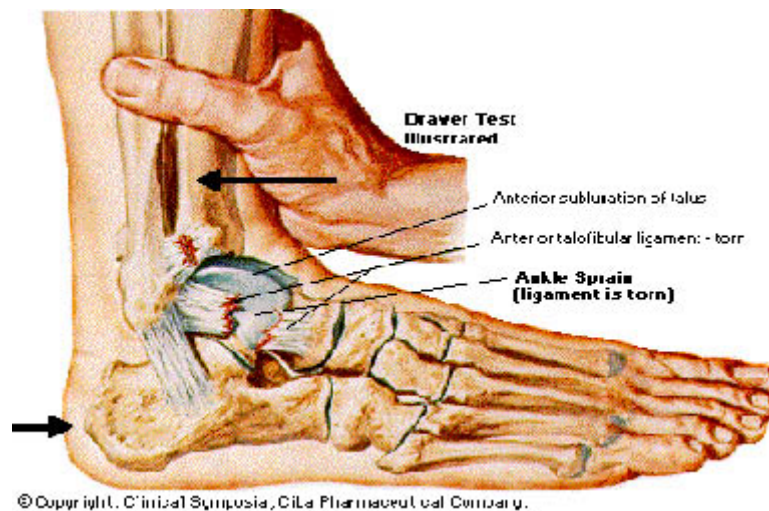


# Ankle Sprains

The most common type of ankle injury is a sprain. A sprain results from the stretching and tearing of small ligaments (fibrous bands connecting adjacent bones in a joint). There are many ligaments surrounding the ankle that can become damaged when the ankle is forced into an unnatural position. Although ligament damage frequently occurs during athletics or exercise, ankles are just as often injured stepping off a curb, into a pothole, or onto uneven ground.

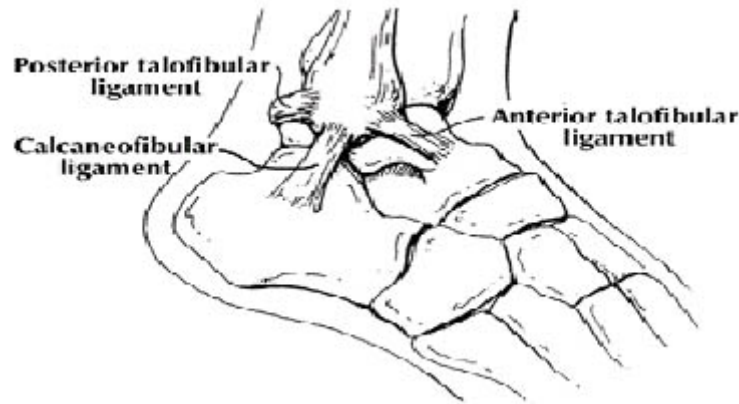
The most frequent type of sprain occurs when weight is applied to the foot when it is on an uneven surface, causing the foot to "roll in" or "turn" (inversion). This places the sole of the foot in such a position that it points inward as force is applied, so the ligaments stabilizing the outside part of the ankle become stressed. Many people report hearing a "snap" or "pop" when an injury of this type occurs. Following such an incident, one experiences difficulty walking and, in a short time, the outside aspect of the injured ankle begins to cause pain and swells, sometimes so excessively that people believe it is broken.

Upon physical examination, the ankle will exhibit swelling and discoloration (black and blue) over the outside part of the joint. Touching of the area will result in a variable amount of discomfort. Frequently, there is instability notes on the drawer test (as illustrated in picture below) as the heel structures are moved forward and back as the leg is stabilized. Range of motion (ROM) in the ankle can be limited due to pain and swelling, but strength is not usually affected. X-rays are essential, as the possibility of a fracture must be ruled out.



