Considerations and Treatment of the Extremity Syndromes

Presented by
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MOTION PALPATION INSTITUTE

Analysis of the Foot & Ankle

- Ankle Mortise Joint
  - ✓ Internal Rotation with A-P Glide
  - ✓ External rotation with P-A Glide
  - ✓ LAE (long axis extension)
- Subtalar Joint
  - ✓ Medial to Lateral Tilt/Glide, **Eversion**
  - ✓ Lateral to Medial Tilt/Glide, **Inversion**
  - ✓ P-A Glide with Eversion
  - ✓ LAE
- Calcaneocuboid Joint
  - ✓ PD Spin
  - ✓ DP Spin
- Midtarsal (Metatarsals/Cuneiforms)
  - ✓ 1st Metatarsal/1st Cuneiform
    - PD Spin & DP Spin
  - ✓ 1st Cuneiform/Navicular
    - PD Spin & DP Spin
  - ✓ TCN
    - PD Spin & DP Spin

Analysis of the Foot & Ankle

- A quick commentary on foot & ankle palpation
  - Unlike most palpation where very gently contacts are encouraged, the foot requires very firm palpatory contacts
  - The fascial & capsular tissues of the foot are very strong & rigid to support the weight of the body
  - The typical amount of movement for most joints is also diminished in the foot with the exception of the MP joints & the AM – therefore a better way to palpate for restriction in most joints of the foot is: ***the joint either moves or it doesn't. PEROID.***
  - The most movable, functional joint of the foot appears to be the ankle mortise. If stabilization of one bony part to another is not sufficient the movement is transferred to the ankle mortise and the examiner assumes the foot is then moving normally – therefore no treatment is given when it is needed
  - ***A good rule to follow --- is to never let the contact or palpation hand overpower the stabilization hand***

Analysis of the Foot & Ankle

- AM Internal Rotation with A-P Glide
  - ✓ Technique:
    - Foot is in dorsiflexion & eversion then stabilized firmly
    - Tibia is Internally Rotated
    - Palpation is performed with a force through the AM by contacting the Tibia
    - Manipulation is short thrust through the joint

Analysis of the Foot & Ankle

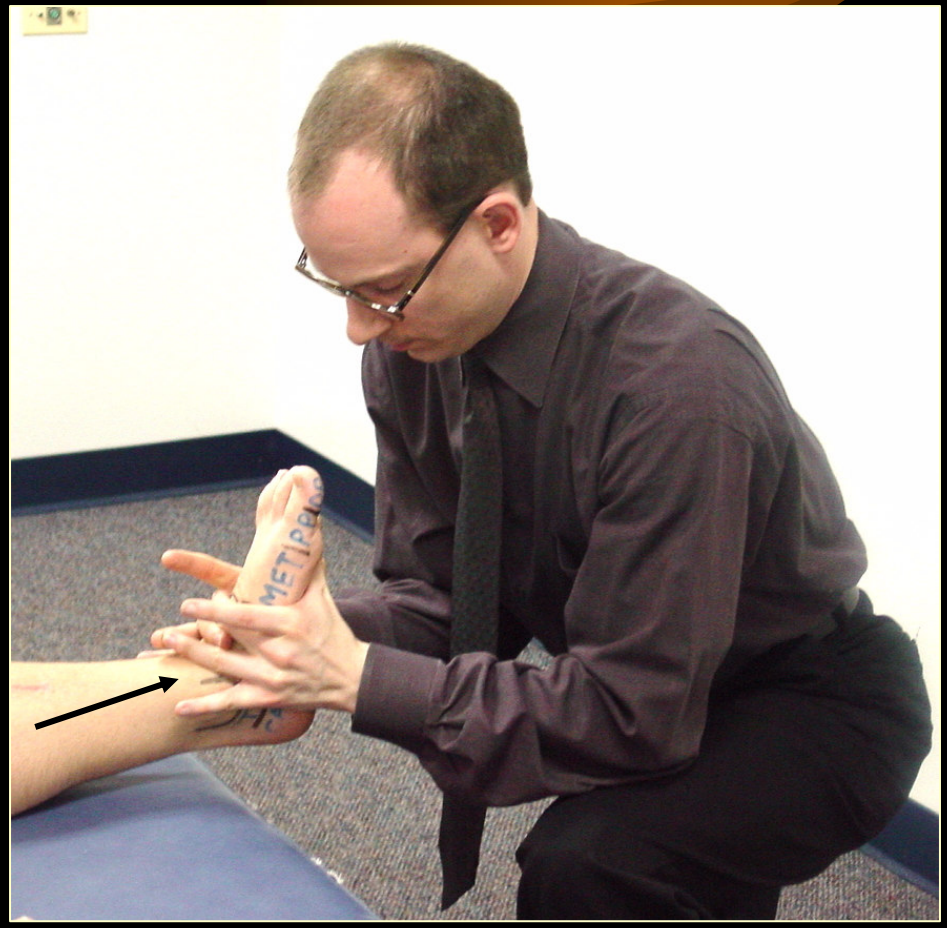
- AM External Rotation with P-A Glide
  - ✓ Technique:
    - Foot is in dorsiflexion & eversion then stabilized firmly
    - Tibia is Externally rotated slightly by allowing the hip to abduct
    - Talus is internally rotated
    - Palpation is performed with a force through the AM by contacting the talus & maintaining the internal rotation
    - Manipulation is short thrust through the joint

Analysis of the Foot & Ankle

- AM LAE (long axis extension)
- Technique
  - Palpation of the AM in LAE requires very good stability of the tibia
  - Notice the patient's "frog-leg" type position
  - In this position the doctor can stabilize the tibia firmly with the forearm and the thigh the tibia is resting on
  - The contact is primarily over the dome of the talus with support on the posterior surface of the talus with indifferent hand
  - Joint play is purely distraction
  - One method of mobilizing the joint is a strong & repeated "milking" type motion in distraction, this ensures no movement will occur in the knee & hip if there is increased risk due to previous damage to these structures

Manipulation of the Foot & Ankle

- AM LAE (long axis extension)
- Technique:
  - Overlapped fingertip contact over the dome of the talus
  - Dorsiflex & evert the foot fully & then back off a few degrees, then allow to calcaneofibular ligament to be lax & prevents injury (fully loaded under full dorsiflexion & eversion) to this ligament
  - To prevent movement of the hip, quickness is required, also have the patient hold the table at the hip level which will create some tension in the pelvis to prevent hip movement



Analysis of the Foot & Ankle

- Subtalar Joint - Inversion & Eversion
  (previously known as Medial & Lateral Side Slide & Tilt)

Technique:

