

Results of treatment of open talar fractures

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ABSTRACT

The purpose of this study is to present our experience on treating 4 open talar fractures. From July 2002 to July 2007, 4 patients with equal number of open talar fractures were managed. All patients were males. The injury concerned the left foot in 2 patients whereas the right one in the remaining 2. The causes were road traffic accident in 1 patient and fall from height in the other 3 patients. The injuries included 1 fracture of the lateral process with combined subtalar dislocation, 2 talar neck fractures of type II and 1 talar neck fracture of type III according to Hawkins classification. All patients were managed within 6 hours after injury with open reduction and internal fixation with K-wires or screws. During a mean follow-up period of 3 years, osteonecrosis with nonunion was observed in one patient, subtalar arthritis in 2 patients and skin necrosis in 1 patient. No other major complications were noted such as superficial or deep infection and malunion. We consider that open reduction and internal fixation is recommended for open fractures of the talus.

Keywords: *open talar fractures.*

INTRODUCTION

The talus is the key of the foot due to its location between the ankle joint and subtalar joint. Through the flexion and extension of the ankle joint, the talus is the

propulsive bone situated at the roof of the first ray and the hallux. Through the subtalar and the talonavicular joints the talus allows the foot to be suspended using a fancy spring mechanism involving ligaments and tendons. The talus thus transmits forces through two important joints without direct muscular constraint. Talar fractures are rare, involving only 0.15-0.32% of all foot injuries. They are divided in body fractures (20%), neck fractures (50-70%) and head fractures (10%)¹⁻⁴. We rarely see stress talar fractures, only in athletes and men in the military service⁵⁻⁷. Talar body fractures are due to tibial compression towards the talus in case of a fall from height, body avulsion fractures are usually caused by ligamentous strain around the joint as in snowboard, while talar neck fractures are in most cases the result of a forced hyperextension of the foot usually during a bike accident. Talar fractures are some of the most interesting fractures of all foot bones but different to face. The outcome of their treatment is in many cases doubtful and there can be serious complications such as skin necrosis, superficial or deep infection, nonunion, malunion, talar necrosis and posttraumatic ankle or subtalar osteoarthritis⁸⁻¹¹. These problems are due to the vulnerable blood supply and the abundant articular surface of the talus.

PATIENTS AND METHODS

From July 2002 to July 2007, 4 patients were treated for open talar fractures. All of them were males and their age ranged from 29-45 years (mean age 34 years). The right foot was affected in 2 patients whereas involvement of the left foot concerned the other 2 patients. The cause was fall from height in 3 patients and road traffic accident in one patient. The fractures included 1 fracture of lateral process combined with subtalar dislocation, 2 fractures of talar neck type II according to Hawkins classification and

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Figure 1. A) Open talar neck fracture type II and IIIA according to Hawkins and Gustilo classification.

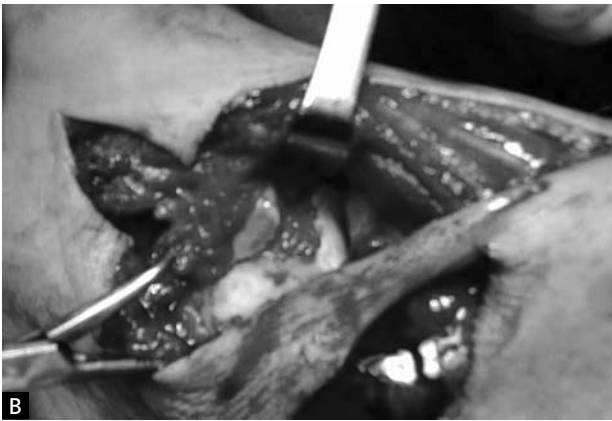
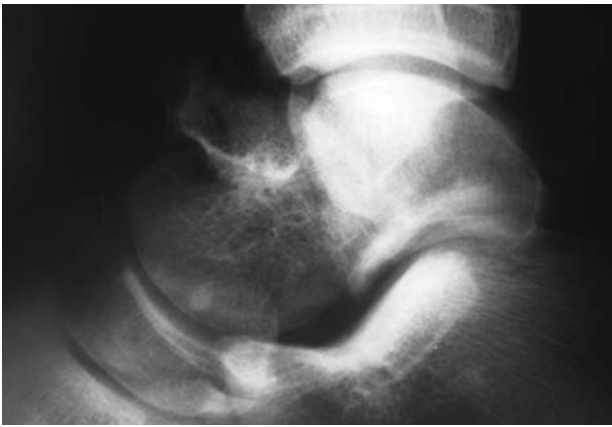


