УДК 616.71-001.5-089.84:616.718.72/.75

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FRACTURES OF THE CALCANEUM

The calcaneus is the largest of the tarsal bones and serves as a springboard for locomotion and as an elastic support for the weight of the body. it is the most frequently fractured tarsal bone, representing 60% of all tarsal fractures and 2% of all fractures in general.
Calcaneus fractures account for approximately 2% of all fractures. the calcaneus, or os calcis, is the most frequently fractured tarsal bone. Displaced intraarticular fractures comprise 60% to 75% of calcaneus fractures. ninety percent of calcaneus fractures occur in men between 21 and 45 years of age, with the majority being in industrial workers. Between 7% and 15% of calcaneus fractures are open injuries.
Keywords: *foot, calcaneus fracture, osteosynthesis of calcaneus, the main methods of treatment calcaneuses*

Anatomy.
The anterior half of the superior articular surface contains three facets that articulate with the talus. The posterior facet is the largest and constitutes the major weight-bearing surface. The middle facet is located anteromedially on the sustentaculum tali. The anterior facet is often confluent with the middle facet.
Between the middle and posterior facets lies the interosseous sulcus (calcaneal groove), which, with the talar sulcus, forms the sinus tarsi.
The sustentaculum tali supports the neck of the talus medially; it is attached to the talus by the interosseus talocalcaneal and deltoid ligaments and contains the middle articular facet on its superior aspect. The flexor hallucis longus tendon passes beneath the sustentacular tali medially. The peroneal tendons pass between the calcaneus and the lateral malleolus laterally. The Achilles tendon attaches to the posterior tuberosity.
Mechanism of injury.
Axial loading: Falls from a height are responsible for most intraarticular fractures; they occur as the talus is driven down into the calcaneus, which is composed of a thin cortical shell surrounding cancellous bone. In motor vehicle accidents, calcaneus fractures may occur when the accelerator or brake pedal impacts the plantar aspect of the foot.
Twisting forces may be associated with extraarticular calcaneus fractures, in particular fractures of the anterior and medial processes or the sustentaculum. In diabetic patients, there is an increased incidence of tuberosity fractures from avulsion by the Achilles tendon.
Clinical evaluation.
Patients typically present with moderate to severe heel pain, associated with tenderness, swelling, and heel widening, and shortening. Ecchymosis around the heel extending to the arch is highly suggestive of calcaneus fracture. Blistering may be present and results from massive swelling usually within the first 36 hours after injury. Open fractures are rare, but when present they occur medially.
Careful evaluation of soft tissues and neurovascular status is essential. Compartment syndrome of the foot must be ruled out, because this occurs in 10% of calcaneus fractures and may result in clawing of the lesser toes.

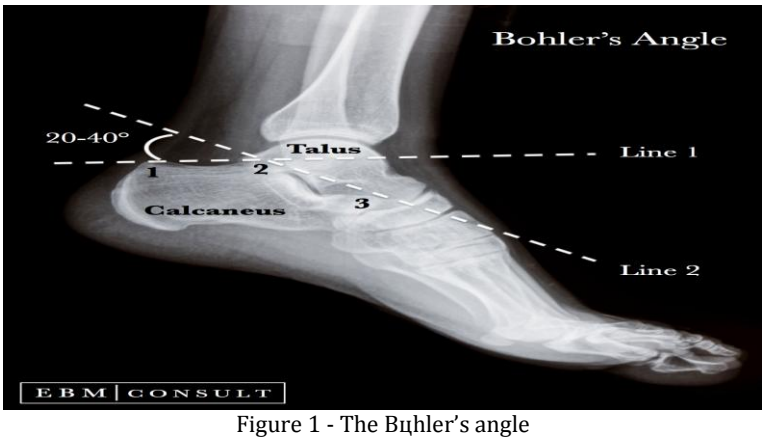

Figure 1 - The Вцhler's angle

Associated Injuries.
Up to 50% of patients with calcaneus fractures may have other associated injuries, including lumbar spine fractures (10%) or other fractures of the lower extremities (25%); intuitively, these injuries are more common in higher-energy injuries. Bilateral calcaneus fractures are present in 5% to 10% of cases.
Radiographic evaluation.
The initial radiographic evaluation of the patient with a suspected calcaneus fracture should include a lateral view of the hindfoot, an anteroposterior (AP) view of the foot, a Harris axial view, and an ankle series. Broden views, Computed tomography (CT)
Classification.

1. Extraarticular Fractures.

Anterior process fractures: These may result from strong plantar flexion and inversion, which tighten the bifurcate and interosseous ligaments leading to avulsion fracture; alternatively, they may occur with forefoot abduction with calcaneocuboid compression. They are often confused with lateral ankle sprain and are seen on lateral or lateral oblique views.