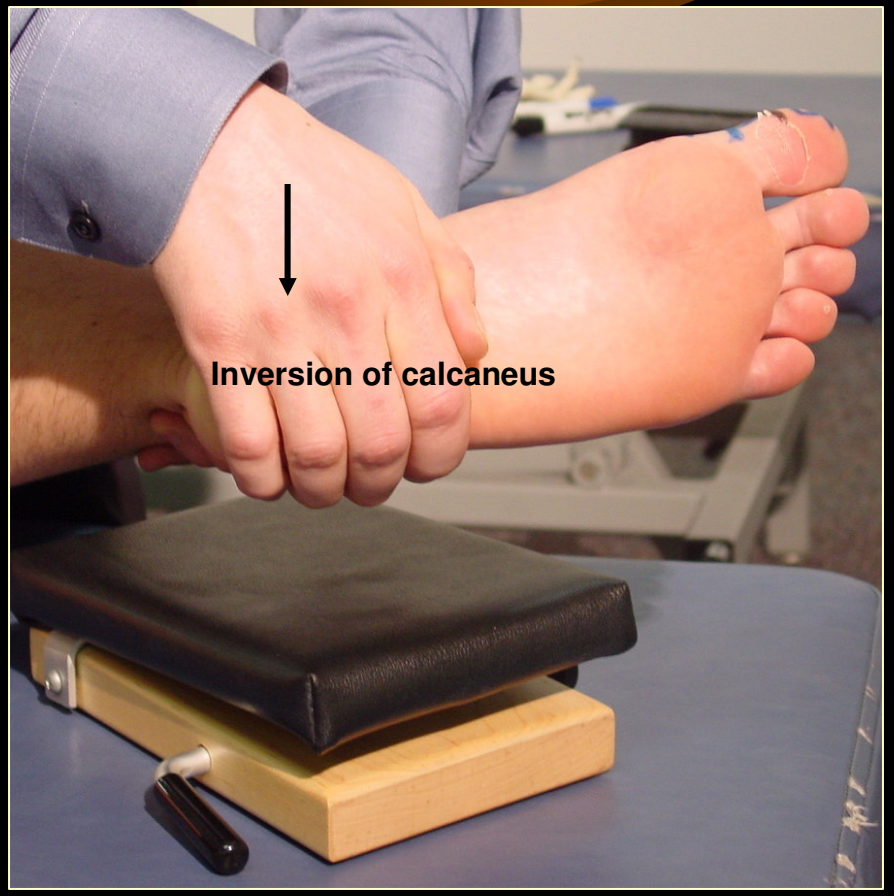
1. **Stabilize Talus firmly with Web Contact**
2. **Firmly grab calcaneus and move in Eversion & Inversion motions**

Manipulation of the Foot & Ankle

- Subtalar Joint - Inversion & Eversion
  (previously known as Medial & Lateral Side Slide & Tilt)

Manipulation of the Foot & Ankle

- Subtalar Joint,Inversion & Eversion
  - From the basic palpation position the doctor can then added an adjustive thrust
  - The Talus **must** be maintained in neutral while the calcaneus is either inverted or everted
  - The doctor should be positioned at the knee that is at ~ 90° of flexion and stabilized by the doctor's thighs
  - Once the positioning is attained and stable a short thrust is directed into the toggle board



Analysis of the Foot & Ankle

- P-A Glide with Eversion of the Calcaneus (subtalar joint)

Technique:

1. **Stabilize calcaneus with foot in Eversion & moderate Dorsiflexion against the table**
2. **Palpation hand makes a web contact over the dome of the talus and applies pressure from Anterior to Posterior**

Manipulation of the Foot & Ankle

- P-A Glide with Eversion of the Calcaneus (subtalar joint)

Technique:

1. **Stabilize calcaneus with foot in Eversion & moderate Dorsiflexion against the table**
2. **Contact hand is placed as web contact over the dome of the talus**
3. **To protect the knee form hyperextension the unaffected foot is placed under the knee in a figure four position**
4. **A short thrust into the board creates a "relative" PA glide of Calcaneus with Eversion**

Analysis of the Foot & Ankle

- Subtalar Joint LAE

Technique:

1. **Stabilize Talus firmly with Web Contact & pressure against the examiners thigh**
2. **Firmly grab calcaneus and move away from talus in pure distraction**
3. **Inadequate stabilization of *any* of the subtalar motions results in failure to find subtalar restriction – which are very very common due to previous injury**

Manipulation of the Foot & Ankle

- Subtalar Joint LAE

Manipulation of the Foot & Ankle

- Subtalar Joint LAE
  - The most difficult of all adjustments for the human body is the subtalar joint in LAE
  - It requires and incredible grip, incredible speed and correct positioning or setup
  - Lack of the above noted requirements results in movement of the AM, Knee, or Hip
  - **Technique:**
    - **Web contact is placed under lateral malleoli with fingers wrapping firmly around the calcaneus on the medial surface (typically the grip can be modestly uncomfortable, especially with severe restriction in the subtalar joint)**
    - **The indifferent hand is at any level along the dorsum of the foot to retain neutral (no Plantarflexion or Inversion)**
    - **Light traction is produced with simultaneous eversion followed by a very fast thrust**

Analysis of the Foot & Ankle

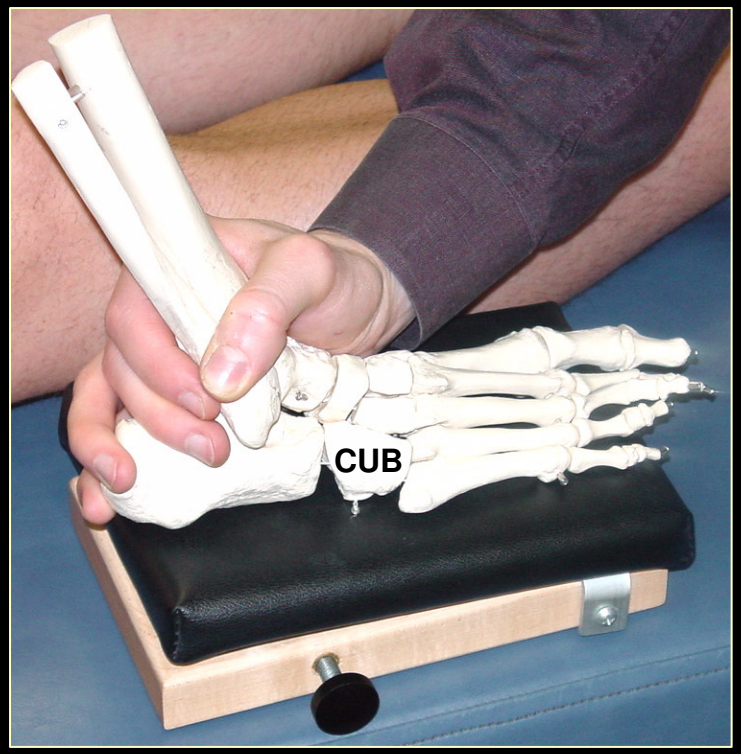
- Calcaneocuboid Joint
  - PD Spin
  - DP Spin

Analysis of the Foot & Ankle

- Calcaneocuboid Joint
  - PD Spin
  - DP Spin
- Technique:
  - The patient's foot is placed on the doctor's thigh is a purely neutral & relaxed position – hip & knee @ 90° of flexion with no adduction or abduction of the hip
  - Locate the cuboid and pinch it firmly between the thumb and the two fingers of the contact hand
  - Stabilize the foot firmly with the indifferent hand over the dorsum of the foot and allow no inversion to occur
  - A PD spin is created by pushing up & out while the PD spin is created by pulling the cuboid from the dorsal surface down and in
  - *Most patients with a pronated foot lack the PD spin motion & patient's with a supinated high arched foot lack a DP spin motion*

Manipulation of the Foot & Ankle

- Calcaneocuboid Joint
  - DP Spin



Manipulation of the Foot & Ankle

- **Calcaneocuboid Joint - PD Spin**
- Technique:
  - To create PD spin the examiner used the middle finger under the cuboid creating an upward spin (very firm) the rest of the hand forces the dorsum of the foot flat onto to the board making sure the great toe is flat on the table
  - The indifferent arm gently abducts the hip by pushing outward on the tibia to create a tension in the calcaneocuboid joint and then a thrust is performed on the talus to force the calcaneus away from the cuboid

Manipulation of the Foot & Ankle

- **Calcaneocuboid Joint - PD Spin (alternate method)**

Manipulation of the Foot & Ankle

- **Calcaneocuboid Joint - PD Spin (alternate method)**
- Technique:
  - Initial setup begins by placing the hip in a frog leg type position with foot on the boot in a parallel position and the lateral malleolus on the board to protect the ankle from inversion
  - The firm thumb contact is made on the plantar surface of the cuboid
  - The pisiform of the indifferent hand strikes the cuboid
  - A MOST EXCELLENT ADJUSTMENT !!!!!

