Unlocking the Feet:
Improving Foot and Ankle Mobility

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Seminar Topics:

1. The whys of today's seminar

2. Muscles and Range of Motions

3. Evaluation of movement

4. Soft Tissue Release Prone

5. Soft Tissue Release Supine

6. Increasing ROM
   a. Tibiofibula joint
   b. Ankle joint (Talus)
   c. Subtalar joint (Calcaneus)
   d. Navicular
   e. Cuneiforms
   f. Cuboid
   g. Metatarsals

7. Re-evaluation of movement

8. Wrap up and evaluations
So: Why the feet?

- Bones, joints, muscles, tendons and ligaments
- Absorb body weight on average 3-4 times ones weight
- Our foundation; can dictate what happens further up the chain
- We just don’t pay much attention to them

Over Pronation:

- Disrupt the dispersions of forces
- Tibia, fibula, knee rotation
- Excessive forces through ankles
- Moves up the body

Look further up the body:

- Femur, pelvic girdle, anterior tilt
- Soft tissue stress from ground up: plantar fascia, Achilles, patella tendon, ITB
- Increase compressive loads: subtalus, patella femoral, tibial femoral, iliofemoral and SI joints
Muscles
- Tibialis Anterior
- Gastroc/Soleus
- Peroneals
- Intrinsic Muscles of the foot
- Extensor Digitorum group
- Flexor Digitorum group
- Plantar fascia

Range of Motion of the Foot and Ankle
- Dorsi flexion
- Plantar flexion
- Inversion
- Eversion
- Supination
- Pronation

Handout technique format:
Handout is organized to allow for ease in replication of technique. Each technique applied includes:
- Subject
- Position of client
- Position of therapist relative to client
- Hand position
- Movement/technique
Active Soft Tissue Release Prone

1. **Gastroc/Soleus: broadening**
   - **Client position:** Prone with foot supported on bolster
   - **Therapist position:** Standing at foot of table, same side
   - **Hand position:** fingers of both hands sink into midline of gastroc/soleus, spread tissue around the leg
   - **Technique:** Myofascial spreading across the fibers
   - **Movement:** Plantar flexion of foot
     - **Variation:** passive pin and friction tech on specific spots along the muscles as passively move foot into dorsi and plantar flexion

2. **Gastroc/Soleus: lengthening**
   - **Client position:** Prone with foot supported on bolster
   - **Therapist position:** Standing at foot of table, same side
   - **Hand position:** soft fist, finger, forearm resting on superior Achilles
   - **Technique:** Stripping length of Gastroc/Soleus group
   - **Movement:** Dorsi flexion of foot
     - **Variation:** passive pin and friction tech on specific spots along the muscles as passively move foot into dorsi and plantar flexion

3. **Fibularis: broadening**
   - **Client position:** prone with hip flexed and laterally rotated and knee flexed, lower leg supported on pillow
   - **Therapist position:** foot of table and side of table
   - **Hand position:** fingers, fists resting along posterior edge of fibularis
   - **Technique:** spread and broaden fibers by moving across the muscle
   - **Movement:** passive eversion

4. **Fibularis: lengthening**
   - **Client position:** prone with hip flexed and laterally rotated and knee flexed, lower leg supported on pillow
   - **Therapist position:** foot of table and side of table
   - **Hand position:** fingers, fists resting along posterior edge of fibularis
   - **Technique:** stripping and friction along the length of the muscle group
   - **Movement:** passive inversion
Active Soft Tissue Release Supine

5. Gastroc/Soleus/Tibialis Posterior/Digitorum:
   - **Client position:** Supine with knee flexed foot flat on table
   - **Therapist position:** seated at side of table at the feet stabilizing clients foot and leg
   - **Hand position:** both hands reach around leg to gastroc/soleus
   - **Technique:** kneading, stripping and broadening techniques along length of gastroc/soleus; stripping along medial/distal aspect into tibialis posterior
   - **Movement:** no movement with this technique

6. Tibialis Anterior 1: broadening
   - **Client position:** Supine, legs extended and support under knees
   - **Therapist position:** Standing same side of table near feet,
   - **Hand position:** One hand guiding foot; one hand, fingers, soft fist engaging tissue at distal tibialis anterior
   - **Technique:** One hand guiding foot, one hand crossing fibers of tibialis anterior,
   - **Movement:** dorsiflexion (only engage 4-5 times actively so as to avoid cramping)

7. Tibialis Anterior 2: lengthening
   - **Client position:** Supine, legs extended and support under knees
   - **Therapist position:** Standing same side of table, near feet
   - **Hand position:** One hand guiding foot; one hand, fingers, soft fist engaging tissue at distal tibialis anterior
   - **Technique:** stripping length of muscle
   - **Movement:** plantar flexion (only engage 4-5 times actively so as to avoid cramping)

