



Ankle Sprains: Assessment SUMMARY SHEETS 2/1/16

Risk Factors: The most commonly reported risk factor for an ankle sprain is a previous ankle sprain.

Assessment Strategy

Step 1: Is there a need for radiographs?

Step 2: Is a neurological/vascular assessment necessary?

Step 3: What is the diagnosis (and what ligaments are injured)? *Lateral ankle sprain, high ankle sprain, chronic ankle sprain* and/or *instability, deltoid ligament sprain*?

Step 4: What grade of sprain?

Step 5: Additional structures injured?

Step 6: Loss of function and/or stability?

Step 7: Contributing factors/effects on kinetic chain?

History Key Questions

- Mechanism of injury?
- Prior ankle injury, treatment & imaging?
- Popping sound at time of injury?
- Significant health problems?
- Bear weight through the injured leg?
- Sport-specific recovery goals?
- Pain in any other location?

Physical Examination

- | | |
|-------------------------------------|------------------|
| Observation | Check pulses |
| Apply modified Ottawa Rules | Orthopedic tests |
| Active range of motion | Muscle tests |
| Gait/functional screen | Motion Palpation |
| Static palpation | |
| Neurological testing (if necessary) | |

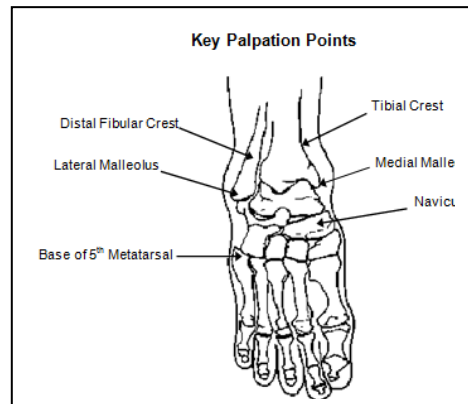
RADIOGRAPHS: Immediate Radiographs After Injury

- Inability to bear weight for four consecutive steps (right after the injury and now)
- Bone tenderness anywhere within a 6 cm zone proximal to the tip of either malleolus (not including tenderness localized only at the ligamentous attachments) **[ankle series]**
- Bone tenderness at the navicular or styloid process of the fifth metatarsal. **[foot series]**
- Patients presenting with multiple injuries, isolated skin injuries, altered sensorium, diabetes, 10 days post-injury, obvious deformity of ankle and/or foot, pregnancy.

Indications for radiography 3 - 7 days after acute injury

- Pain localizes over anterior talus
- Pain or swelling does not improve
- Inability to bear weight

Minimally, patients should be advised to return in 5-7 days if their symptoms have not improved.



Indications for MRI or CT: Suspected talar fracture; negative radiographs but with persistent or disproportionate pain that fails to improve with immobilization; tenderness along anterior distal tibia or persistent pain while under care or severe swelling and bruising suggesting a Salter Harris type 1 fracture; radiographs suggesting an osteochondral injury; suspicion of a syndesmotic injury.

Indications for MRI, CT or MSK-ultrasound: >1 week persistent pain and initial radiographs were negative

Physical Examination

Important note: Palpation and exam procedures should be performed on both extremities for comparison. Charting should always clearly indicate which ankle is injured.

Range of Motion

Active, passive and resisted ROM in plantar flexion, dorsiflexion, inversion and eversion. Differences can be measured by a goniometer.

AROM

plantar flexion (40°)

dorsiflexion (20°)

inversion (20°)

eversion (10°)

Static Palpation

Point tenderness over ligaments is a good indicator of the injured structures. Bony tenderness over the fibular attachment sites of the anterior talofibular ligament should not raise suspicion of a fracture.

- The bifurcate ligament, sinus tarsi, the anterior inferior tibiofibular, calcaneofibular, and anterior talofibular ligament.
- Muscles of the lower leg and the entire length the fibula and tibia, including the proximal fibula (Maisonneuve fracture).
- The Achilles tendon for pain or deformity, tendons of medial compartment, & peroneal tendons.
- The metatarsals and base of the 5th metatarsal in particular.
- The navicular, cuboid, and the posterior talofibular ligament.
- If swelling is minimal, the lateral tubercle of the posterior talus.