Analysis of the Foot & Ankle

- Midtarsal (Metatarsals/Cuneiforms)
  - ✓ 1st Metatarsal/1st Cuneiform
    - PD Spin & DP Spin
  - ✓ 1st Cuneiform/Navicular
    - PD Spin & DP Spin
  - ✓ TCN
    - PD Spin & DP Spin

- This is actually a palpation technique that can be applied from the first ray to the shared joint capsule of the **Talocalcaneonavicular (TCN)** joint – it duplicates the internal & external rotation motions of the forefoot that match the phases of gait

Analysis of the Foot & Ankle

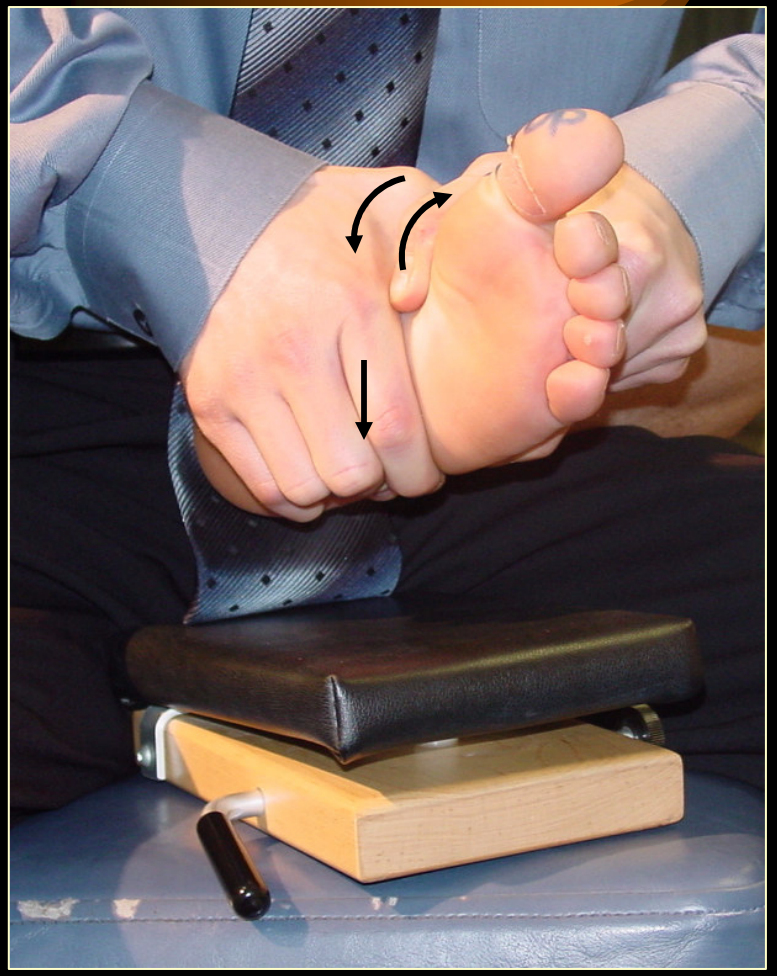
- DP Spins

Plantarflexion,
Inversion &
Downward (DP) spin
of distal bone

Analysis of the Foot & Ankle

- PD Spins

Dorsiflexion, Eversion & Upward (PD) spin of distal bone



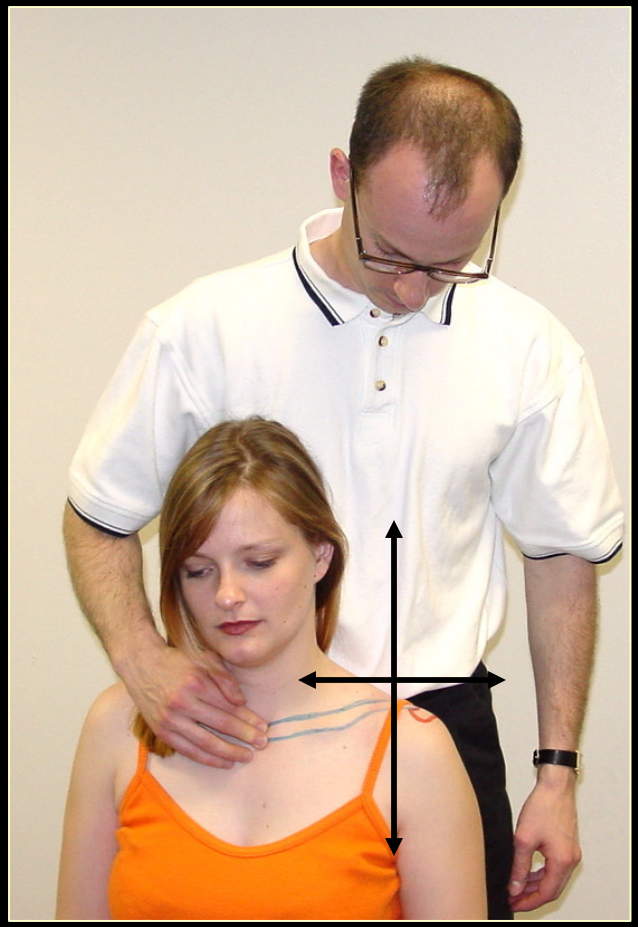
Analysis of the Foot & Ankle

- Technique:
  - The joints are tested in consecutive order – **TCN, Navicular/cuneiform, cuneiform/1st metatarsal**
  - **DP spins** – stabilization hands creates "slight" ***plantarflexion & inversion***, contact hand creates a ***downward spin*** of adjacent distal bone
  - This is repeated for all three joints by moving the contact & stabilization hand down one bone toward the toes and repeating process
  - **PD spins** are identical except the motions are reversed – stabilization hand creates ***dorsiflexion & eversion***, the contact hand creates an ***upward spin***
  - Manipulation is performed by holding the foot in the restricted position with a short thrust into the toggle board

