds to the long axis of the leg that allows for adduction and abduction of the foot. The third axis is the long axis ($z$ axis) of the foot and allows for pronation and supination of the foot.

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Flexion and extension

The range of the movement of flexion and extension is determined by the articular surfaces of the joint.

Flexion is checked by:
- **Bony factors**: During extreme flexion, the neck of the talus encounters the anterior margin of the tibia. Interestingly, the capsular ligaments are pulled upward by the foot flexors and its sheath attaches to the capsule, preventing the capsule from being impinged by the bony structures.
- **Capsular and ligamentous factors**: The posterior capsule and posterior collateral ligaments are stretched
- **Muscular factors**: The tone of the soleus and gastrocnemius will limit flexion. These muscles may become short due to inhibition of the flexion muscles.

Extension is checked by:
- **Bony factors**: The posterior tubercles of the talus contacting the tibia. Once again the capsule is kept from impingement by the extensor muscle just as in the flexion example.
- **Capsular and ligamentous factors**: The anterior capsule and posterior collateral ligaments are stretched
- **Muscular factors**: The tone of the flexor muscles will limit extension. These muscle may become short due to inhibition of the extensor muscles.

Transverse Stability of the Ankle

The medial and lateral malleoli provide the bony stability along with muscular and ligamentous integrity.

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Movements of the Foot:
Along with flexion and extension seen at the ankle joint, the foot can move about the vertical axis of the leg (y axis) and about the horizontal axis of the foot itself (z axis). About the y axis, we have abduction and adduction. Abduction is when the toes point outward from the anatomical position. Adduction is when the toes point inward from the anatomical position. The total ranges of motion that occur exclusively in the foot are between 35° to 45°. However, when referencing the tips of the toes in a horizontal plane, there can be much greater ranges of motion obtained. This is accomplished by rotation of the knee, lower leg, femur and hip. This can be up to 90° in either direction, mostly in ballerinas. Around the longitudinal axis of the foot (z axis), the sole can turn to face either medially (supination) or laterally (pronation). Supination has a general range of motion of about 52° and is significantly greater than that of pronation approximately 25-30°, due to the size of the lateral malleolus.

These movements cannot and do not occur independently of each other. **Adduction** will be accompanied by supination and a slight measure of **extension**. When these three motions are combined it becomes characteristic of the position that is known as **inversion**. If the extension component is canceled by flexion at the ankle then the term for the position of the foot is Talipes Varus. Finally, if lateral rotation at the knee compensates for the adduction of the foot then pure supination is apparently produced.

Conversely, if the foot **abducted**, **pronation** and **flexion** are combined the position of the foot is termed **eversion**. If the flexion is canceled by the extension of the ankle, the position is termed Talipes Valgus. If in addition, medial rotation of the knee makes up for abduction of the foot, then a movement of apparent pure pronation is obtained.

Thus, barring any compensatory movements occurring at joints outside the foot, adduction can never be associated with pronation and abduction can never be associated with supination.

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Observation:

• Gait
  • Watch for proper heel strike and transition through to toe off
  • The patient should strike with their heel and transfer their weight through to 5th metatarsal without their arch dropping. The metatarsals should make contact 5th, 4th, 3rd, 2nd, 1st with the first going into full dorsiflexion (extension of the MTP joint) before toe off.
  • If the toe doesn’t extend fully, then the entire gait mechanism will not properly facilitate and the arches will not properly “lock in”

• Static:
  • Look at the foot, is the patient standing properly? Do they have solid arches?
  • Look for Helbings sign
  • Look at the patients shoes
    • Is the ware uneven?
    • Are the shoes to tight or to big?

Palpation:

The palpation of the feet is relatively easy. I will never list a subluxation off of palpation alone, but it is good to determine if there is a lack of gross motion in the foot.