Tuberosity fractures: These may result from avulsion by the Achilles tendon, especially in diabetic patients or osteoporotic women, or rarely by direct trauma; are they seen on lateral radiographs.

Medial process fractures: These vertical shear fractures are due to loading of heel in valgus; they are seen on axial radiographs.

Sustentacular fractures: These occur with heel loading accompanied by severe foot inversion. They are often confused with medial ankle sprain and are seen on axial radiographs.

Body fractures not involving the subtalar articulation: These are caused by axial loading. Significant comminution, widening, and loss of height may occur along with a reduction in the Bцhler angle without posterior facet involvement.

Figure 2 - Extraarticular Fractures

2. Intraarticular Fractures.

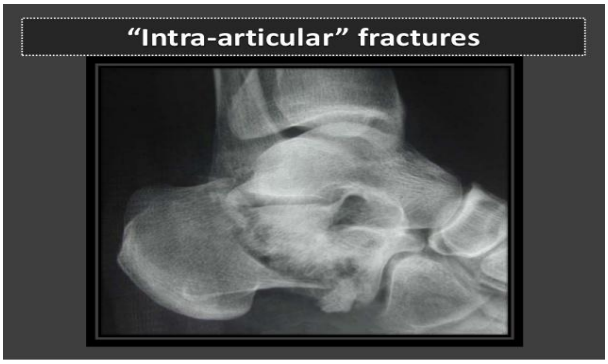

Figure 3 - Intraarticular Fractures

Essex-Lopresti Classification.

a. PRIMARY FRACTURE LINE

The posterolateral edge of the talus splits the calcaneus obliquely through the posterior facet. The fracture line exits anterolaterally at the crucial angle or as far distally as the calcaneocuboid joint. Posteriorly, the fracture moves from plantar medial to dorsal lateral, producing two main fragments: the sustentacular (anteromedial) and tuberosity (posterolateral) fragments.

The anteromedial fragment is rarely comminuted and remains attached to the talus by the deltoid and interosseous talocalcaneal ligaments. The posterolateral fragment usually displaces superolaterally with variable comminution, resulting in incongruity of the posterior facet as well as heel shortening and widening.

b. SECONDARY FRACTURE LINE

With continued compressive forces, there is additional comminution, creating a free lateral piece of posterior facet separate from the tuberosity fragment.

Tongue fracture: A secondary fracture line appears beneath the facet and exits posteriorly through the tuberosity. Joint depression fracture: A secondary fracture line exits just behind the posterior facet.

Continued axial force causes the sustentacular fragment to slide medially, causing heel shortening and widening. As this occurs, the tuberosity fragment will rotate into varus. The posterolateral aspect of the talus will force the free lateral piece of the posterior facet down into the tuberosity fragment, rotating it as much as 90 degrees. This causes lateral wall blowout, which may extend as far anteriorly as the calcaneocuboid joint. As the lateral edge of the talus collapses further, there will be additional comminution of the articular surface.

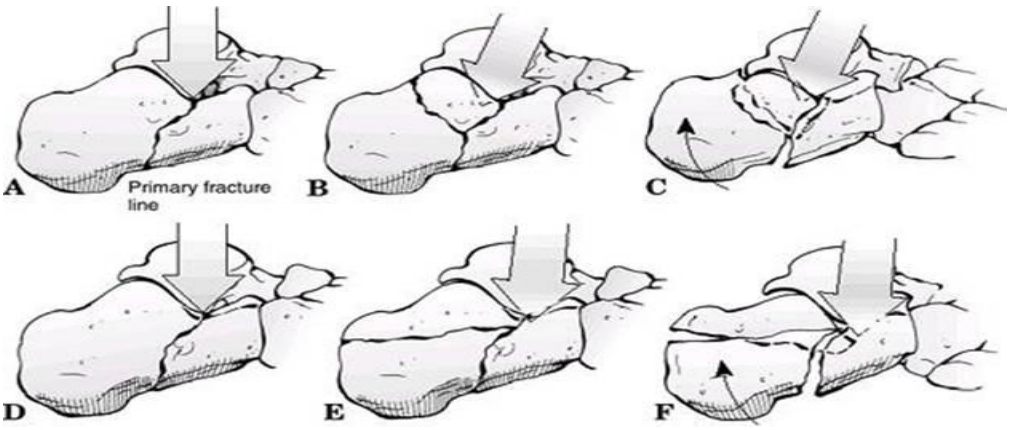

Figure 4 - Essex-Lopresti Classification

Treatment.

