

# Calcaneal Fractures

Fractures of the calcaneus (heel bone) is the most common tarsal bone fracture. Most calcaneal fractures occur as the result of a fall from a height greater than 14 feet. Calcaneal fractures are common among roofers and rock climbers. The second most common contributing cause to these types of traumatic fractures are vehicle accidents. Calcaneal fractures are most commonly found in males age 30-50 y/o.



Calcaneal fractures have a track record of being difficult to treat and have frustrated doctors for a long time. The issue in treating calcaneal fractures is in trying to rebuild the break so that recovery may take place. The particular calcaneus is much like an egg; an outer firm shell and soft on the inside. As a result, the calcaneus often shatters when broken. Calcaneal repair not only requires re-approximation of multiple break patterns, but also calls for restoration of the subtalar joint. The particular subtalar joint is the interface between the calcaneus as well as talus and is a primary load bearing joint of the base. In some cases, additional joint surfaces may be affected (the calcaneal cuboid joint) but are of lesser importance because of their limited weight bearing roles.

Two classifications are used for the classification of calcaneal fractures. The Rowe classification and the Essex-Lopresti classification both describe calcaneal fractures. The Essex-Lopresti classification describes subtalar joint depression fractures (very serious fractures) in a bit more detail than the more commonly used Rowe group. Plain xrays and CT scans are often used to determine the extent and classification of calcaneal fractures.

Type 1a - Tuberosity fracture medial or even lateral

Type 1c - Fracture of the anterior process of the calcaneus

Type 2b - Avulsion break involving the insertion with the tendo-Achilles

Type 4 - Body fracture involving the subtalar joint

The Essex-Lopresti Group Of Calcaneal Fractures

Type a - Tongue Type

Type B - Joint depression type.

## Stress Fractures from the Calcaneus

Stress fractures of the calcaneus are typically the result of a sudden abrupt injury but can happen without a history of trauma. The most common injury seen our practice is a fall from a height of more than 6 toes. A stress fracture of the calcaneus is a condition that is often overlooked as a differential diagnosis of heel pain. Plantar fasciitis (also called heel spur syndrome) is so common that many health care providers will defer to plantar fasciitis as a primary diagnosis when analyzing heel pain. A good patient history, and particularly one that notes the onset and character of the pain, is very important when distinguishing between plantar fasciitis and calcaneal stress fractures.

The diagnosis of calcaneal stress fractures can be difficult at times. Stress fractures, regardless of where they occur in the body, are different than what we would tend to think of when we go over fractures. The appearance of a stress fracture on x-ray are not always evident. Quite often, the only x-ray findings that we shall see are those who show up for the end of the healing process, sometimes as long as several months after the injury. We don't actually visualize the fracture, but rather we see the calcification that occurs in the late phases of the healing process. Should the symptoms of heel pain not respond to treatment for plantar fasciitis, or initial clinical findings seem suggestive of a stress fracture, there are several tools that can be used to help differentiate between calcaneal stress fractures and each of the other common conditions considered in treating heel pain.

“ Plain x-rays may be able to see a calcaneal crack, but quite often, due to the lack of disruption of the bone, plain films lack the ability to 'see' the fracture. As fractures heal, many times the healing process can be seen on plain x-ray films. The recovery process will increase the amount of calcium surrounding the break. This process of calcification typically takes about 4-6 weeks to see on plain x-ray, as a result, periodic follow-up x-rays may aid in diagnosing a stress fracture of the heel.

Three phase technitium bone scan can help differentiate the location and degree of inflammation in the calcaneus thereby helping to identify a calcaneal stress fracture. Bone scans are a test the place where a radioactive nucleotide is injected into the patient and a scan is taken of the injured area three times over the course of three hours. Each of the tests show a different level of inflammation based upon the increased blood flow to the inflamed area. In the case of a calcaneal crack, a bone scan can help in many ways.

- First, the scan will locate the area of the break based upon the inflammation seen in fracture healing.
- Second, the bone scan will help to differentiate between a number of other potential difficulties with the heel such as plantar fasciitis.
- And lastly, a scan might help to determine the acuteness of an injury.
- For instance, we may see a questionable area on an x-ray but we'll not be able to tell whether the diagnosed injury is old or new.
- The bone scan will help us in that a new injury can 'light up' on the check out due to its' current inflammation.
- An old injury on the other hand is not going to light up' on the scan due to its' not enough current inflammation.
- MRI's are also helpful in differentiating calcaneal fractures from plantar fasciitis.
- MRI's can identify small areas of bone edema suggestive of a break.

