Ankle Movement Coordination Deficit

"Lateral Ankle Sprain"

ICD-9-CM: 845.02 Sprain of calcaneofibular ligament

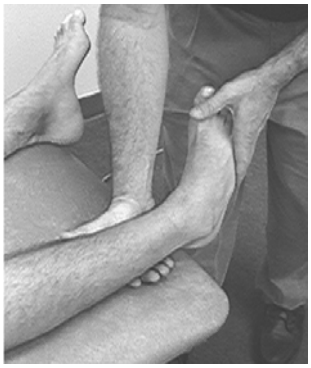
Diagnostic Criteria

History:
Inversion sprain
Swelling
Pain
If chronic - instability

Physical Exam:
Antalgic gait
Lateral ankle effusion
Tender anterior talofibular ligament and possibly also the calcaneofibular lig.
Pain reproduced with inversion stress (usually worse with plantarflexion and inversion)
If severe sprain, or recurring sprains - laxity with anterior drawer

Anterior Talofibular Ligament

Cues: 1 = Lateral malleolus (fibula); 2 = Anterior talofibular lig.; 3 = Calcaneofibular ligament
Locate lateral malleolus - palpate anteriorly and slightly inferiorly
Palpate using graduated pressure to avoid inadvertent further injury



Inversion Stress Test (Talar Tilt)

Cues: Apply graduated force to avoid inadvertent injury
Slightly reproduce reported pain complaint (must not assume all lateral ankle pain/effusion is from anterior talofibular and/or calcaneofibular ligament tears).
If not symptomatic with gentle inversion – consider tarsal or metatarsal fracture, or inferior tibiofibular syndesmosis sprain

Anterior Drawer

Anterior Drawer

Cues: Either (1) Stabilize tibia and fibula and pull calcaneus and talus anteriorly, or
(2) Bend knee to 90 degrees, place calcaneus on table and hold ankle in about 10 degrees of plantar flexion – push tibia and fibula posteriorly to create a relative anterior glide of talus

Lateral Ankle Sprain

ICD-9: 845.02 sprain of calcaneofibular ligament

Description: Lateral ankle sprains are usually caused by an inversion and plantar flexion injury, followed by ankle swelling and decreased function. After the initial recovery from a lateral ankle sprain, some patients exhibit residual pain that limits their activities. Also, some patients are prone to reinjure the ankle. This re-injury predisposition is thought to be caused by neuromuscular deficits following the sprain that result in functional instability.

Etiology: With an inversion force of foot, there is injury to anterolateral capsule, anterior talofibular ligament, and anterior tibiofibular ligament – about 40% of patients will have this injury type. As the inversion force progresses, the calcaneofibular ligament is injured as well. In about 58% of cases, there will be a tear of both the anterior talofibular ligament and the calcaneofibular ligament. Finally, in a small number of cases (3%), there will be tears of the above two ligament and the posterior talofibular ligaments.

Physical Examination Findings (Key Impairments)

<u>Acute Stage / Severe Condition</u>

- Severe swelling (more than 4 cm about the fibula)
- Severe ecchymosis
- Loss of function and motion (patient is unable to bear weight or ambulate)
- Positive anterior drawer test
- Inversion will bring on pain and apprehension
- Tenderness over Anterior Talofibular Ligament, Calcaneofibular Ligament, and Posterior Talofibular Ligament
- Possible anterior shift/displacement of lateral malleolus

Sub Acute Stage / Moderate Condition

- Moderate pain and swelling
- Mild to moderate ecchymosis
- Some loss of motion and function (patient has pain with weight-bearing and ambulation)
- Mild to moderate instability (mild positive anterior drawer)
- Pain with inversion
- Mild to moderate tenderness with swelling/effusion over the lateral malleolus

Settled Stage / Mild Condition

- Mild tenderness and swelling
- Slight or no functional loss (patient is able to bear weight and ambulate with minimal pain)
- No mechanical instability (negative anterior drawer test)
- Slight to no apprehension when taken into inversion

Intervention Approaches / Strategies

Acute Stage / Severe Condition

Goals: Limit effusion
Reduce pain and protect from further injury
Prevent movement induced inflammatory reactions

- Physical Agents
  Cryotherapy / Ice
  Electrical stimulation

- Therapeutic Exercises
  Gentle, active dorsiflexion and plantarflexion in painfree ranges
  Progress to ankle pumps, ankle circles, and ankle alphabet
  Note: In grade III and severe grade II injuries, AROM exercises for inversion and plantar flexion should be limited until tenderness over the ligament decreases in order to avoid disrupting healing structures.
  Towel stretch for the calf myofascia
  Pain free-isometrics strengthening exercises – all directions
  Towel toe curls
  Note: Early Mobilization of joints following ligamentous injury actually stimulates collagen bundle orientation and promotes healing, although full ligamentous strength is not reestabilished for several months.
  Limiting soft-tissue effusion speeds healing.