Measuring Edema

Option: Place a tape measure around the ankle, crossing over the navicular tuberosity, the tip of the lateral malleolus, the tip of the medial malleolus, and the base of the fifth metatarsal, forming a figure 8.



Neurovascular Assessment

Nerve injuries are common in moderate ankle sprains (17% affect peroneal nerve, 10% tibial nerve) and severe sprains (86% affect peroneal nerve, 83% tibial nerve). Perform the following:

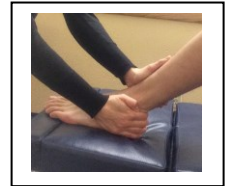
- Sensory testing (light touch, sharp & dull)
- Motor testing of big toe and ankle
- Capillary refill at the toes
- Dorsal pedal & posterior tibialis pulses

Orthopedic Tests

During the acute phase of injury, pain, swelling, and spasm may hinder an accurate assessment of the degree of instability. The anterior drawer and the talar tilt tests have an increased sensitivity 4 to 5 days after injury.

INVERSION and EVERSION sprains

Anterior drawer test (tear of ATFL): A + test is excessive anterior translation of the talus or the sensation of a clunk or anterior translation > 4-5 mm compared to the uninjured side.



Inversion talar tilt: In a neutral position tests the calcaneofibular lig (CFL); in plantarflexion tests the anterior tibiofibular lig (ATFL). A + test is pain in the area of the ligament or the sensation of a clunk. A spongy or indefinite end feel may indicate a complete rupture. Also considered positive if 5-6 degrees more motion is seen on the injured side compared to the uninjured side.



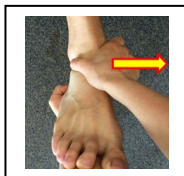
Clinical tips: 1) Increased inversion of 5° to 10° can indicate a tear of the CFL. 2) Palpate the ligament and feel it pushing against the fingertip if it is intact.

Eversion talar tilt: A + test is pain in the area of the deltoid ligament. A spongy or indefinite end feel may indicate a complete rupture.



HIGH ANKLE SPRAINS

Dorsiflexion-external rotation test (Kleigers): A + test is pain in the area of the tibiofibular syndesmosis. Medial ankle pain indicates deltoid ligament involvement.



Cotton test (side to side test): Increased translation or pain suggests syndesmosis involvement or deltoid ligament injury depending on location of the pain. This test may also be positive with a distal fibula fracture.



Squeeze test: A + test is pain in the area of the anterior inferior tibiofibular ligament.

Joint Motion Palpation

Focus on the joints of the foot and ankle. But in addition motion palpate knee, hip, pelvis and spine.

Weight and BMI

The role of weight and risk of ankle injury is controversial. Biomechanically, increased weight and BMI increases the load on the talocrural joint which, in turn, theoretically may increase the risk for acute ankle sprain.

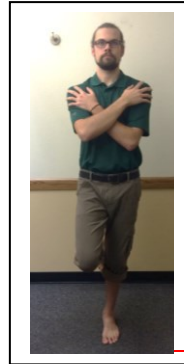
Single Leg Balance Test (SLBT)

Procedure: The bare-footed, open-eyed patient stands on one foot with arms crossed for up to 10 seconds. The bent contralateral leg does not touch the weight-bearing leg. Both legs are to be tested. Time starts when the foot comes off the floor and *ends* when:

- arms uncross
- raised foot hits ground
- weight-bearing foot moves
- eyes open during the eyes closed trial

The patient gets 3 trials with eyes open and 3 trials with eyes closed. Ideally, allow 5 minutes rest between sets.

One can also time the subject (stop if 45 seconds elapse).