Analysis of the Sternoclavicular Joint

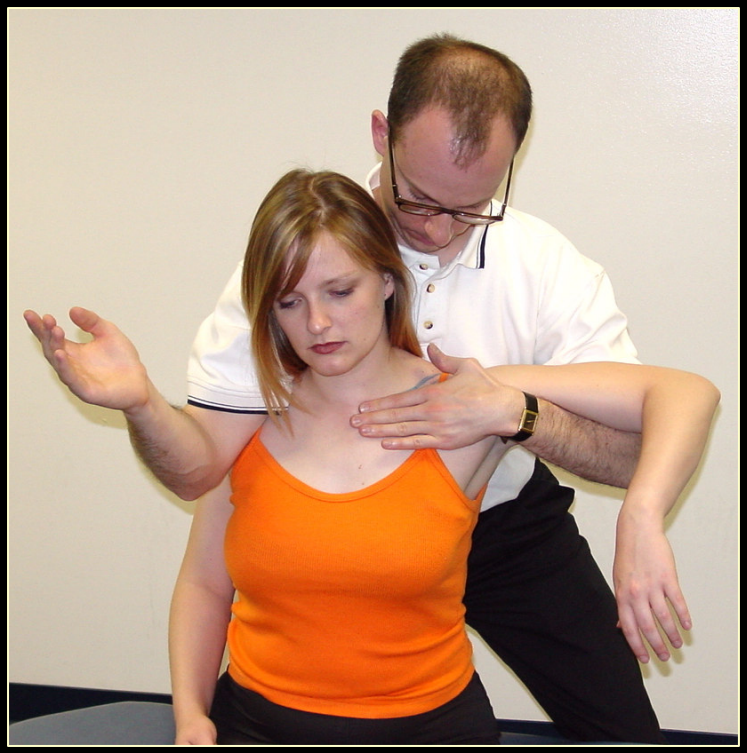
- ***Always consider posture*** … any patient with shoulder protraction & anterior head carriage will have SC joint compression & ***reciprocal Cervicothoracic restrictions***
- Analyze Active ROM during movements of Elevation, Depression, Protraction & Retraction of the shoulder complex
- Retraction joint play palpation – actually a combination of LAE & Retraction – most common loss of movement in the SC joint
- **Loss of the normal 55° of posterior rotation** of the distal 1/3 of the clavicle when moving from 90-180° of Glenohumeral Abduction (also a component of the SC joint)
- Due to the very small covering of skin, fascia, etc over the clavicle ***all palpation & manipulation may be uncomfortable***, use flat & soft contacts

Analysis of the Sternoclavicular Joint



Analyze Active ROM during movements of Elevation, Depression, Protraction & Retraction of the shoulder complex

Analysis & Manipulation of the Sternoclavicular Joint

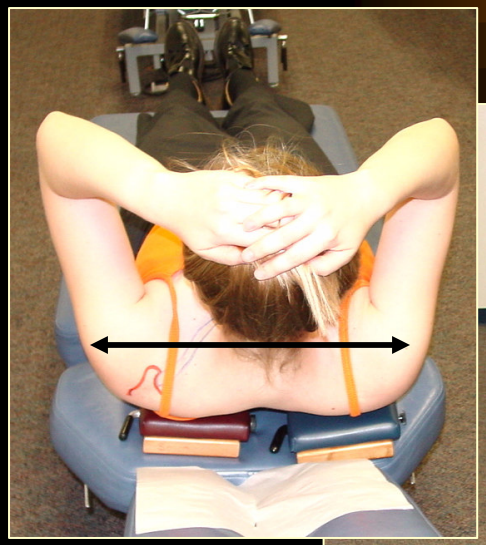


Retraction joint play palpation – actually a combination of LAE & Retraction
Manipulation is test plus impulse

Manipulation of Sternoclavicular joint

Toggle board method:

- Two toggle boards or similar method to make sure the torso is horizontal
- Soft, flat hand contact over the entire clavicle to prevent contact pain
- Arm is relaxed off the side of the table & the patient full inspires
- ***Thrust is "PURE" LAE (No AP movement) at full inspiration***



Analysis of the Sternoclavicular Joint

Alternate method of SC palpation & mobilization

Technique:

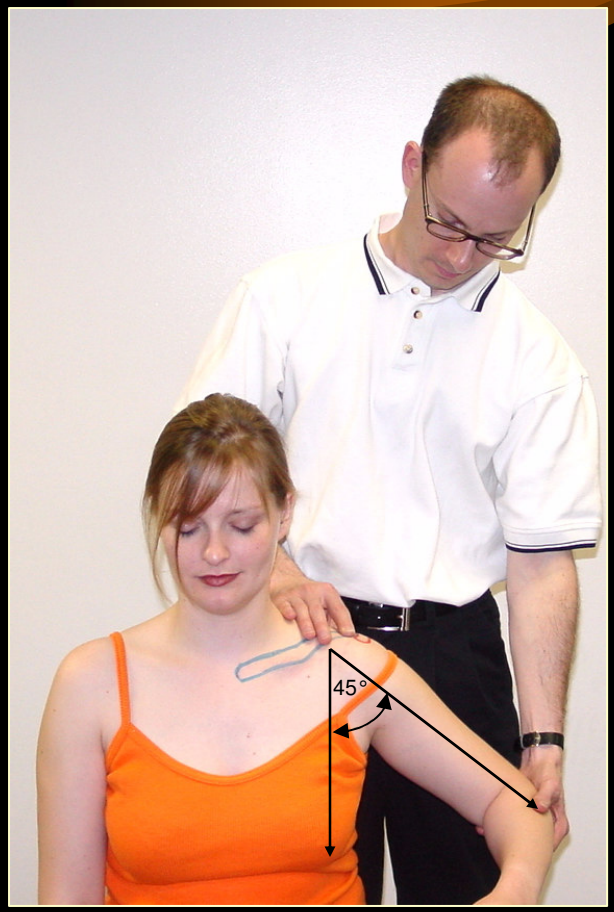
1. Fully elevate arm to create gap under clavicle
2. Place two to three fingers under midpoint of clavicle
3. Lower arm slowly to horizontal
4. Excellent method for older patients
5. ***Also a good method to determine restriction because attempts to lower arm in restricted SC joint will cause a "pinching" of the doctors fingers under the clavicle***

Analysis of the Acromioclavicular Joint

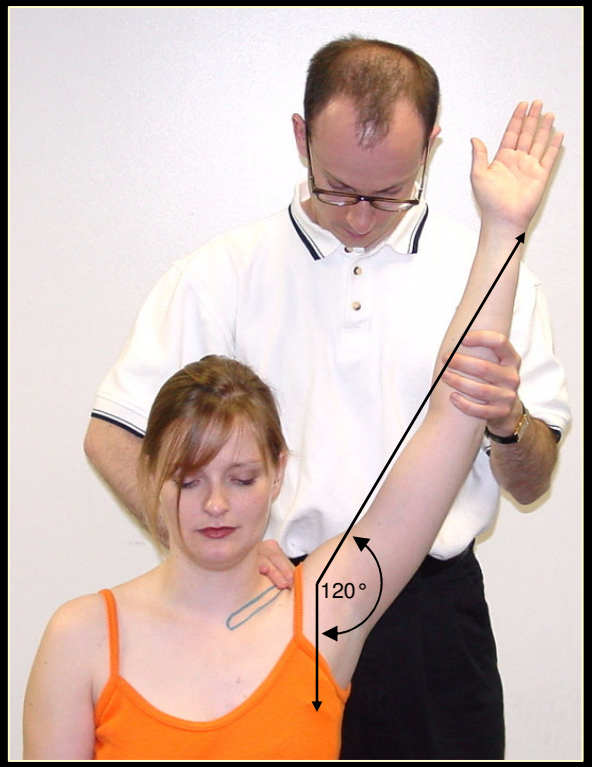
- Movement of the distal clavicle **before 45°** of Glenohumeral Abduction indicates lack of movement between the acromion & distal clavicle
- Pain **above 120°** of Glenohumeral Abduction (impingement of subacromial structures occurs at 60-120°) & Pain with **forced Adduction**
- **Loss of the normal 55° of posterior rotation** of the distal 1/3 of the clavicle when moving from 90-180° of Glenohumeral Abduction (also a component of the SC joint)
- Seated **joint play shear** of the AC joint