## Anatomy of Lateral Aspect of Ankle:

1. Anterior talofibular ligament (front) - tears first
2. Posterior talofibular ligament (back) - tears second
3. Calcaneofibular ligament (middle) - tears last



## Degree of Severity of Ankle Sprains:

### Grade I

- Mild sprain, mild pain, little swelling, and joint stiffness may be apparent
- Stretch and/or minor tear of the ligament without laxity (loosening)
- Usually affects the anterior talofibular ligament
- Minimum or no loss of function
- Can return to activity within a few days of the injury (with a brace or taping)

### Grade II

- Moderate to severe pain, swelling, and joint stiffness are present
- Partial tear of the lateral ligament(s)
- Moderate loss of function with difficulty on toe raises and walking
- Takes up to 2-3 months before regaining close to full strength and stability in the joint

### Grade III

- Severe pain may be present initially, followed by little or no pain due to total disruption of the nerve fibers
- Swelling may be profuse and joint becomes stiff some hours after the injury
- Complete rupture of the ligaments of the lateral complex (severe laxity)
- Usually requires some form of immobilization lasting several weeks
- Complete loss of function (functional disability) and necessity for crutches
- Usually managed conservatively with rehabilitation exercises, but a small percentage may require surgery
- Recovery can be as long as 4 months

# Treatment and Rehabilitation:

Many problems resulting from sprains are due to blood and edema (swelling) in and around the ankle. Minimizing swelling helps the ankle heal faster. Most sprains heal completely within a few weeks. With increasing injury severity, the rehabilitation process becomes more complex and extensive. Chronic or recurrent lateral ankle sprains usually receive some type of strengthening program and proprioception training due to poor balance on the injured leg.

## Phase I (Early Phase):

### *Goal:*

Decrease post-injury swelling, bleeding, and pain. Protect the healing ligament(s).

### *Avoid the first 24 hours:*

Hot showers

Heat rubs (e.g. Ben Gay)

Hot packs

Drinking alcohol

Aspirin—it prolongs the clotting time of blood and may cause increased bleeding into the ankle (Tylenol or ibuprofen (Advil) may be taken to help with pain, but will not speed up the healing process)

The **PRICE** regimen is the most important aspect of the initial management of a sprain:

### Protection

Ligaments must be maintained in a stable position so healing can occur

Get off your feet if pain persists

Use an ankle stirrup or brace if necessary

Non-weight bear or partial weight bear with crutches to control other inhibitors of healing

Early walking is essential, since weight bearing inhibits contractures (tightness) of tendons, which may lead to tendonitis

### Rest

Allow injured ankle to rest for approximately 24 hours after the injury

Caution should be taken against vigorous exercise

Exercise for the uninjured leg may be performed

Isometric exercises (to increase static strength and assist in decreasing atrophy) with toes pointing up (DF) and then down (PF), progressing to toes pointing in (Inv) and then out (Ev)—done in pain free motion (each exercise held for 6-8 count)

### Ice

Ice the ankle every 2 hours for 20 minutes to decrease pain, swelling, and spasticity for the first 48-72 hours

Do not place ice on the ankle for over 30 minutes

### Compression

Done with ice

Place air or cold water within enclosed bag to provide pressure to decrease swelling

Ace wraps, which may be wet to facilitate the passage of cold, could be used - wrap distal to proximal

To add more compression, a horseshoe-shaped felt pad may be inserted under the wrap over the area of maximum swelling

## Elevation

- Elevate as much as possible with ice and compression
- Elevate foot higher than the waist to reduce swelling and pain
- Keep the leg elevated while sleeping
- Elevation allows gravity to work with lymphatic system rather than against it
- Elevation also decreases hydrostatic pressure to decrease fluid loss and also assists in venous and lymphatic return through gravity

## Phase II (Rehabilitation Phase):

This phase begins when swelling stops increasing and pain lessens, so that the ligament(s) have reached a point in the healing process at which they are not in danger given minimal activity. Pain is the guide as to how much activity is enough.

### *Goal:*

To increase motion and strength, which will aid in circulation and help eliminate residual inflammatory agents.

