ANKLE FRACTURES
(512) 476-2830

Ankle fractures are the most common intra-articular fracture of a weight-bearing joint (Phillips WA et al. J Bone Joint Surg 67A:67-78, 1985). The ankle joint is made up of three bones – the tibia, fibula, and talus – along with their connecting ligaments – the deltoid, lateral ankle ligaments, and the syndesmosis. These structures together form a highly congruent joint and allow complex motion in several planes. Disruption of these structures, whether bony or ligamentous, can lead to abnormal contact stresses and ligamentous instability. This in turn, can lead to the development of arthritis of the ankle joint.

Ankle fractures come in many different forms and not all of them require surgical intervention. Those fractures that alter the congruency of the ankle joint need to be treated with surgery in order to re-establish the normal contact pressures of the ankle joint and delay the development of arthritis. Although the bony anatomy can be restored in many cases, the cartilage injury associated with this trauma is not reversible or reparable. This, in many cases, can lead to the development of post-traumatic arthritis of the ankle, regardless of the quality of the repair.

There are multiple classification systems for ankle fractures, but the two most commonly used are the Danis-Weber and the Lauge-Hansen. These subdivide the fracture type by the level of the injury and the mechanism of the injury, respectively. Although these classification systems are good for describing the fracture, the stability of the fracture and the congruency of the joint should guide the treatment decisions.

Danis-Weber Ankle Fracture Classification
Lauge-Hansen Supination and Adduction Injury

Lauge-Hansen Pronation and Abduction Injury
Treatment

I. Non-operative management – non-surgical management of ankle fractures is reserved for those that have a stable fracture configuration, even under stress evaluation. Fractures can also be treated non-operatively in those patients that have medical problems that preclude fixation.

II. Operative management – all ankle fractures that are unstable should be fixed operatively. Unstable ankle fractures include the following:
   a. Fracture-dislocations
   b. Bimalleolar and trimalleolar ankle fractures
   c. Bimalleolar equivalent ankle fractures – lateral malleolus fracture with deltoid injury
   d. Ankle fractures with syndesmotic injuries

Surgical fixation [open reduction with internal fixation (ORIF)] involves fixing the fracture in proper alignment with a combination of plates and screws.
Operative and post-operative care

You have sustained an unstable ankle fracture that your surgeon has determined warrants surgical intervention. Below is an outline of the typical course in preparation for and following fixation of the ankle fracture.

Risks of Surgery

- Typical risks for any surgery include, but are not limited to, infection, bleeding, nerve injury, deformity, disability and the need for additional surgery
- Infection risk is typically less than 1%
- On the early side, we will be on the lookout for possible infection and wound healing issues.
- Later, we will be monitoring your fracture healing. Approximately 3-5% of all fractures go on to not heal.
- As a result of your injury, you have a greater chance of developing ankle arthritis down the road.

In Preparation for Surgery

- After the surgery, you are not to put any weight on the foot for 6 weeks. To facilitate ambulation, we recommend a knee scooter. Although crutches or a walker can work, they are more difficult and make it harder to stay off of the foot.
- You will also have to keep the wound clean and dry for the first 6 weeks. For that reason, we recommend a cast cover, which can be obtained at CVS or Walgreens
- A bedside commode can facilitate going to the bathroom during the period of non-weightbearing activities.
- Driving:
  - For surgeries that are done to the right ankle, studies have shown that is takes 8-10 weeks to have enough strength to slam on the brakes when necessary.
  - For surgeries that are done to the left ankle, you can start driving once you are off of the narcotics.
  - You will be given a prescription for a temporary handicap placard at the first appointment

Day Before the Surgery

- Nothing to eat or drink after midnight
- You are to show up to your surgical facility at the time that was given to you by our office, regardless of what is told to you by the hospital staff

Day of Surgery

- The surgery is an outpatient procedure.
- The surgery is performed under general anesthesia, although the surgeon and anesthesiologist may recommend a regional block for post-operative pain control. Even though the block works well for pain control in the first 24-48 hours after surgery, some patients are left with prolonged nerve symptoms that, in a small number of cases, can be permanent. You can discuss your desire for the block with your physician.
- You will receive antibiotics prior to the start of the procedure. Studies have shown that there is no need for continuation of antibiotics after the procedure.
- The typical length of the procedure is approximately 1-1:30 hours
- You will be given a prescription for pain medication on your surgery day. Our medication of choice is hydrocodone. Let the surgeon know if there are any issues with this medication.
- You can take an anti-inflammatory medication if you need additional pain control.
- The fracture is fixed with plates and screws. The hardware used in the surgery is made out of titanium. Although it appears that a large amount of hardware is used, it is typically not enough to be detected by the metal detectors at the airport. That said, there is nothing that we can provide you in order to skip this step in security.
- When the repair is completed, the skin is closed with the use of sutures and a splint – partial cast – is applied to the leg. This is to remain in place for the next 2 weeks.
- We recommend elevation as often as possible for the first 2 weeks in order to assist with the swelling.
- Burning, swelling and pain are to be expected after the surgery.

2 weeks after surgery – follow up appointment

- The wound will be evaluated, and the sutures removed.
- A circumferential cast or a tall boot will be applied in the office depending on the type of fracture. That said, non-weightbearing activities continue for another 4 weeks.