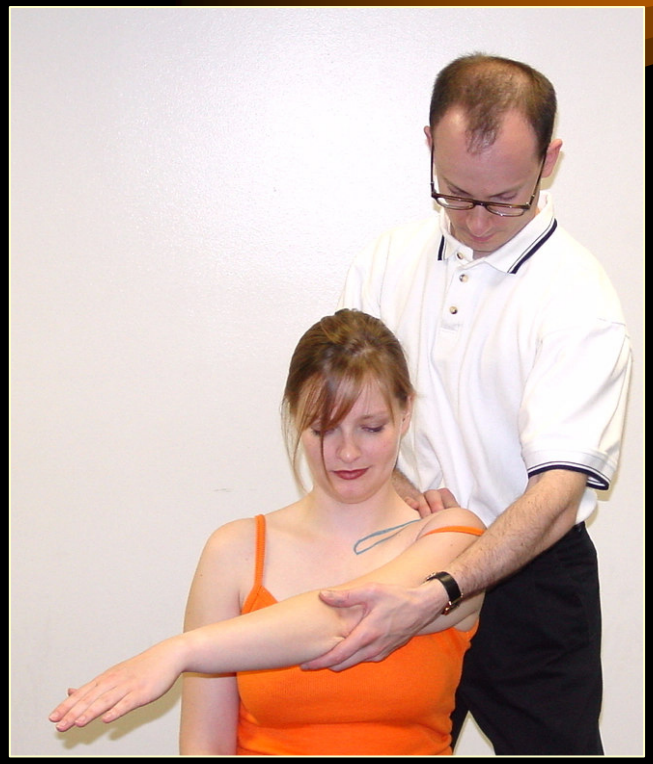
Analysis of the Acromioclavicular Joint

Movement of the distal clavicle before 45° of Glenohumeral Abduction indicates lack of movement between the acromion & distal clavicle



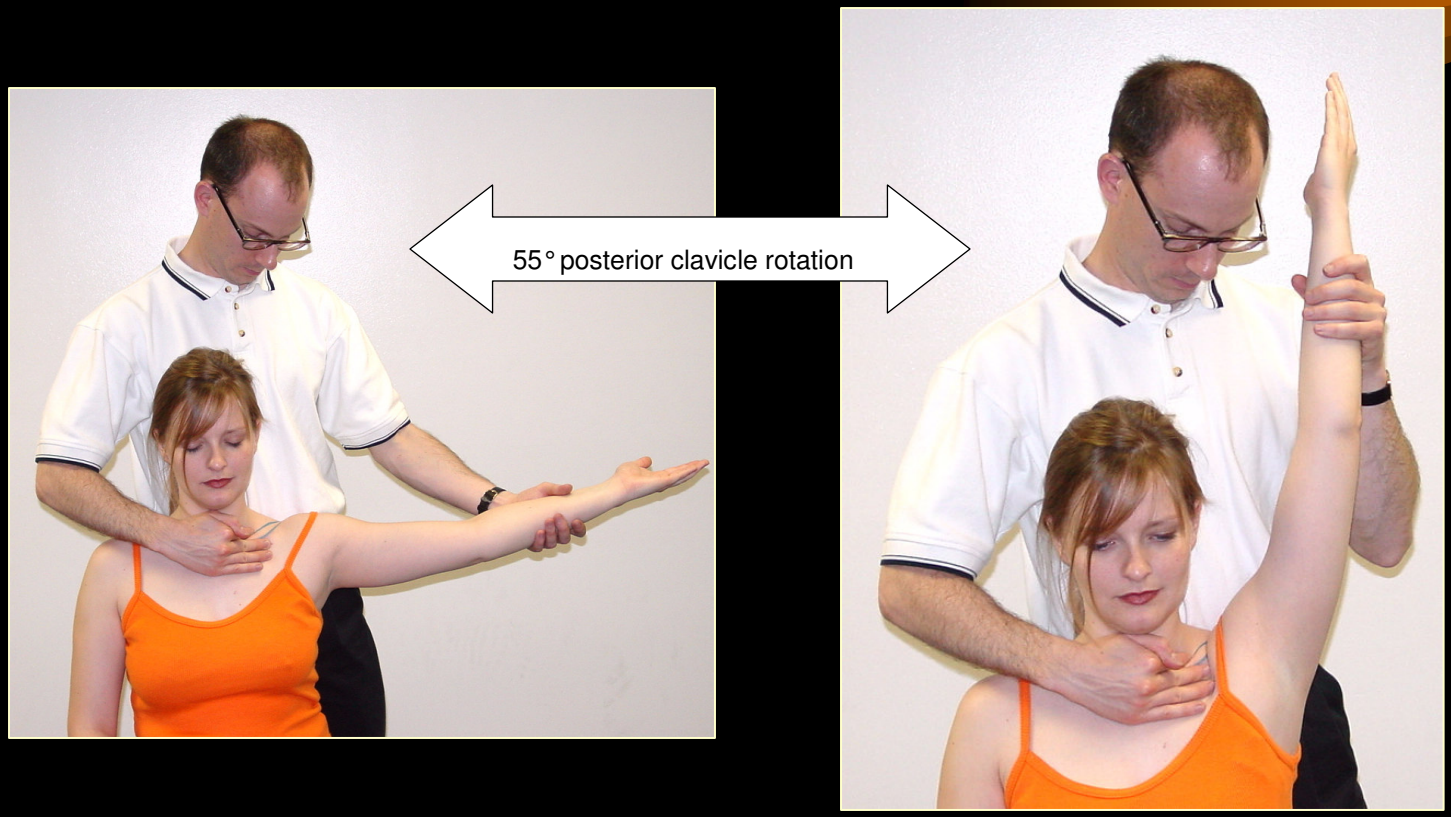
Analysis of the Acromioclavicular Joint





Pain above 120° of Glenohumeral Abduction (impingement of subacromial structures 60-120°) & Pain with forced Adduction

Analysis of the Acromioclavicular Joint



Loss of the normal 55° of posterior rotation of the distal 1/3 of the clavicle when moving from 90-180° of Glenohumeral Abduction

