Calcaneus Fractures

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Fractures of the calcaneus account for approximately two percent of all fractures, and 90% of calcaneal fractures occur in men of working age. Industrial workers make up the majority of calcaneal fractures in workers. A displaced intra-articular calcaneus fracture occurs in 60–75% of fractures, and these fractures may lead to the development of arthritis in the subtalar joint.

The calcaneus is the largest bone in the foot, and it articulates with the talus superiorly and the cuboid distally. The joint between the calcaneus and the talus (aka subtalar joint) is composed of three separate articular facets. They are referred to as the posterior, middle, and anterior facet. The posterior facet is the largest of the three and is the facet most commonly involved in intra-articular calcaneal fractures. The calcaneal tuberosity is on the posterior aspect of the calcaneus, and occasionally fractures of the tuberosity may be a surgical urgency if the displaced bone fragment is pushing on the skin. Fractures of the anterior process of the calcaneus may occur by a twisting injury to the foot and often heal uneventfully. A small percentage of anterior process fractures will require surgery, which typically involves excision of the fracture fragment.

The typical mechanism of calcaneal fractures is a fall from a height with the patient landing on their feet. The denser talus is driven into the calcaneus by the patient’s body weight. This pile driver effect causes the calcaneus to occasionally be crushed into multiple fragments and causes widening of the heel due to the bony fragments being pushed apart by the talus occupying their prior location. The posterior facet of the subtalar joint may be fractured in multiple places. In these situations the patient should be told that they have a high risk of developing subtalar arthritis even with surgical treatment. Almost all patients will notice a loss in the range of motion of their subtalar joint after a calcaneus fracture. The subtalar joint helps the foot accommodate to uneven surfaces.

Severe soft tissue injuries may occur with calcaneal fractures and the treating surgeon will have to monitor the patient’s skin closely in these situations. The treating surgeon may need to delay surgery until the patient’s soft tissues have healed to a point where they can tolerate surgery to minimize post-operative wound healing complications. With high energy mechanisms associated with significant soft tissue injury, a patient may develop a compartment syndrome in the foot, which long term may cause the patient to develop claw toes and sensory deficits in the foot. It is not uncommon for a patient to develop blisters around the heel and foot after sustaining a calcaneus fracture. Multiple treatments have been described for treating the blisters, from leaving them alone, to unroofing them and applying a silver sulfadiazine cream. Open fractures (aka compound fractures) may occur and are treated as a surgical urgency.

Calcaneus fractures may be associated with other injuries such as lumbar spine fractures and other lower extremity fractures. It has been reported that 10% of patients with a calcaneus fracture had a lumbar spine fracture and 25% had an associated lower extremity injury. The peroneal tendons may occasionally be injured due to their location along the lateral wall of the calcaneus. A thorough physical exam of the legs and spine is critical in the initial evaluation of these patients.
The initial radiographic evaluation includes dedicated x-rays of the foot and ankle with a Harris axial view of the heel. A CT scan with sagittal and coronal recon images may be necessary to fully appreciate the severity of the fracture, determine treatment, and for surgical planning.

Historically, calcaneus fractures were treated non-operatively by placing patients in a cast and instructing them to remain non-weight bearing for a period of two to three months. More recently, due to improvements in surgical techniques, combined with the appreciation of the consequences of untreated severe calcaneus fractures, more and more patients have been undergoing surgery to treat calcaneus fractures. The need for surgery is determined by the patient’s specific fracture pattern. Patients with non-displaced fractures may be treated non-operatively with a short leg cast or a removable boot and period of non-weight bearing. In cases with a displaced intra-articular fracture, loss of calcaneal height, or significant widening of the heel, surgery may be indicated to restore the bony anatomy. Even with anatomic restoration of the bony anatomy, the patient should be told that they may develop symptomatic arthritis of the subtalar or calcaneocuboid joints. In cases of severe intra-articular fractures, the surgeon may elect to perform a fusion of the subtalar joint knowing that the patient will most likely develop significant arthritis of the joint in the future.

Post-operatively, the patient will be immobilized in a splint, cast, or removable boot and will be non-weight-bearing for six to twelve weeks. In the initial post-operative period, DVT prophylaxis may be required while the patient is immobilized. Patients are followed clinically and radiographically until the fracture has healed. It may take six to nine months until the patient has reached maximal improvement.

Calcaneus fractures can be a severe and disabling injury that can lead to permanent impairment of the patient’s foot. Occasionally these injuries will require multiple surgeries including the initial fracture fixation, removing painful hardware, performing fusion of an arthritic subtalar joint, or correcting a painful malunion of the calcaneus. Since these fractures often occur in individuals in the prime of their careers, they can have a large economic impact.

This article was written by one of GENEX’s CHOICE Network Providers.