6 weeks after surgery – follow up appointment

- The incisions are evaluated once again
- Radiographs of the ankle are performed to evaluate the healing
- If you were placed in a cast at the previous visit, a boot will be provided for you in order to continue protecting the ankle
- You can start weightbearing activities to tolerance in the boot. The boot DOES NOT have to be worn when you are not walking or standing.
- You will also be given a prescription for physical therapy. The typical therapy prescription is for 2-3 sessions per week for 6 weeks. That said, you can discuss your goals and availability with the therapist in order to find a schedule that works for you.

12 weeks after surgery

- You can discontinue the boot and start wearing a regular shoe.
- Because of the swelling, and in order to continue to protect the foot, we recommend walking or running shoes. These can be adjusted in order to accommodate any swelling.

14 weeks after surgery – follow up appointment

- The incision is evaluated once again.
- Radiographs are performed in order to evaluate healing
- We will allow you to advance activities to tolerance
- It is normal for there to be swelling and soreness. These symptoms typically resolve over 6 months to a year after the surgery

6 months after surgery – follow up appointment

- Final evaluation
- Radiographs are once again performed in order to evaluate final healing
- By now, you should have been able to return to most of your activities and shoe wear choices
- It is still normal for there to be some swelling, soreness and stiffness.
REHABILITATION

Remember, the patient has been NWB for quite some time and will have atrophy not only of the calf, but the entire LE. This needs to be addressed in the therapy program. Exercises are progressed on an individual basis depending on symptoms. Younger patients tend to heal faster and can be progressed as tolerated. Swelling is usually the biggest problem and patients must be advised to limit weight bearing to control this.

Week 6-10
Gait training – FWB in walking boot progressing to no crutches

Modalities
Whirlpool or hot pack to help increase ROM (can do ROM ex in W/P)
Ultrasound (pulsed) around incisional area to increase circulation and decrease swelling
Cold pack – following exercises and again at night to help control soreness and swelling

Manual therapy
Soft tissue mobilization – scar massage, petrissage to decrease swelling and increase mobility
Joint mobilization – to surrounding joints (not ankle joint) if needed to normalize mobility

ROM
AROM all planes:
  Ankle pumps
  Inversion/eversion
  Ankle circles
  Ankle alphabet

Toe curls – flexion/extension
Towel squeeze with digits
Marble pick-up with digits
Calf stretching – standing gastroc/soleus stretch, towel stretch
Lower extremity stretching – hamstring, piriformis, iliopsoas, quad, etc.

Strength
Ankle theraband – inversion, eversion, plantarflexion, dorsiflexion
Cycling – in boot with resistance and time as tolerated
Exercises in boot:
  Weight shifting – lat, fwd/retro
  Step-ups: lateral, forward
  Leg press: Bilateral, unilateral
  Hamstring curls
  Single leg squats
  Single leg balance
  Reverse lunges

Week 10-16
ROM – full
Stretch – continue with all LE stretching
Strength – out of boot per MD discretion
  Leg press – bilateral and unilateral calf raises
  Hamstring curls with plantar flexion
  Biodex – inversion/eversion, plantarflexion/dorsiflexion
  Walking lunges with heel raise
  Step-ups on toes
  Sports cord – side-step, forward-retro walk
  Single leg squats
  Wall Squats
  Eccentric standing calf raises progressing to full single leg calf raise

Balance/Proprioception
Single leg balance – progress to unstable surface or eyes closed
Tandem cone walking
Steamboats – 4 way kick with theraband – progress to unstable surface
Plyoball toss on trampoline or with partner
Balance board squats
Step-ups using airex
Four corner reach drill – reach using other foot or one hand

*Unstable surfaces can include mats, airex, balance board, wobble board, etc.
*For increased levels of difficulty, increase the speed of exercise and/or hold dumbbells or medicine balls at side or overhead

**Weeks 16-24**
Continue with strengthening with goal of being able to perform single leg calf raises throughout full ROM
Initiate jogging program – treadmill or track progressing to hard surfaces (i.e., street)
Initiate plyometric program – bilateral progressing to unilateral hops

**Core exercises**
Swiss Ball Activities:
Bridge w/knee ext: Bilateral or Unilateral
Bridge w/knee flexion: B and/or unilat
HS curls
Bridge w/knee flexion and alt hip fl

Prone on elbows 3x1min
Sidelying on elbow 3x30"
Prone on ball – LE extension
Prone on ball – upper body ext
Prone on ball – scissor kick
Walk outs on ball

Table top – knee extension
Crunches on ball
Supine knee ext w/ball b/x legs
Push-ups on ball

**Abdominal routine**
- Reverse sit-ups
- Crunch – reach to toes
- Crunch – alt reach to toes
- Sidelying crunches
- Sit-backs controlled hold
- Sit-ups w/plate
- Leg lowering
- Side to side leg swing
- Diagonal leg swing
- Cable column ab curls
- D2 at C Col seated on ball
- V-ups
- Ball toss in sit-up position
- Ball toss from side
- Back to back ball toss
- Ball toss doing sit-up w/feet supported

Roman Chair
LE extension on table
Flutter kicks w/LE ext