8. Tibialis Anterior 3:
   - **Client position:** Supine with legs extended on table, move one leg closer to midline
   - **Therapist position:** Standing opposite side of table
   - **Hand position:** Working across the table; begin by resting fingers on anterior/lateral aspect of tibia.
   - **Technique:** myofascial spreading and friction along length of tibialis anterior; use tibia as anchor and guide.
   - **Movement:** dorsiflexion (only engage 4-5 times actively so as to avoid cramping)
9. **Dorsal foot surface:** there are a number of ways to work this area; here is one:
   - **Client position:** Supine with legs extended on table
   - **Therapist position:** Seated at foot of table facing client
   - **Hand position:** one hand used to apply technique; one hand used to move foot
   - **Technique:** varied forms of myofascial spreading over tarsals as move foot from neutral into plantar flexion.
   - **Technique:** friction and myofascial work between metatarsals as move foot from neutral into plantar flexion
   - **Technique:** shearing of metatarsals followed by rotation of the foot with heel stabilized

10. **Plantar foot surface:** there are numerous methods of working this area including:
    - **Client position:** Supine with legs extended and bolstered under knees
    - **Therapist position:** Standing at corner of table with knee resting on table
    - **Hand position:** wrist of working hand resting on the therapists’ leg. Other hand stabilizing the foot
    - **Technique:** friction and stripping throughout the plantar surface of the foot; follow with stretch to plantar surface; can move either your hand to create the technique or move the foot against the fingers to create the technique
Bones and Joints of the lower leg, ankle and foot

Tibiofibula joint:
- Posterior lateral surface of tibia and head of fibula
- Reduce torsional stress at ankle
- Minimize lateral bending of tibia
- Decrease weight-bearing torsion
- Transmits axial loads in weight-bearing

Movements between Tibia and Fibular head:
- Anteroposterior glide
- Superoinferior motion and rotation
- Movement of the proximal tibiofibular joint is impossible without movement at the distal end

Impaired mobility of Proximal Tibiofibular joint:
- Decreased range of motion at the ankle joint; in particular dorsiflexion
- Lateral knee pain

Increasing ROM at Tibia/Fibula Joint

1. **Tibia/ Fibula Articulation**: work from proximal end: Begin by testing ROM of the ankle in plantar and dorsiflexion. Note mobility.
   - **Client position**: Supine with knee flexed foot flat on table
   - **Therapist position**: foot of table facing client
   - **Hand position**: medial hand stabilizing tibia; lateral hand palm resting in proximal tibialis anterior over proximal fibular head
   - **Movement**: rhythmic compressions over proximal aspect of tibialis anterior feeling for **Tibiofibular joint movement and/or restriction**. Work at proximal end.
   - **Do Not Force Movement.** Only move the joint through its comfortable ROM.
Movement of the distal fibula with ankle movement:
- Posterior glide with dorsiflexion
- Some movement possible with plantar flexion
- Strength of ankle joint dependent upon strength of distal tibiofibular joint.

Distal Tibiofibular/Talus joint
- Makes up the ankle joint
- Includes fibula, tibia and talus
- Dorsi and Plantar flexion

Talus
- Along with tibia and fibula makes up ankle joint
- Cylindrical top rolls within the mortis
- Allows foot
  - to tilt, shift or lean quickly
  - Subtalar joint includes talus and calcaneus
  - Can slide forward and back on Calcaneus
  - Can be involved in ankle impingement: impingement of the joint capsule

Increasing ROM at Talus/Fibula/Tibia Joint

2. Talus: articulates with Tibia/Fibula
- **Client position:** Supine with legs straight or bolstered under knees
- **Therapist position:** standing at foot of table facing client
- **Hand position:** Stabilize tib/fib by holding at the ankle with more proximal hand; grasp middle of foot just below talus with lateral hand.
- **Movement 1:** gently pulling foot forward and back while stabilizing leg.
  - **Note:** if you feel excessive movement in the ankle joint or notice the ‘ankle drawer sign’ discontinue movement as there is too much laxity in the ligaments surrounding the ankle.
- **Movement 2:** rotate foot creating movement of the talus
Taluscalcaneal joint (Subtalar Joint)
- Made up of the Talus and Calcaneus
- These bones also articulate with Navicular bone
- Key to proper function is the ability of the Calcaneus to move freely

Calcaneus:
- Largest bone of the foot
- Articulates with Talus forms Subtalar joint
- Allows Inversion and Eversion
- Articulates with Navicular bone
  - Allows for Pronation and Supination

Navicular: transmits forces from back of foot to front of foot.
- Articulates with Talus, Calcaneus, Cuboid and Cuneiforms
- Helps form arch of the foot
- Pronation and supination involve the Navicular

Increasing ROM at Calcaneal and Navicular Joints

Calcaneus: most plantar bone of the foot. **Client position:** Supine with leg laterally rotated at the hip, knee flexed and lower leg supported on pillow with heel slightly off.