Analysis of the Acromioclavicular Joint

Seated joint play shear of the AC joint

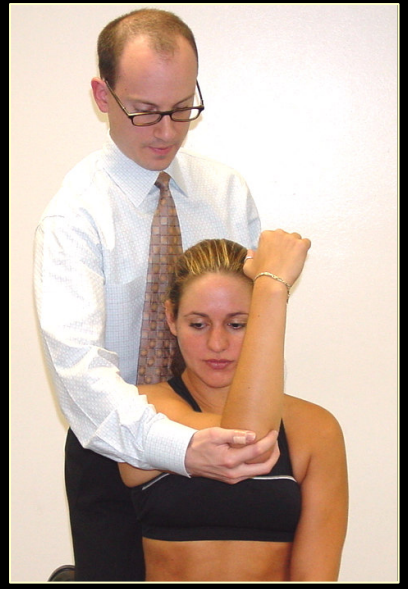
Manipulation of the Acromioclavicular Joint

- Do not stabilize the scapula during the manipulation
- Demo of Toggle board variety

Analysis of the Glenohumeral Joint

- Seated, posterior shear @ 90° with tolerable horizontal ADduction up to 45 degrees with internal rotation
- Seated, posterior shear @ 90° with tolerable horizontal ADduction up to 45 degrees with external rotation
- Inferior Glide or inferior glide with ABduction
- Supine Lateral Glide (LAE)
- ***Note – by anatomical design, the GH joint is a very lax joint … it is also greatly affected by protraction of the shoulder complex – making it more lax, less stable & more inflamed, care should be taken in the decision to manipulate this joint***

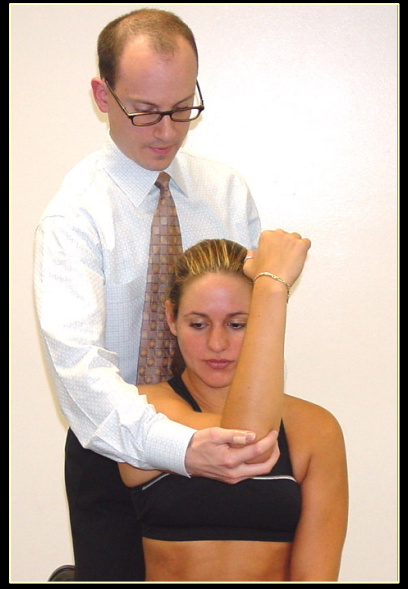
Analysis of the Glenohumeral Joint



Seated, posterior shear @ 90° with horizontal ADduction up to 45 degrees & internal rotation, manipulation is test plus impulse

(make sure to stabilize scapula with sternum)

Analysis of the Glenohumeral Joint



Seated, posterior shear @ 90° with horizontal ADduction up to 45 degrees & external rotation, manipulation is test plus impulse

Analysis of the Glenohumeral Joint

Inferior glide with Abduction
Doctor will demo adjustments

Manipulation of the Glenohumeral Joint

Supine Lateral Glide (LAE)
Manipulation is test plus impulse

Analysis of the Scapulothoracic Joint

- Definition - A soft tissue restriction of the layers of the muscles & fascia underlying the scapula & overlying the thoracic cage
- Common in any sub-clincial inflammatory state:
  - Chronic disease process, i.e. diabetes, inflammatory diseases
  - Chronic lifting – work activities or heavy exercise
  - Postural deformity – excessive KYPHOSIS
- A very important component of Adhesive capsulitis

Analysis & Mobilization of the Scapulothoracic Joint

Technique (side posture) :

1. Positioning is very important in this procedure
2. Typical Lumbar side posture position is employed with the exception of the downside hand which is placed underneath the patient's head, and the upside arm which is placed over the hip
3. Care must be taken to maintain the cervical spine in neutral – to prevent pull on the numerous muscles that attach to the scapula
4. Allow the patients pelvis to roll forward to rest against examiners thigh
5. The tip of the shoulder & hip are lined up with the patient's ear
6. One hand is placed on tip of shoulder and the dorsum of the fingertips are placed at the inferior border of the scapula
7. The hands are approximated and the fingers at the inferior of the scapula should slide fully underneath the scapula in a normal joint
8. Mobilization is performed by circumductng the scapula as the medial border of the scapula is pulled away from the thoracic cage ***(medial to lateral motion)***
9. A **lateral to medial motion** can also be created in those with obvious postural deformities – see DEMO

Many doctors place the hand behind the back but this tends to place too much pressure on the GH joint in those patients that are suffering from inflammation

Analysis of the Tibio-Femoral Joint

- Tibio-Femoral Articulation
  - Internal rotation
  - External Rotation
  - A-P Glide

Manipulation of the Tibio-Femoral Joint should be undertaken with care, mobilization is often safer and creates increased movement without the risk

Mobilization of the Tibio-Femoral Joint

Distraction (LAE) of the Tibio-Femoral Joint combined with internal & external rotation

Mobilization of the Tibio-Femoral Joint

Distraction (LAE) of the Tibio-Femoral Joint combined with AP Glide

Analysis of the Proximal & Distal Tibiofibular Articulation

- Standing evaluation of the Tibiofibular Articulation
  - Inferior Glide during late mid-stance evaluates the function of the fibula during gait, both the upper & lower articulation
  - The Lateral malleolus should drop inferior & glide anterior until late midstance when the malleolus glides superior & posterior

Manipulation of the Proximal & Distal Tibiofibular Articulation




Technique:

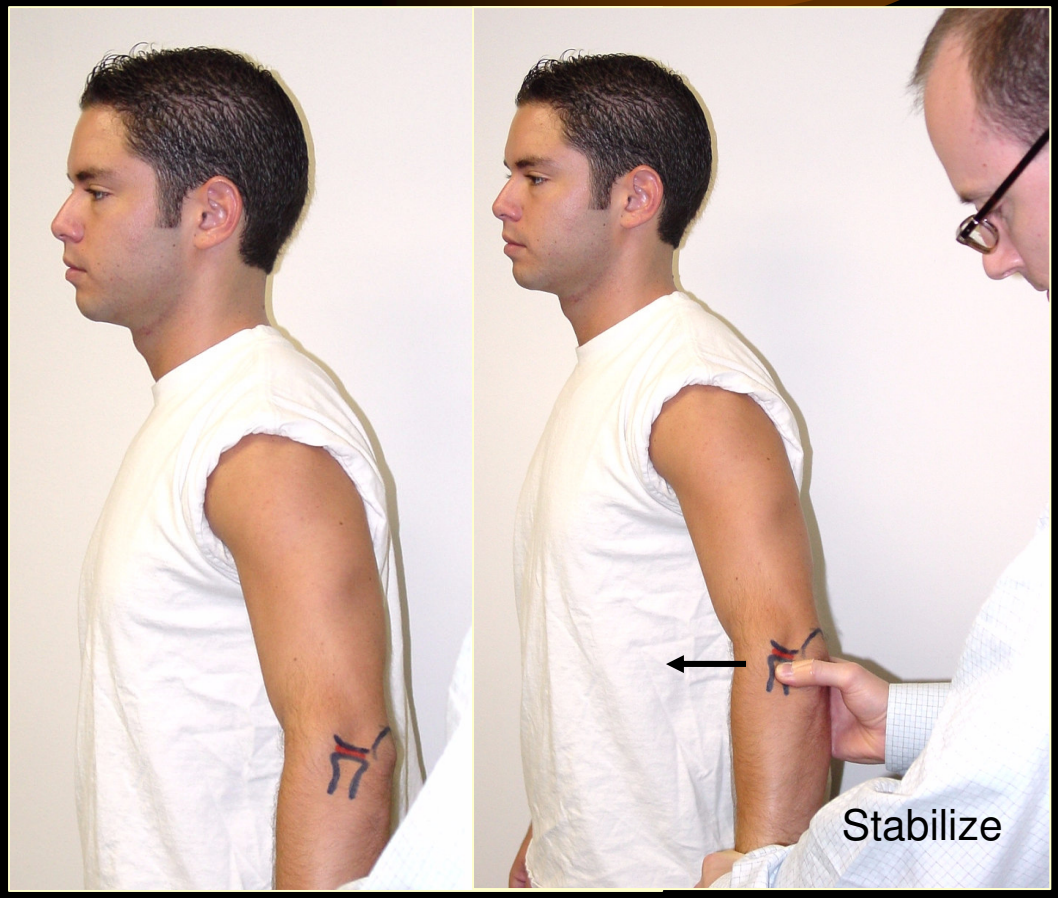
1. Toggle board is placed on the floor
2. Patient places affected leg on toggle board
3. The doctor stabilizes the medial knee firmly with one hand
4. The contact hand is placed over the fibular head with a cupped calcaneal contact
5. The patient creates a late midstance shift and the thrust is made toward the floor