• With the calcaneus being fixed, moving the foot from eversion to inversion (toes pointing laterally to toes pointing medially with dorsiflexion)
  • The navicular and cuboid should slide medially
  • This allows the calcaneus to slide anteriorly and turn the talus slightly

• Technique:
  • Grasp the calcaneus invert and evert the foot feeling for gross motion
  • Grasp the first and third metatarsals flex and extend them again feeling for gross motion

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Feet

The feet are one of the most important things to address in the body. 25% of your bones are in your feet. There is a tremendous amount of proprioception that is derived from the feet. Think back to the homunculus in neurology class. Also, remember the positive support mechanism that facilitates and inhibits muscles to obtain posture and gait. If these mechanoreceptors do not fire properly then the spinal extensors may not facilitate, allowing a slumped, poor posture. This is the patient that is better after resting or taking their shoes off at home and worse after walking or being upright.

Screening:

Any articulation in the body should be able to withstand a mild to moderate stress without manifesting abnormal responses. This procedure can be used as a screening device to rule out any hidden subluxations within a joint. The “Shock Absorber Test” is a very quick and easy screening method for the feet or any other extremity for that matter. The procedure is simple and is generally a form of “challenge” to the joints of that extremity.

- For the foot, find any strong indicator. Psoas is usually considered the best/easiest for the foot.
- Challenge by tapping on the foot using your fist, then re-check the strong indicator. If it weakens, you more than likely have a foot subluxation.

Procedure:

- Test for a strong indicator muscle
- Shock the joint in question by striking one of the bones directly associated with the joint with a force of five to ten pounds
  - Note that any joint that the shock is transferred to must be considered
- For example, if the calcaneus is struck, the joints of the ankle as well as the knee will be stressed
- If weakness is found, examine the joints shocked for hidden subluxations

In manganese deficiencies, the shock test will stretch the ligaments and create weakness of muscles that are directly related to the joint. For example, shocking the wrist, in a manganese deficiency, will create a carpal tunnel entrapment and the opponens muscles will test weak.

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Anterior Tibia (Distal):
• Muscle Correlation: Neck Flexors
• Set Up: Cup the calcaneus with your lateral hand, while having the calcaneus on the table. With your medial hand slide the heel up the foot until you contact the tibia just about the talus.
• Thrust: Straight P-A
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Anterior (Superior) Talus:
• Muscle Correlation: Neck Flexors
• Set up: Thumbs go under the 1st and 5th metatarsals. Sliding down the tibia, contact the talus with the middle finger of the medial hand and back it up with the middle finger of the lateral hand making sure your elbows are close together.
• Thrust is a scooping motion of the wrist with a traction
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Lateral Talus:
• Muscle Correlation: Psoas
• Set up: Cup the heel with the lateral hand, slide the 5th finger of the medial hand down the tibia until you reach the talus. Evert the foot with your palm. Elbows remain close together.
• Thrust is a traction S-I
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**Lateral Cuboid**
- Muscle Correlation: **TFL**
- Set up: Standing lateral to the foot, grasp the foot with the medial hand placing the thumb over the cuboid by following the 5th MT down to the cuboid and putting your thumb right in the “saddle”. Grasp the heel with the lateral hand while backing up the thumb contact with the “heel” of you hand.
- Thrust is a traction with a lateral to medial thrust

**Posterior Calcaneus**
- Muscle Correlation: **Gastrocnemius**
- Set Up: Patients knee bent, foot on the table. The doctor interlaces their fingers around the calcaneus and sits on the patients foot.
- Thrust: Thrust is directly P-A making sure there is NO I-S component!

**Inferior Navicular**
- Muscle Correlation: **Posterior Tibialis**
- Set Up: With lateral hand, reach around the foot and contact the navicular bone with your middle finger. Backing that up with your pisiform from your medial hand. Standing on the medial side of the foot.
- Thrust is a traction and I-S push with the pisiform and middle finger
Superior 1st Cuneiform
- Muscle Correlation: Anterior Tibialis
- Set up: Full dorsiflexion and eversion or the bone can’t move inferiorly. Follow the 1st MT up to find the 1st cuneiform. As with the superior talus, contact the 1st cuneiform with your middle finger of the medial hand backing it up with the middle finger of the lateral hand placing your thumbs at the distal base of the 1st metatarsal. Elbows are close together.
- Thrust is S-I making sure to keep full dorsiflexion and eversion of the foot