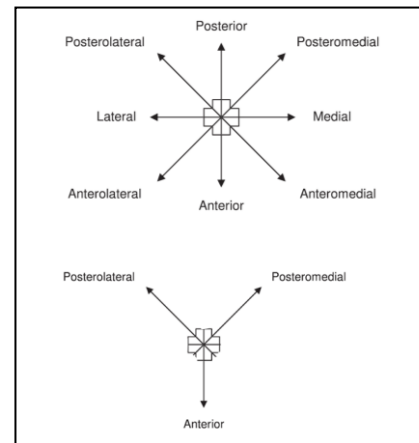


Age (yrs)	Eyes open (sec)	Eyes closed (sec)
18-39	43.3 (5.1)	9.4 (9.4)
40-49	40.3 (10.8)	7.3 (7.0)
50-59	37.0 (12.6)	4.8 (4.8)
60-69	26.9 (16.6)	2.8 (2.2)
70-79	15.0 (13.9)	2.0 (1.6)
80-99	6.2 (9.3)	1.3 (0.6)

Star Excursion Balance Test (SEBT)

The subject stands on one leg and attempts to touch the floor at their maximal reach along each of three (or 8) lines on the floor. Left and right sides are compared.

- First the legs are measured from the ASIS to the medial malleolus.
- The patient is barefoot, hands on hips.
- The stance foot and heel are aligned with anterior tape.
- Warm up: 4-6 trials in each of 3 directions (randomly changing the order). Toe is lightly touched down at the point of maximum reach. Measure the distance. The stance heel is allowed to raise.
- Both legs are usually tested.
- Record the distance in each direction both in centimeters and as a percentage of the leg length. Compare measurements side to side or compare the injured side to the patient's previous baseline.



The trial is nullified and has to be repeated if the subject commits any of the following errors:

- makes a heavy touch,
- rests the foot on the ground,
- loses balance,
- shift stance foot
- or cannot return to the starting position under control

Interpretation: Information on cut-off scores and side to side differences is limited. Basketball players with anterior reach difference of more than 4 cm left to right were 2.5 times more likely to sustain a lower extremity injury (primarily ankle or knee). Girl players with a composite reach score of less than 94% of their limb length were 6.5 times more likely to be injured.



Ankle Sprains: Diagnoses SUMMARY SHEET

2/1/16

Lateral ligament sprain (inversion sprain)

Chronic ankle sprain and instability

Syndesmotic sprain (high ankle sprain)

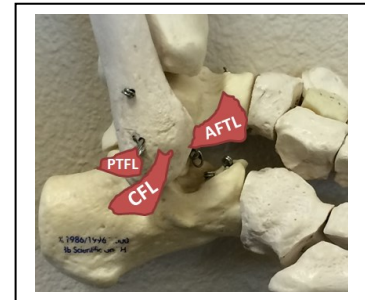
Medial ligament sprain (deltoid)

1. Inversion Sprain (Lateral Ligament)

Mechanism of injury: a combination of inversion, plantar flexion and medial rotation. Injuries primarily affect the anterior talofibular ligament (ATFL), followed by the calcaneofibular (CFL), and then the posterior talofibular ligaments (PTFL). Pure inversion injuries (e.g., landing on another's foot) are less common and primarily injure the CFL.

Signs

- Swelling distal to the lateral malleolus of the ankle (may extend to the foot if the lateral capsule is torn).
- Tenderness over the ATFL and, in more severe cases, the PTFL and CFL.
- Excessive translation during the anterior drawer and the talar tilt test may reveal suggests at least a grade 2 sprain of ATFL and/or CFL.
- Stress radiographs may reveal excessive anterior translation of the talus or inversion of the talus.



Lateral Sprain Grading

Sign/Symptom	Grade I	Grade II	Grade III
Ligament tear	None	Partial	Complete
Loss of functional ability	Minimal	Some	Great
Pain	Minimal	Moderate	Severe
Swelling	Minimal	Moderate	Severe
Ecchymosis	Usually not	Common	Yes
Difficulty bearing Weight	None	Usual	Almost always

2. "Chronic" ankle sprain & ankle instability

Signs & Symptoms

- A subjective sensation of the ankle "giving way" during activities of daily living (suggests "functional instability").
- Persistent ankle pain from prior injury (often localized to the anterolateral aspect of the ankle) and/or a history of recurrent sprains.
- The inability to participate in sports and/or difficulty in walking on uneven ground.
- A + anterior drawer test or when done in combination with radiographs one of the following: (translation measuring ≥ 10 mm or a 3-mm difference compared to contralateral side or a talar tilt of greater than 9° or a 3° difference compared with the contralateral side).
- Position of the hindfoot: varus malalignment predisposes to recurrent inversion injuries.
- The single leg balance test and the star excursion balance test can be performed.