Analysis of the Elbow complex

- Ventral glide of the radial head, PRONATION, Proximal Radio-Ulnar Joint
- Dorsal glide of the radial head, SUPINATION, Proximal Radio-Ulnar Joint
- Extension of the Ulno-Humeral joint
- The movements of the elbow are heavily influenced by posturally & ergonomically induced “FLEXOR DOMINANCE”
- ***Less manipulation & more stretching of various types – PIR, Strain-Counterstrain, Active Release, Quick stretches are usually more effective in restoring motion and reducing symptomology in the elbow & the wrist***

Analysis of the Proximal Radio-Ulnar Joint

Ventral glide of the radial head, ***Pronation***, manipulation is test plus impulse



Analysis of the Proximal Radio-Ulnar Joint

Dorsal glide of the radial head, ***Supination***

Manipulation is test plus impulse

Manipulation of the Proximal Radio-Ulnar Joint

Toggle Board Technique:

1. Stabilize Ulna
2. Internal Rotate Upper Arm
3. Thrust on Proximal radius for SUPINATION

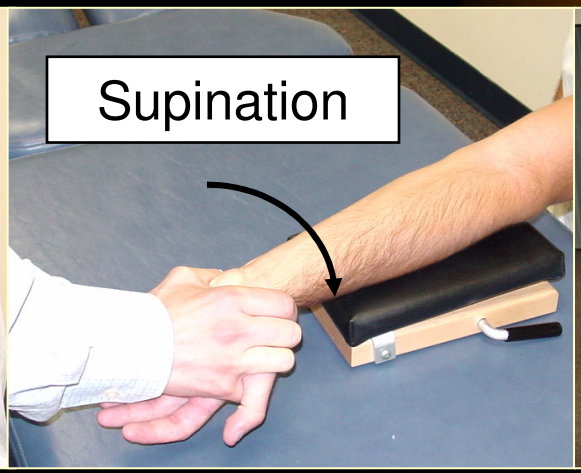
Analysis of the Ulno-Humeral joint, Extension

Two palpation methods:

1. Thumb up & fully supinated – heavy contribution of the common flexors
2. Thumb down & fully pronated – common flexor & bicep contribution to restriction reduced

Manipulation is test plus impulse

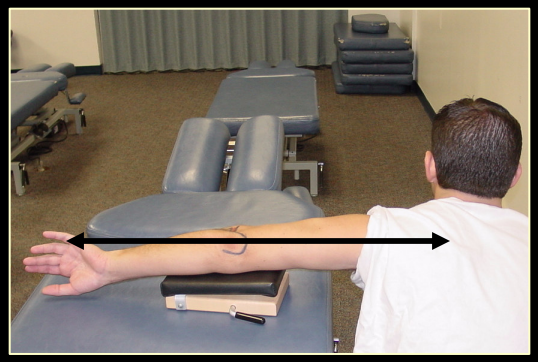
Quick Stretch Mobilization of Elbow Complex



Quick stretch of Common Flexors:

1. Arm & antecubital fossa must be parallel with the floor (for safety & reduction of discomfort)
2. Forearm is supinated and wrist & elbow extended
3. Upper arm is internally rotated
4. Soft tissue contact & thrust on common flexors
5. Can be performed for the entire length of the flexor group

Quick Stretch Mobilization of Elbow Complex



Quick stretch of Biceps:

1. Arm & antecubital fossa must be parallel with the antecubital fossa facing the toggle board
2. Doctor stabilizes olecranon against the board
3. Wrist is flexed & pronated, forearm is lifted slightly
4. Short thrust on the olecranon
5. Produces stretch on bicep & extension of the Ulno-Humeral joint simultaneously

Analysis of the Iliofemoral Joint

- Supine
  - AP glide with 90° of Hip Flexion
  - AP glide with 90° of Hip Flexion & Horizontal Adduction
  - AP glide with 90° of Hip Flexion & Horizontal Adduction & External Rotation
  - LAE – Long Axis Extension
- Prone
  - PA glide with Internal Rotation
  - PA glide with External Rotation

Analysis of the Iliofemoral Joint

AP glide with 90° of Hip Flexion

Manipulation of AP glide is performed with test plus impulse,
(more comfortable with toggle board under hip)

Analysis of the Iliofemoral Joint

AP glide with 90° of Hip Flexion & Horizontal Adduction

Manipulation is performed with test plus impulse, (more comfortable with toggle board under hip)

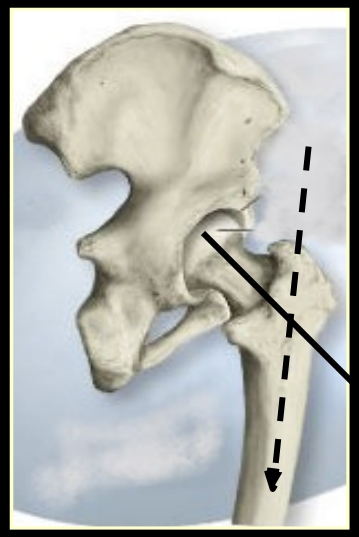
Analysis of the Iliofemoral Joint

AP glide with 90° of Hip Flexion & Horizontal Adduction & Internal / External Rotation

1. Perform very similar to previous test with only the addition of a small internal or external rotation component
2. In must be assumed that will all hip palpations with the possible exception of LAE movements – that various muscles that move the hip are also involved in the restriction
3. Manipulation of all the AP glide movements is performed with test plus impulse, (more comfortable with toggle board under hip)

Analysis of the Iliofemoral Joint

LAE – Long Axis Extension

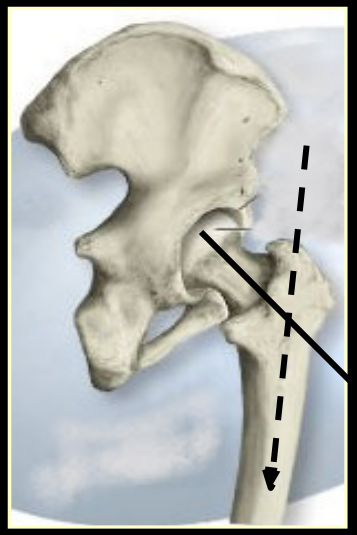


Manipulation of LAE is performed with test plus impulse, (more comfortable with toggle board under hip)