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Superior 2nd Cuneiform
- Muscle Correlation: Pec Maj Clav
- Set up: Full dorsiflexion and eversion or the bone can’t move inferiorly. Follow the 2nd MT up to find the 2nd cuneiform. As with the superior talus, contact the 2nd cuneiform with your middle finger of the medial hand backing it up with the middle finger of the lateral hand placing your thumbs at the distal base of the 2nd metatarsal. Elbows are close together.
- Thrust is S-I making sure to keep full dorsiflexion and eversion of the foot

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Superior 3rd Cuneiform

- Muscle Correlations: **Supraspinatus**
- Set up: Full dorsiflexion and eversion or the bone can’t move inferiorly. Follow the 3rd MT up to find the 3rd cuneiform. As with the superior talus, contact the 3rd cuneiform with your middle finger of the medial hand backing it up with the middle finger of the lateral hand placing your thumbs at the distal base of the 3rd metatarsal. Elbows are close together.
- Thrust is S-I making sure to keep full dorsiflexion and eversion of the foot

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Rotated 5th metatarsal

- Muscle Correlations: **Peroneus Tertius/Brevis**
- Set Up: Grab the entire 5th MT with one hand stabilizing with the other
- Thrust is to laterally rotate the 5th MT

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Inferior Fibula

- Muscle Correlations: **All peroneal muscles weak**
- Set Up: Patient’s tibia is completely flat, the doctor’s inferior hand contacts the inferior portion of the fibula and the superior hand contacts the superior head of the fibula. The line of drive is S-I, L-M.
- Thrust: There is NO thrust you either use a drop or respiratory adjustment

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Ankle Sprain

Discussion:

- Due to the fact that the ankle is basically a hinge joint, ankle injuries are almost always due to a lateral stress
- There are very few hyperextension or hyperflexion injuries of the ankle

Inversion Injury

- In this type of injury, the foot is inverted and the ankle and leg are forced to the other side
- The push is applied against the medial malleolus and the pull is away from the lateral malleolus
- The major strain is applied against the external collateral ligament, and if the strain is great enough, the ligament will tear to some degree
- As the ligament gives way, the ankle opens up and the talus is thrust against the medial malleolus. In the young, this results in a tear of the ligament and in the elderly, the lateral malleolus may break before the ligament tears.
- Eighty-five percent of all injuries to the ankle are inversion type sprains
- The **medial head of the gastroc** is often involved with the strain counterstrain portion of this type of injury

Eversion Injury

- In this injury, the foot is forced outward in relationship to the leg
- The talus is forced against the lateral malleolus, which is much longer than the medial malleolus
- Many times, fracture of the lower portion of the fibula is found along with tearing of the deltoid ligament
- The tibiofibular ligament may also be damaged causing a separation of the ankle mortise joint. In this case, fracture of the fibula will usually be found in the lower \( \frac{1}{3} \). Presence of a fibular fracture in this area is indicative of a torn tibiofibular ligament.

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Tarsal Tunnel Syndrome

The tarsal tunnel is found inferior and posterior to the medial malleolus. The lateral boundary of the tunnel is formed by the bones and the medial boundary by the flexor retinaculum. Through this tunnel passes the tibial nerve, the medial and lateral plantar nerves, the medial and lateral peroneal artery, the tibialis posterior, the flexor hallucis longus and flexor digitorum longus muscles.

The flexor hallucis brevis is the major muscle innervated after the tarsal tunnel. Entrapment of the structures in the tunnel will cause alterations in the vascular supply to the foot and weakness of the flexor hallucis brevis. Chronic involvement leads to changes in the plantar muscles that will cause hammer toes or a claw toe. While some consider this condition to be infrequently found, this condition will be found to accompany almost every case of bunion formation and chronic pronation.