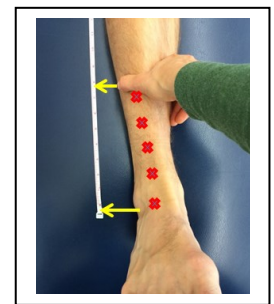
Warning: Chronic instability often is painless so when there is persistent pain, consider additional injuries such as peroneal tendinopathy, syndesmotic sprains, complex regional pain syndrome, sinus tarsi syndrome, osteochondral lesions of the talus, loose bodies, synovitis, and ankle arthritis.

3. Syndesmotic (high ankle) Sprain

The injury can include the anterior inferior tibiofibular, posterior inferior tibiofibular, inferior transverse and interosseous ligaments and the interosseous membrane. The most common mechanism of injury: external rotation with the foot in a dorsiflexed pronated position (e.g., in collision sports and those with a high, rigid boot such as skiing and hockey). Also a severe inversion sprain or eversion caused by a blow to the lateral aspect of the leg or knee with the foot fixed to the ground.

Signs & Symptoms

- Reports of difficulty “pushing off” during gait and generally lacking power when attempting to return to activities.
- Swelling & bruising proximal to the ankle mortise, often 2-6 inches above the malleolus.
- Tenderness over the anterior inferior tibiofibular ligament.
- Tenderness along syndesmosis: palpate and measure up the leg along the interosseus space until the patient no longer reports any tenderness.
- Positive squeeze test, stabilization tests, and/or external rotation test (stand on injured and rotate the pelvis away from the injured side). A single leg calf raise can be attempted. Pain or instability suggests a high ankle sprain.
- Standard or stress radiographs may reveal abnormal widening of the ankle mortise.



Grading syndesmotic sprains: grade 1 sprain is without diastasis (pathological separation) of the ankle mortise; in grade 2, diastasis is only apparent after stress radiographs; and in grade 3, there is frank diastasis, usually accompanied by a fracture.

Diagnostic ultrasound if symptoms persist after 6 weeks of therapy or a CT or MRI to rule out osteochondral lesions and tumors or in reevaluating the grade of injury.

4. Eversion Sprain (deltoid ligament)

Deltoid sprains are rare and involve traumatic over pronation, abduction, eversion and dorsiflexion (e.g., having the foot firmly planted on the ground with a valgus load applied to the ankle or an internal rotation load applied to the rear foot). Associated with running down stairs, landing on an uneven surface, planting a foot then rapidly rotating away (as in dancing). Co-injuries such as high ankle sprain or stress fractures should be ruled out. In addition, a pronation injury or even recurrent *inversion* ankle sprains can lead to an unstable deltoid ligament.

Signs & Symptoms

The typical presentation is pain/ bruising on the anteromedial and even the lateral aspect of the ankle, especially with the ankle in dorsiflexion.

Chronic medial ankle instability: Reports of the ankle giving way, especially going downhill or on uneven ground. Key findings include pain over the medial gutter (just anterior to the medial malleolus) and a valgus and pronation deformity which can often be corrected by contracting the tibialis posterior muscle or rising up on toes. There can also be pain along the posterior border of the Achilles tendon.

The tilt and drawer tests may be positive for pain and may exhibit increased movement. The cotton test (AKA side to side test) may demonstrate increased translation and lateral ankle pain. If chronic instability is suspected, weight bearing radiographs can detect the extent of the valgus deformity in the rear foot. Arthroscopy can be helpful in assessing medial instability, but is no longer commonly done in the case of acute tears. MRI, however, may enable the practitioner to detect associated cartilage lesions.