The emergency management of these fractures includes ice, elevation, and immobilization in a bulky compressive dressing with a posterior splint. Ice and a bulky dressing are important to prevent soft-tissue injuries, such as fracture blisters and skin sloughing, which ultimately delay surgery. The presence of an intraarticular fracture necessitates consultation with the orthopedics service for definitive management. Patients with significant swelling and the possibility of developing compartment syndrome should be admitted

Definitive management depends on the degree of displacement. Nondisplaced fractures may be treated with non "weight-bearing status for 6 to 8 weeks and hydrotherapy, followed by a gradual increase in activity. The treatment of displaced fractures is controversial, and varies from a conservative approach to surgical repair. For this reason, early consultation and referral is strongly recommended in the management of these injuries. When indicated, surgery is not emergent (unless a fasciotomy is required for compartment syndrome), and generally occurs 7 to 10 days after injury, but can take place up to several weeks if swelling is significant.

In patients with comminuted, displaced, or depressed intraarticular fractures, a good outcome requires the reestablishment of joint congruity and the elevation of depressed fragments. Open reduction with internal fixation is recommended in these patients.

Nonoperative.

Indications include:

a. Nondisplaced or minimally displaced extraarticular fractures. B. Nondisplaced intraarticular fractures.
b. Anterior process fractures with less than 25% involvement of the calcaneal-cuboid articulation. d. Fractures in patients with severe peripheral vascular disease or insulin-dependent diabetes. Fractures in patients with other medical comorbidities prohibiting surgery. e. Fractures associated with blistering and massive prolonged edema, large open wounds, or life-threatening injuries.

Initial treatment is placement of a bulky Jones dressing. Nonoperative treatment consists of a supportive splint to allow dissipation of the initial fracture hematoma, followed by conversion to a prefabricated fracture boot locked in neutral flexion to prevent an equinus contracture and an elastic compression stocking to minimize dependent edema. Early subtalar and ankle joint range-of-motion exercises are initiated, and none "weight-bearing restrictions are maintained for approximately 10 to 12 weeks, until radiographic union.

Operative.

Displaced intraarticular fractures involving the posterior facet, Anterior process of the calcaneus fractures with >25% involvement of the calcaneal-cuboid articulation. Displaced fractures of the calcaneal tuberosity. Fracture-dislocations of the calcaneus. Selected open fractures of the calcaneus

Timing of surgery.

Surgery should be performed within the initial 3 weeks of injury, before early fracture consolidation. Surgery should not be attempted until swelling in the foot and ankle has adequately dissipated, as indicated by the reappearance of skin wrinkles.

Figure 5 - Intra-operative photograph of a patient with a fractured calcaneus that has been fixed by using a special titanium plate and screws. Post-operative x-ray of the same patient

Complications.
Calcaneus fractures are associated with a 10% incidence of compartment syndrome of the foot. Symptoms include tense swelling and severe pain and may be associated with long-term problems, including clawing of the toes, stiffness, chronic pain, weakness, sensory changes, atrophy, and forefoot deformities. The diagnosis can be made in the acute phase utilizing pressure measurements within the compartment. Fasciotomy is the recommended treatment.
The long-term consequences of these fractures are disabling. Posttraumatic arthritis with stiffness and chronic pain is the most frequent complication. Spur formation with chronic pain or nerve entrapment may complicate the management of these fractures. Intraarticular calcaneus fractures have a very poor prognosis with the incidence of long-term problems approaching 50% despite optimal treatment.

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Қалалық клиникалық аурухана №4

ӨКШЕ СҮЙЕГІНІҢ СЫНЫҒЫ

Түйін: Өкше сүйегі бұл толарсақ сүйектердің ең үлкені және қозғалыс үшін трамплин ретінде қызмет етеді және дене салмағына серпінді тірек ретінде қызмет етеді. Ең жиі таралған сынық - бұл табан сүйегі сынықтарының 60% -ы, тұтастай алғанда барлық сынықтардың 2%-ын құрайды.

Түйінді сөздер: табан, өкше сүйегінің сынығы, өкше сүйектерінің остеосинтезі, өкше сүйектерін емдеудің негізгі әдістері.

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ПЕРЕЛОМ ПЯТОЧНЫХ КОСТЕЙ

Резюме: Пяточная кость является самым большим из костей предплюсны и служат в качестве трамплина для передвижения и в качестве упругой опоры для веса тела. Наиболее часто ломается предплюсневая кость, что составляет 60% от всех переломов предплюсны и 2% всех переломов в целом.

Ключевые слова: стопа, перелом пяточной кости, остеосинтез пяточных костей, основные методы лечения пяточных костей