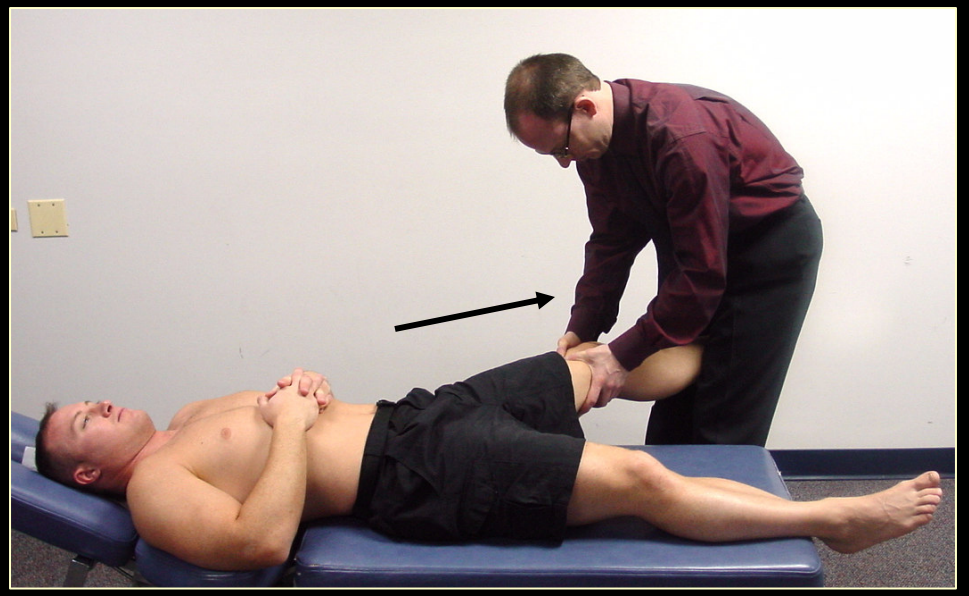
Analysis of the Iliofemoral Joint

LAE – Long Axis Extension – Alternate Method

Make sure to maintain firm grip above knee to prevent stress to knee



"True" Long Axis Extension



Manipulation of LAE is performed with test plus impulse

Analysis of the Iliofemoral Joint

PA glide with Internal & External Rotation

Manipulation of PA glide & Rotation is performed with test plus impulse, (more comfortable with toggle board under hip)

Analysis of the Wrist / Hand

- Intermetacarpal Joints
  - PA / AP Glide
  - Rotation
- Carpals - Scaphoid, Lunate, Triquetrum, Hamate, Capitate, Trapezoid and Trapezium - PA / AP Glide
- Distal Radio-Ulnar Joint
  - Dorsal and Palmer Glide
  - Rotation
- Transverse Carpal Ligament & Flexor Retinaculum – Opponens Roll
- Wrist function is dependent on elbow & shoulder movement and postural elements
- ***Loss of function in supination & extension of the elbow often leads to excess mobility in the small mobile joints of the wrist – this hypermobility can lead to a loss of rigidity in the Carpal Tunnel – leading to a greater prevalence of CTS***

Analysis of the Wrist / Hand

- Intermetacarpal Joints
  - PA / AP Glide
  - Rotation

See Demo

Analysis of the Wrist / Hand

Carpals (PA / AP Glide) - Scaphoid, Lunate, Triquetrum, Hamate, Capitate, Trapezoid and Trapezium

Analysis of the Wrist / Hand

Radio-carpal DP/PD glide

1. **Stabilize Distal RU joint**
2. **Locate carpal on dorsal & palmer surface**
3. **DP – PD Glide Motion**

Analysis of the Wrist / Hand

Intercarpal DP/PD glide

1. **Stabilize Adjacent Carpal**
2. **Locate carpals on dorsal & palmer surface**
3. **DP – PD Glide Motion**

Manipulation of the Wrist / Hand

Radio-carpal & Intercarpal DP/PD glide :

1. Toggle Board stabilizes adjacent bones & Distal RU
2. Pisiform of contact hand is placed over thumb contact restricted carpal
3. Short thrust over carpal restriction
4. Many combinations of restriction can be addressed this way simply by using remaining fingers & toggle board to stabilize carpals that surround restriction

Analysis of the Wrist / Hand

Both motions, ***DP & PD Glide & Rotation*** *can be tested by determining the ability of the Distal RU to lateral distraction*
Similar to the ankle the Distal RU joint must able to accommodate a spreading motion during wrist flexion & extension – if the Oblique cord & Interosseous ligament is normal

1. **Place middle two fingers in most distal part of joint**
2. **Stabilize Radius & Ulna**
3. **Overlap indifferent hand & apply Squeezing pressure**

Manipulation of the Wrist / Hand

Technique for DP-PD glide with rotation:

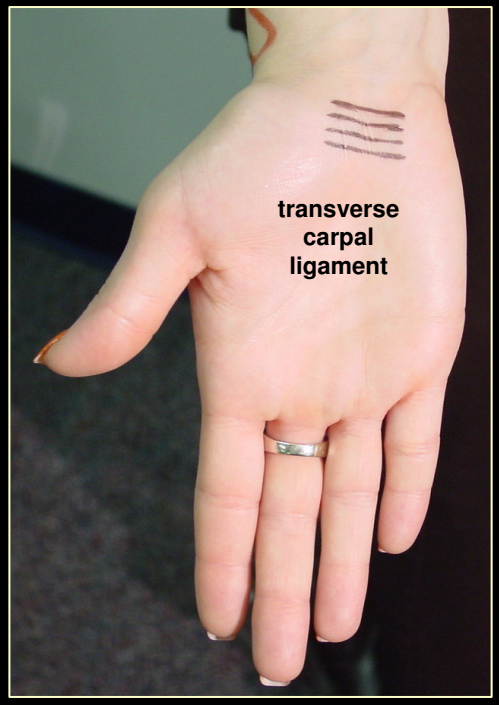
1. **Stabilize Ulna**
2. **Short thrust on Distal part of radius with thenar pad**
3. **Reverse the process for Ulna moving against Radius**

Manipulation of the Wrist / Hand

Technique for Lateral Distraction (separation) of Distal RU joint :

1. **Patient's hand flat on the toggle board**
2. **Ridge of the thumb is placed in the most distal part of the joint, soft pisiform is placed over doctor's thumb**
3. **Thrust is directed PA & toward the patient**
4. **This should thoroughly stretch the interosseous ligament because the ligament is already partially loaded in the pronated position**

Analysis of the Wrist / Hand



Technique:

1. **Stabilize Thenar & Hypothenar pad with doctor's thenar pad**
2. **Maintain wrist in slight extension**
3. **Apply stretching (spreading motion) to transverse carpal ligament**

Manipulation of the Wrist / Hand

Technique:

1. **Maintain spreading action of Transverse Carpal Ligament**
2. **Maintain wrist in slight extension**
3. **Apply short thrust onto toggle board**