This condition commonly is found when the navicular has dropped inferior. This causes the calcaneus to be moved in a posterior direction causing increased pressure on the flexor retinaculum. Other localized problems can produce a narrowing of the tunnel. These can result from chronic injury to the area, gouty formation of crystals, edema, etc.

A common finding is the patient who lands on their foot in a horizontal position and does not use the big toe to push off. This causes excessive stress on the ligaments and muscles of the foot that slowly causes the calcaneus to move in a posterior direction. In general, improper stride and mechanics of landing on the feet are common causes of this condition.

Correction requires supporting the arch of the foot, normal function of the tibialis posterior, manipulative procedures to normalize the position of the talus, navicular and calcaneus and instruction on proper gait. In a paper dealing with lower leg and knee pain, Eng and Pierrynowski, of the University of Waterloo in Ontario, report that patients that were in a treatment program using soft orthotics in addition to an exercise program for strengthening of the weakened muscles recovered faster than a control group that did not use the orthotics.

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**Functional Hallucis Limitis**

**Discussion**

Howard Dananberg, D.P.M., has written about the failure of the proximal phalanx of the hallux to extend on the first metatarsal head. This failure leads to a decreased performance in runners and to a specific gait imbalance. In this case, the person’s upper portion of the body is carried far forward as if doing a "pigeon" walk.

This condition is easily tested for by having the patient weightbearing. The great toe extensor is tested with the weight forward over the foot. This position is just prior to the point where the flexor hallucis muscles should contract to stabilize the body weight. Goodheart has found that the rib pumps at the fifth intercostal space will correct this pattern.

**Procedure:**

1. Test the great toe extensors non weightbearing
2. Test the great toe extensors with the patient standing with the weight on the heel
3. Test the extensors again with the weight forward
4. If weakness is found, have the patient therapy localize to the fifth intercostal space on the side of weakness and retest for strengthening
5. If this strengthens the weak extensor, perform the strain counterstrain procedure on the indicated rib pump area

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**Navicular Sustentacular Descent Taken from Leaf**

Many reflex actions occur from the foot in walking. One of these is the reflex action caused by the descent of the navicular bone. When this is found, the calcaneus has rotated internally and created an entrapment of the neurovascular bundle by the descent of the sustentacular shelf.

Goodheart found that when therapy localization to the sacroiliac joints is negative and this condition exists, if the patient exaggerates the pronation of the ankle/foot, the therapy localization will show the hidden pelvic problem. Goodheart states "the sustentacular shelf drop hooks the neurovascular bundle beneath it. Navicular descent from long arch drop requires adjustment and supportive taping; orthotic support does not provide this vital treatment factor. De-rotation of the calcaneus is also required but no tape is needed. Often there is a balance problem in the foot associated with a weak posterior tibialis."
This condition creates the need for strain counterstrain on the peroneus longus and brevis, ligament interlink problems in the ankle as well as the weak tibialis posterior.

**Procedure:**
1. Suspect if the subject has any degree of pronation especially during walking, or if the symptoms point to a pelvic subluxation that does not therapy localize
2. Therapy localize the SI joints. If no weakness is found, have the patient further pronate the foot. Retest.
3. If weak, treat any pelvic problem found
4. Test tibialis posterior and treat as indicated
5. Test for strain counterstrain problem of peroneus longus and brevis
6. Test and manipulate navicular, talus and calcaneus
7. Test for ligament interlink and skin reflexes over medial and lateral aspects of the ankle
8. Tape as to support the navicular
9. Retest for need of orthotic

**Spinal Extensor Muscle Weakness**

The proprioceptors of the feet cause an inhibition of the spinal extensors when the patient is standing. Visually draw a vertical line extending down from the external auditory meatus. This line should bisect the shoulder, the acetabulum and the external malleolus.

If this alignment is not found, test an extensor muscle of the spine. The mid-trapezius, upper trapezius or the neck extensors are easily tested. If weakness is found, have the patient remove the weight from the foot on the side being tested and retest the prior weak muscle. If the plantar muscles are in a state of hypertonicity, then the muscle will test strong and weak again if the weight is reapplied.