### **Stretching**

- Do stretches before and after activity
- Vigorous heel cord/calf stretches initiated ASAP (hold stretches for 20 seconds each, performed every 2 hours) - moderate pull but no pain
- Begin with active DF and PF activities
- Progress to Inv and Ev exercises when tenderness over the ligaments decrease
- All activities should be done slowly without pain at high repetitions (3 sets of 20)
- Toe curls—place a towel on the floor and curl your toes to pick up the towel
- Marble pickups—pick up marbles with your toes
- Perform alphabet exercise—rest heel on floor and write the alphabet in the air with your big toe, making the letters as large as you can
- Stationary bike

### **Strength**

- Begin with isometric exercises with progression to isotonic exercises (with and without resistance) in a pain free motion
- As the ligament heals further and ROM increases, strengthening exercises may begin in all planes of motion
- Pain should be used as the basic guideline for deciding when to start Inv and Ev isotonic exercises

Obtain a strip (about 2 feet long) of elastic belting material, surgical tubing (from a medical supply store), or a bike tire inner tube and work your ankle in four directions. Pull the tubing taut, making sure that the tube is placed at the base of your toes, and do the exercises only with your foot and ankle, not the whole leg

#### Out and up:

sit on floor or chair, loop tubing over foot and around table leg, with heel on floor, work ankle out and up

#### In and up:

as above, but loop tubing to provide tension against an inward motion, with heel on floor, work ankle in and up

#### Straight up:

as above, but with heel on floor, work ankle straight up

#### Straight down:

hold tube loop against bottom of foot, with heel on floor, work ankle down

At the beginning of the rehabilitation process, use ankle weights for light resistance in the four directions described above (2-4 sets of 20)

Heel/toes raises—stand on a step with your heels slightly off the step and slowly rise up on your toes and equally slowly lower heel down; when this exercise becomes simple to perform, do the exercise using only the injured leg in a pain free motion

Single knee flexion exercises—stand on injured leg and bend that knee and straighten it

### **Proprioception**

Defined as the knowledge of where one's body is in space

Following ankle sprains, the injury can cause balance deficits (from loss of proprioception), and therefore increasing the risk of reinjury and poor healing

The greater ligament disruption, the greater proprioception loss

Early weight bearing on the ankle (e.g. standing/walking) decreases proprioception loss - begin by standing with eyes closed and progress to standing on injured leg with eyes closed

### **Phase III (Full Functional Level):**

*Goal:*

Return to prior level; return to activity

- Must have full ROM
- Must have 80-90% strength in injured ankle compared to the uninjured ankle
- Strengthen the uninjured leg
- Run in a pool, using a floating device; swimming
- Tape the ankle if necessary
- High-topped footwear to stabilize the ankle
- Cleats should be outset along periphery of the shoe to provide stability
- Gradual progression of functional activities that slowly increase stress on ligaments
- Full weight bearing when you can walk without a limp
- Lunges forward, on a 45° angle, and sideways with injured and uninjured leg
- Pain-free hopping on affected side (start with hopping with both legs and progress to hopping with only injured leg)—four-square hopping drills
- Step up and over, forward and sideways, on high step in pain free motion
- Stand on your toes of the injured ankle for 20 seconds, and hop on your toes 10 times
- Begin stairmaster, treadmill, biking
- Running can be started as soon as you can walk in a fast pace without pain; initially, start jogging in a straight line, and progress to running from smooth, flat surface to uneven surfaces
- Cutting exercises: run in figure eights, cross-over walking
- Jump rope

## **Prevention:**

- Wear the correct shoes for the event. Good walking shoes provide more comfort and better balance
- Wear hiking shoes or boots in rough terrain
- Different sports activities call for specific footwear to protect feet and ankles. Use the correct shoe for each sport. Don't wear any sports shoe beyond its useful life.
- Use steel toed shoes for occupations that threaten foot safety. Be certain they are fitted properly.
- Do not walk barefoot on paved streets or sidewalks.
- Watch out for slippery floors at home and at work
- Be aware of uneven terrain, potholes, and high curbs.
- If you get up during the night, turn on a light.
- Wear a brace or have ankle taped when doing activities that have a high incidence of ankle injuries (such as basketball, volleyball, soccer, tennis, and other sports requiring a lot of stopping, starting, and twisting motions)

## **When to Seek Medical Attention:**

If the ankle is obviously fractured/dislocated or the injury is causing severe pain/disability, then medical attention should be sought immediately.