## Treatment of Calcaneal Fractures

As previously mentioned, calcaneal fractures can be very difficult to manage. Closed reduction is a term used when doctors will manipulate the fracture under anesthesia without surgery. Closed reduction can be successful in treating calcaneal fractures in many cases dependant on the stage of fracture. Open reduction (surgical reduction of the fracture) is not guaranteed to produce more successful outcomes. Calcaneal fractures can range from simple in order to explosive. Follow-up following reduction (whether close or open) varies but will include a period of non-weight bearing, splinting or throwing to allow for fracture healing.

- Severe cases of joint depression fractures (Rowe type 4 and additional surgery may be forced to fuse the subtalar joint.
- When the subtalar joint is significantly damaged in the injury, fusion of the stj is the only solution.
- Most doctors will stage these types of procedures, performing a subtalar fusion long after the particular immediate trauma of the injury.
- Treatment of calcaneal stress fractures varies with the severity of the break and also the degree of pain.
- Numerous cases of calcaneal stress fractures are simply treated with rest and a decrease of activity.
- Others may necessitate a walking cast or period of non-weight bearing.
- Medical treatment is rarely indicated.
- Healing of calcaneal stress bony injury can be prolonged and may require a period of several months in order to heal.

## Nomenclature:

Calcaneus - The particular bone with the heel.

- Subtalar Joint - (STJ) the joint between the two major bones of the rearfoot, the talus and calcaneus.
- The particular STJ is a common site of residual arthritis following calcaneal fractures.
- Technitium - a radioactive substance that is attracted to area of inflammation.
- Used as the active substance in bone scans.
- Anatomy: The calcaneus is very firm upon its' outer surface but soft and also spongy on the inside, similar to a good egg.
- It is an unusually shaped bone with numerous surfaces making in the support for the subtalar joint and the calcaneal cuboid joint.

## Biomechanics:

The biomechanics of calcaneal stress fractures has not been defined. Due to the fact that most calcaneal stress fractures take place due to a random traumatic incident, no defined pathway to the cracks has been proven. Symptoms: The diagnosis of a calcaneal stress fracture is usually considering pain that continues following an incident of trauma. Sometimes a calcaneal stress break will have a good insidious onset, but a majority of with have got a severe onset. Edema (swelling) and erythema (redness) may or may not be present.

The most common symptom of a calcaneal stress fracture, and the one symptom that can help to differentiate tension fractures from fasciitis, is the nature of the pain. Stress fracture pain is constant. It hurts when a person's body weight is first applied and continues to hurt. Pain due to plantar fasciitis is sharp in the beginning of weight bearing yet soon subsides, to be able to a degree, over 5-10 minutes.

## The Location of Pain is Also Important

Stress fracture pain will generally (and not always) be in the body of the calcaneus. Pressure to the medial and lateral walls of the calcaneus result in pain. Plantar fascial pain is specific to the bottom of the heel and is average with direct pressure, but serious with weight bearing.

## Differential Diagnosis:

Baxter's nerve entrapment - a good entrapment of the recurrent branch of the posterior tibial nerve.

Gout - deposition of monosodium urate crystals (hyperuricemia)

## Heel Spur Syndrome - See Plantar Fasciitis

Plantar fasciitis - a common condition of the heel that results in pulling by the plantar fascia and a tearing pain at the addition of the fascia on the bottom of the heel. Pain is extreme with the first few steps out of bed in the morning or after a brief period of rest.



Gout

Retrolcalcaneal bursitis (Albert's Disease) - this is the formation and inflammation of a bursa at the rear of the heel between the heel bone and Achilles tendon

## Rheumatoid Arthritis

Rheumatic Fever.

## Septic Arthritis

Sero-negative arthropathies for example Reiter's Syndrome.

Sever's Disease - and inflammatory problem typically found in youthful over weight boys age 10 to 15 years old

- Tarsal Tunnel Syndrome - also referred to as posterior tibial nerve neuralgia.
- Tarsal Tube Syn. characteristically has pain that does not decrease with rest.
- Also has numbness or 'tingling' with the toes

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