Treatment by correcting the spindle cell and golgi apparatus that are involved on the plantar surface by applying pressure towards the center of the muscle in the belly to correct the spindle cell, and by pulling away from the belly on the origin and insertion to correct the golgi involvement.

**Miscellaneous**

This condition is found frequently in chronic back patients. If the patient is prone, squeezing the foot will cause weakening of the gluteus maximus, hamstrings, and the neck extensors. Many times, fascial techniques needs to be added to the treatment routine to correct this condition. Nutritionally support the patient with a raw bone extract and B12 if indicated.

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**Gait Test**

Walking and running require coordination of motion between opposite extremities. As part of the compensatory mechanism of the body to react to fixations and other imbalances, these coordinated activities are altered.

Goodheart found that you can test for the proper functioning of these joint actions by testing the opposing extremities. The tests are performed in the cardinal motions of flexion, extension, abduction, adduction and the rotational motions caused by the opposing contractions of the abdominal oblique, gluteus medius, psoas and the pectoralis sternal.

These six tests are performed on the opposing extremities. Weakness patterns can be normalized by stimulation of the related acupuncture point on the leg of the weak extremity.

If you find these gait imbalances, first test the patient for the existence of spinal fixations. Fixations in the spine are one of the most common causes for the creation of these gait imbalances. The body attempts to compensate for the failure of normal spinal mechanics by altering the muscular coordination of the body. After correcting any fixations found, have the patient walk for fifty steps and then retest for the gait imbalances. You will find that many times the gait imbalances are now corrected.

**Posterior Gait Testing**

![Posterior Gait Testing](image)

**Anterior Gait Testing**

![Anterior Gait Testing](image)
Lateral Gait Testing:

Oblique Gait Testing

Adductor Gait Testing
Kidney Gait Testing

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**Metatarsalgia**

This term is used loosely to describe any discomfort around the metatarsal heads. The metatarsal tunnels lie between the superficial and deep transverse metatarsal ligaments. Within these tunnels lie the medial and lateral plantar nerves, arteries and veins. Chronic imbalances in the foot lead to over stretching of the transverse ligaments. This, in time, causes an increase in pressure over the middle three metatarsal heads. Causes of this condition vary from improper foot strike to shoes that are narrow compressing the metatarsal heads. A person who consistently lands on the toes, or forefoot, will create this condition due to the repetitive stress.

Entrapments of the nerves in these tunnels is known by many names. The most common name being Morton's neuroma. In general, entrapments are caused by misalignments of the metatarsals. Other causes include edema, fractures, inflammatory conditions, sesamoid bones, etc.

Pain can easily be palpated over the dorsum of the foot. When this is found, place tongue depressors under the metatarsal arch elevating it. Re-palpate the dorsum of the foot for a reduction of pain. There will also be weakness of the extensor muscle of the great toe. This is easily tested with the patient standing. Have the person bring their weight forward over the front of the foot and test for weakness of the toe extensors. This weakness pattern will also be relieved if the metatarsal arch is elevated. In cases where the patient complains of pain when wearing shoes, grasp the foot and compress the metatarsals then palpate for pain.

Correction involves correcting all foot imbalances and elevating the metatarsal arch.

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Taping Procedure:
If you have to adjust more than 3 bones in the feet you should tape the foot. The taping procedure is simple and effective.
Orthotics:
• After correction and taping of feet check for the following pain pattern
• Muscle tension pain pattern:
  • Pterygoid pocket
  • Scalenes
  • Rhomboids
  • Greater trochanter
  • Medial knee
  • Lateral calcaneus

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Ligament Interlink

We are a quadruped that has learned to be bipedal. Coordination of walking is a spinal cord function. Goodheart discovered a spinal cord reflex that is involved with gait that appears to relate opposing ligaments. This research was developed from material first presented in Scientific American on the motion of limbs in a decerebrated cat.

There is a relationship between a ligament on one side of the body to a corresponding ligament in a contralateral joint of the body.