- External Devices (Taping/Splinting/Orthotics)
  Fit patient with knee support if pain relief requires temporary use of an external device
  Compression ankle strapping
  An ankle brace, such as air cast splint, or a walking boot

- Re-injury Prevention Instruction
  Crutch walking for 2-3 days depending on grade of sprain
  Wear a brace or have ankle taped when doing activities that have high incidence of ankle injuries.
  Wear correct footwear for each sport
  Be aware of uneven terrain, potholes, and high curbs
  Turn a light on at night when out of bed
  Watch out for slippery floors

Sub Acute Stage / Moderate Condition

Goals: Decrease and eliminate pain
Increase pain-free range of motion
Limit loss of strength and proprioception

- Approaches / Strategies listed above

- Manual Therapy
  Manual joint mobilization if dorsiflexion or eversion range of motion is limited

- Therapeutic Exercises
  Progress active dorsiflexion / plantarflexion and eversion and inversion in painfree ranges – add resistance of tolerated (e.g., with rubber tubing or gravity via toe raises)
  Initiate proprioceptive exercises, such as single leg standing, seated BAPS board – progressing to standing BAPS board type exercises

Settled Stage / Mild Condition

Goals: Regain full pain-free motion
Regain normal strength
Regain normal proprioception

- Approaches / Strategies listed above

- Therapeutic Exercises
  Gradual return to sport activities through use of functional progression, such as activity-specific exercise – for example:
    Running in pool, swimming
    Gradual progression of functional activities
    Pain free hopping on both legs progressing to single leg
    Stand on toes and hop on toes
    Step up / over / forward / sideways on high step pain free
    Begin stairmaster, treadmill, biking
    Initiate running when fast pace walking is pain free
    Figure 8's, cross-over walking
    Jump rope
    Ball on wall
    Weight bearing wobble board
    Heel raises

- External Devices (Taping/Splinting/Orthotics)
  Reinjury is common with ankle sprains; so external bracing is recommended and can include taping, lace-up braces, and air splints

Intervention for High Performance / High Demand Functioning with Workers or Athletes

Goals: Return to desired occupational or leisure time activities
Prevention of recurring injury

- Approaches / Strategies listed above

- Therapeutic Exercises
  Progress functional activies related to desired sport activity – for example:
  Walk-jog, 50/50 backwards, forwards, patterns, circles
  Jog-running, backwards, forwards, patterns
  Jumping rope single limb
  Figure 8's, cross-over running
  Improve strength and endurance through use of progressive resistive training

  Consider early mobilization with the movitated athlete. However, when choosing the specific intervention strategy, consider the patient's activity level, age, goals for recovery, degree of injury, previous history of injury, and general motivation.

Selected References

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Hertel, J; Denegar, CR; Monroe, MM; and Stokes, WL. Talocrural and subtalar joint instability after lateral ankle sprain. Med Sci Sports Exerc 1999;31(11):1501-8.

Seto, JL; and Brewster, CE. Treatment approaches following foot and ankle injury. Clinics in Sports Medicine. 1994;13(4):695-719.

Mascaro, TB; and Swanson, LE. Rehabilitation of the Foot and Ankle. Orthopedic Clinics of North America. 1994;25(1):147-160.

Impairment: Limited and Painful Ankle Inversion

Distal Tibiofibular MWM

Cues: Glide the fibula posteriorly on a stable tibia
Sustain the posterior glide while the patient actively inverts his/her foot
As always: 1) alter the direction and amplitude of the glide to achieve painfree active motion, 2) repeat movement several times (sets of ten) 3) add overpressure, if indicated, at the end of available painfree active movement

The following reference provides additional information regarding this procedure:
Brian Mulligan MNZSP, DipMT: Manual Therapy, p. 98-100, 1995