- **Therapist position:** standing at foot (or just to side of foot) of table facing client
  - **Hand position:** Grasp calcaneus in one hand; grasp medial foot with other hand to stabilize
  - **Movement:** gently traction calcaneus and move it laterally and medially while stabilizing foot
    - **Variation:** Perform in the side lying position with heel off table.
Navicular: transmits forces from back of foot to front of foot.
- **Client position**: Supine with legs straight or bolstered under knees
- **Therapist position**: seated at foot of table facing client
- **Hand position 1**: While standing grasp foot over Talus with one hand, grasp on lower edge of Navicular with the other stabilize lateral foot with left hand;
  - **Movement 1**: Rotate foot medially and laterally feeling for slight range of movement of the Navicular joints.
  - **Hand position 2**: grasp top and bottom of Navicular between fingers of right hand (feel for knob on top of foot)
  - **Movement 2**: move in a plantar and dorsal direction while stabilizing rest of foot.

Cuneiforms and Cuboid

6. Cuneiforms: Medial, Intermediate, Lateral
   
   Note: Technique for all Cuneiforms is the same: hand position changes slightly as you move medially to laterally across the foot.

   **Location**: three bones that articulate with the metatarsals; begin on medial side of foot.
   - **Client position**: Supine with legs straight or bolstered under knees
   - **Therapist position**: seated at foot of table facing client
     - **Hand position**: stabilize lateral foot with lateral hand; grasp top and bottom of each Cuneiform between fingers of medial hand. (may reverse hands for lateral cuneiform)
     - **Movement**: move in a plantar and dorsal direction while stabilizing rest of foot.
       - **Medial Cuneiform**: articulates with 1 metatarsal: big toe.
       - **Intermediate Cuneiform**: articulates with 2nd metatarsal; Push tendon on dorsi surface medially to access
       - **Lateral Cuneiform**: articulates with 2nd, 3rd, 4th metatarsals; most easily accessed proximally from 3rd metatarsal, may palpate slight protrusion on plantar surface.
Cuboid: articulates with 4\textsuperscript{th} and 5\textsuperscript{th} metatarsals.

- **Client position:** Supine with legs straight or bolstered under knees
- **Therapist position:** seated at foot of table facing client
- **Hand position:** stabilize medial foot with right hand; grasp top and bottom of Cuboid between fingers of left hand (follow 5\textsuperscript{th} metatarsal proximally)
- **Movement:** move in a plantar and dorsal direction while stabilizing rest of foot.

Metatarsals

- Gliding joints
- Hinge joints

Metatarsals

- **Client position:** Supine
- **Therapist position:** seated at foot of table facing client
- **Hand position:** grasping either side of each metatarsal
- **Movement:** shearing motion between metatarsals

9. **Re-assess range of motion** of forefoot with a bit more enthusiasm!

- Plantar and dorsi flexion
- Supination and pronation
- Inversion and eversion
- Figure eight
Assessment of Foot Movement

1. **Tibiofibular joint movement**: work from proximal end:
   - **Client position**: Supine with knee flexed foot flat on table
   - **Therapist position**: foot of table facing client
   - **Hand position**: medial hand stabilizing tibia; lateral hand palm resting in proximal tibialis anterior over proximal fibular head
   - **Movement**: gently compress head of fibula feeling for any movement

2. **Dorsi/Plantar Flexion**
   - **Client position**: Supine with legs straight
   - **Therapist position**: foot of table facing client
   - **Hand position**: one hand grasps calcaneus, one hand grasps around metatarsals
   - **Movement**: move foot into dorsi and plantar flexion feeling for amount of movement and ease of movement; feel for where movement feel and looks limited

3. **Talus Movement**
   - **Client position**: Supine with legs straight
   - **Therapist position**: standing at foot of table facing client
   - **Hand position**: one hand stabilizing anterior tib/fib just above the ankle; one hand grasping foot around tarsals
   - **Movement**: gently pull and push foot in an anterior/posterior direction. Feel for fluidity of movement. Watch for excessive movement forward.

4. **Calcaneus Movement**
   - **Client position**: Supine with legs straight
   - **Therapist position**: Seated at foot of table
   - **Hand position**: sit calcaneus in the palm of one hand, one hand grasps foot around tarsals stabilizing foot. Can switch hand position.
   - **Movement**: Move calcaneus medially and laterally feeling for ability of the joint to move.

5. **Inversion/Eversion**
   - **Client position**: Supine with legs straight
   - **Therapist position**: Seated at foot of table
   - **Hand position**: grasp calcaneus with one hand; grasp metatarsals/tarsals with other keeping foot in a neutral position
   - **Movement**: inversion and eversion making sure you do not pronate and supinate

6. **Pronation/Supination**
   - **Client position**: Supine with legs straight
   - **Therapist position**: Seated at foot of table
   - **Hand position**: grasp calcaneus with one hand; grasp metatarsals/tarsals with other
   - **Movement**: plantar flex and invert foot (supination); dorsi flex and evert foot (pronation) feeling for restrictions and/or fluid movement.