- Right wrist
- Right elbow
- Right shoulder
- Left wrist
- Left elbow
- Left shoulder
- Sacroiliac
- Xiphoid

- Left ankle
- Left knee
- Left hip
- Right ankle
- Right knee
- Right hip
- Costal-sternal junction
- Coccyx

- This is a global ligament treatment
- Any pain occurring over a ligament of the body
- Check this with any injury to a joint

Procedure:
1. Palpate for soreness over the suspected ligament
   - This ligament will not therapy locate
2. Go to the opposite joint and palpate for tenderness over related ligaments
   - The body should be viewed as if you were walking on all fours
3. Therapy localization will only be positive when both ligaments are being contacted and a strong muscle is tested for weakening
4. Determine which is more tender and have the patient contact this point. Push the hyoid laterally to the side of lesser ligament tenderness and apply a pulsating pressure 20 to 30 times against the less tender ligament.
5. Soreness should be reduced over the point that the patient is holding. If not, check the TMJ, first ipsilateral and then contralateral for involvement.

Additional Points
- The temporomandibular joint can be related to any other joint, either ipsilateral or contralateral, in the body

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Cutaneous Receptors and Scars

Skin is the largest organ of the body. Proprioceptors in the skin tell us where our joints are. They are involved in the inhibition of some muscular activity. Imbalances in these receptors can create muscular imbalances that lead to the continuation of many structural pain patterns. Challenge the skin over any suspected joint by lifting the skin and stretching it. Weakness will indicate involvement of the skin. Treatment consists of finding the direction of tugging that inactivates the weakening and then treating in the exact opposite direction while the patient inspires.

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Iliacus

Meridian:
- Kidney (Open ICV)

Origin:
- Upper ⅔ of the iliac fossa, internal border of the iliac crest, anterior sacroiliac joint, lumbosacral and iliolumbar ligaments, ala of the sacrum

Insertion:
- Lesser trochanter of the femur with the psoas

Nerve Supply
- Femoral nerve, L1, 2, 3

Neurolymphatic Reflexes
- Anterior: 1 inch superior and 1 inch lateral to the umbilicus
- Posterior: Intertransverse space between T12 and L1

Neurovascular Reflexes
- Inferior to the mid-section of the lambdoidal suture on the occiput

Action:
- With the psoas, flexes thigh; minimal activity on rotation of the thigh. The muscle supports the abdominal viscera. Aids in anterior support for the pelvis. Aids in the respiratory process through its reflex relaxation during inspiration and its contraction during forced expiration.

Indications:
- Will be unable to hold the test position. With bilateral weakness the patient will have problems with hip flexion, especially on arising from a supine position. With unilateral weakness the patient will rotate the trunk to the side of weakness when arising from a supine position. Anterior supporter of the SI joint, possibly find a posterior ilium in association with weakness.

Body part position:
- Supine patient, flexes and externally rotates the hip. The leg is kept in its anatomical position without abduction or adduction.

Stabilization:
- The pelvis below the ASIS as to not challenge or use a painful contact, making sure not to allow the patient to rotate the pelvis

Vector of Force:
- Contact on the anterior medial distal femur or at the ankle, depending on the amount of leverage that is needed

Nutrition:
- Vitamin A and E, Kidney Concentrate or nucleoprotein extract
- Also see open ICV

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### Ileocecal Valve

The ileocecal valve is the anatomical junction between the large and small intestines that is supposed to keep the contents of the large intestine from regurgitating into the small intestine. The ICV has been described as a sphincter like thickening and a bicuspid like valve. The sphincter is under neurologic control and the valve is shaped to provide a mechanical oneway valve. The Applied Kinesiology examination and treatment of the ICV was introduced in 1967 by Dr. Goodheart.

In AK, we talk about the ICV being stuck open or closed. If the valve is “stuck” open then the bowel contents will regurgitate into the small intestine and be reabsorbed, increasing the toxicity. If the valve is “stuck” closed, then the small intestine contents will continue to be absorbed.

The valve is under neurological, hormonal control and can be influenced by the emotions primarily by reflexes within the cecum. When the cecum is distorted, the contraction of the sphincter intensifies. It can be influenced secondarily by visceral-sympathetic reflexes from other portions of the gastrointestinal tract, like the kidneys or the peritoneum. An increases in colonic pressure squeezes the valve shut while ileal pressure tends to open the valve. Symptoms may include bowel changes, shoulder, back, heart, sinus, head, bursitis or sacroiliac type pains. Dizziness, fatigue or pallor. Dark circles under the eyes. The etiology could be related to imbalances in the functioning of the valve caused by excess or inadequate roughage, coffee, alcohol, failure of mastication, excess gas formation, etc..

### Signs and Symptoms of ICV:

<table>
<thead>
<tr>
<th>Shoulder pain</th>
<th>Faintness</th>
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<tbody>
<tr>
<td>Sudden low back pain</td>
<td>Pseudo sinus infection</td>
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<tr>
<td>Pain around the heart</td>
<td>Pseudo hypochlorhydria</td>
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<tr>
<td>Dizziness</td>
<td>Headache</td>
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<tr>
<td>Flu symptoms</td>
<td>Sudden thirst</td>
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<tr>
<td>Pseudo bursitis</td>
<td>Pallor</td>
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<tr>
<td>Pseudo sacroiliac strain</td>
<td>Dark circles under the eyes</td>
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<tr>
<td>Tinnitus</td>
<td>Bowel involvement</td>
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<tr>
<td>Nausea</td>
<td>Pain of sudden onset, no hx of trauma</td>
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Diagnosis:
- Therapy localization to McBurney’s point weakens a strong indicator muscle
- To determine open or closed ICV you must challenge the valve
  - If a strong muscle weakens to pushing the valve towards the right acetabulum (opening the valve) this would be the challenge direction for a closed valve
  - If a strong muscle weakens to pulling the valve towards the left shoulder (closing the valve) this would be the challenge for an open valve

Treatment of the Open type of Valve:
- Contact below the valve and push upwards towards the left shoulder (the patient can do this)
- While holding this contact, treat the reflexes and continue to hold the abdominal contact until a pulsation is felt
- Nutrition:
  - Chlorophyll, okra, flora
- Related muscle weakness:
  - Iliacus, abdominal oblique, pelvic floor
- Cranial Fault:
  - Zygomatic suture
- Spinal level:
  - C5 - L1
- Reflexes:
  - Chapman: Located over the anterior humerus along the bicipital groove
  - Chapman: Just inferior to the anterior superior iliac spine
  - Chapman: Over the third cervical lamina on the left
- Acupuncture point:
  - K - 5 on the right
  - BI - 58 on the left

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**Treatment of the Closed Type of Valve:**
- Contact below the valve and push down towards the right acetabulum (the patient can do this)
- While holding this contact treat the reflexes continue to hold the abdominal contact until a pulsation is felt
- Nutrition:
  - Calcium, magnesium, flora, choline
- Related muscle weakness:
  - Quadriceps (rectus)
- Cranial Fault:
  - Universal – Interosseous
- Spinal level:
  - C3 - L3
- Reflexes
  - Located along the lower rib margins
- Meridian Point
  - Bilateral Bl - 58

**Lasting correction-fix the D.A.P.E.S (A.P.E.S.-Walker)**
- Diet, Allergies, Parasites, Emotions, Structural

**Eating right**
- Intestinal lining health/ileocecal valve

**Don't eat…**
- WHEAT, CORN, DAIRY, SOY, SUGAR
- popcorn
- nuts/seeds
- whole grains
- spicy
- alcohol
- chocolate/cocoa/cacao
- caffeine (1 or 2 cups in morning is ok)

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Pectoralis Minor

Meridian
• Stomach

Origin:
• Arises from the third, fourth and fifth ribs near the junction of the rib and its costal cartilage

Insertion:
• Into the coracoid process of the scapula

Nerve Supply:
• C6, 7 & 8, T1, Medial pectoral nerve

Neurolymphatic Reflexes
• Anterior: Superior to the xiphoid process
• Posterior: None have been found

Neurovascular Reflexes
• None have been found

Action:
• Flexes the shoulder joint. Draws the scapula anterior and inferior. By itself, it can cause winging of the scapula. Aids in forced inspiration.

Indications:
• Entrapment syndromes involving arteries, veins and nerves. Edema. Decreased vital capacity. Weakness and/or numbness of the hand and arm.

Body part position:
• The arm is adducted with the elbow extended. The arm is placed directly over the fibers of the pectoralis minor (towards the opposite anterior superior iliac spine). The arm is then externally rotated.

Stabilization:
• The hand is placed over the shoulder not being tested

Vector of Force:
• Pressure is directed in an arcing fashion lateral to medial and superior

Nutrition:
• Zinc Liver Chelate, Chezyn, Trace Minerals B12

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Retrograde

The thoracic duct drains the major lymphatic vessels into the venous system. It drains the body except for the right side of the head and neck. The thoracic duct ends by an opening into the junction of the left subclavian and the internal jugular veins. The lymphatic system acts as a retrieval system for proteins, minerals, fats and vitamins. It is also a transport system for hormones.

An osteopathic procedure, designed to increase lymphatic drainage, was to pull and elevate the arms. Goodheart, on examining this, found that the pectoralis minor was shortened, restricting the lymph flow, and the treatment produced many measurable changes in the body.

Movement of lymph is primarily done by: muscle activity, passive muscle activity, blood vessel activity, contractions of the intestinal tract, gravity, and diaphragm activity. Goodheart found that a shortening of the pectoralis minor muscle could block the flow of lymph.

• Correcting this would cause increased lymphatic drainage

Symptoms

• Muscle or joint tenderness
• Edema
• Poor response to nutritional supplementation
• Weakness of leg and left arm muscles with the patient in a retrograde position
• Weakness of the right arm when it is elevated
• Poor immune function
• Slow healing
• Types of problems
• Local muscle or organ malfunction = Lymphatic reflexes
• Leg left arm edema - weakness
• Retrograde lymphatic - left lymphatic duct
• Symptoms that get better with movement

Diagnosis:

• Test for a strong indicator muscle (usually the tensor fascia lata)
• Place the patient in a retrograde position (the head lower than the pelvis)
• Retest the previously strong muscle

Treatment:

• If the weak is found, then the pectoralis minor is treated
  • If muscle is weak in the clear then test for O/I, SC or GTO techniques
  • If it is strong then stretch the pec minor if it then weakens, use facial flush technique to the muscle
• At times, the pectoralis clavicular and sternal may also have to be treated
• The neurolymphatic reflex for the pectoralis minor, located at the junction of the xiphoid and the sternal body, should be treated for approximately two minutes
• Check patient’s zinc status

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Right Lymphatic Duct

Symptoms:
- Neck lymphatic node tenderness
- Head (sinus-ear) symptoms
- Weakness of neck and right arm muscles with the patient in a weight bearing position

Procedure
- Test a muscle of the right arm for strength
- Have the patient flex the neck and then flex the head on the neck. This places stress on the lymphatic drainage. Retest the previously tested muscle.
- If weakness occurs, have the patient elevate the chest cage, do not have the patient take a breath, and retest the now weak muscle. If the muscle is now strong, an involvement of the pectoralis minor has been found.
- Before correcting the pectoralis minor muscle, test the patient for a respiratory cranial fault
- If a fault is found, Goodheart recommends correcting the fault using masking
- Masking is the process of covering the mouth and nose with a bag and having the patient rebreathe their own air
- This breathing of an increasing amount of carbon dioxide is done for five to six respirations while you are correcting any respiratory fault found
- The pectoralis minor is treated using the fascial technique
- At times, the pectoralis clavicular and sternal may also have to be treated
- The neurolymphatic reflex for the pectoralis minor, located at the junction of the xiphoid and the sternum, should be treated for approximately two minutes

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