Figure 1. B) Through the wound open reduction and internal fixation with two screws and a butressing external fixation.



Figure 1. C) Excellent radiological result 3 years postoperatively.



1 fracture of the neck of the talus type III according to Hawkins classification. There were one type II fracture and three type IIIA fractures according to Gustilo classification. All patients were operated within 6 hours from the injury. The initial management included taking cultures from the trauma, Xrays and CT of the foot to identify concomitant fractures. In the operating theatre they underwent meticulous surgical and mechanical debridement, open reduction through extension of the trauma where it was necessary, and internal fixation with k-wires in 2 patients, screws in one patient and no fixation material in another one. External fixation from tibia to calcaneus was placed in one patient whereas in the other three a below knee cast was used (Figure 1). Closure of the wound was performed 7-10 days after operation. In 2 patients with negative cultures, intravenous antibiotics were administered for 14 days whereas in the other two patients with positive cultures intravenous antibiotics were administered for 6 weeks followed by per os administration for another 6 weeks. Micromolecular weight heparin was given in all patients for 45 days. The patient with talar neck fracture (Hawkins II, Gustilo IIIA) was advised partial weight bearing 3 months postoperatively which was switched on to full weight bearing 4 months after surgery, whereas the external fixation was removed 5.5 months after operation. In the patient with lateral process fracture and concomitant subtalar dislocation the brace was removed 2 months after injury and he was encouraged partial weight bearing and intensive physiotherapy till the third month followed by full weight bearing. The other two patients with talar neck fractures (Hawkins III - Gustilo IIIA and Hawkins II - Gustilo II) were suggested partial weight bearing 3 months postoperatively following the removal of the brace (Figure 2).

RESULTS

The patients were evaluated 3, 6 and 12 months postop-

eratively and then every 6 months with a mean follow-up period of 3 years. Skin necrosis treated eventually with skin grafting and subtalar arthritis were observed in the patient with lateral process fracture and subtalar dislocation. Talar osteonecrosis with nonunion and subtalar arthritis were noticed in the patient with fracture of the talar neck (Hawkins III-Gustilo IIIA). The other two patients had satisfactory radiological and clinical result without major complications including nonunion, osteonecrosis, superficial or deep infection. The overall results were considered excellent and very good in two patients, fair in one patient and poor in one. The clinical results were illustrated with the AOFAS score¹² which was 60, 70, 95, 95 respectively at the latest follow-up.

DISCUSSION

Talar body fractures include a wide array of injuries varying from relatively minor posterior tuberosity fractures to devastating comminuted body fractures. Fracture types include osteochondral fractures, transverse, coronal or sagittal fractures of the whole body, lateral process fractures, posterior tubercle fractures and comminuted body fractures. Roentgenograms and CT scanning are very helpful in therapeutical decision. If the fragment is small we remove it but if it is big, it can be fixed either with a k-wire or with a bioabsorbable pin¹³. Posterior process fractures are very rare and often overlooked, so CT scanning is very helpful. Precise open reduction and rigid internal fixation are necessary for a good result. If we have a missed fracture or an ununited fracture the method of treatment is excision of the fragment in order to relieve foot pain^{14,15}. Lateral process fractures (snowboarder's fracture) are rare and often overlooked, too. Results of plain films are negative up to 40% of all the cases and therefore a CT scanning is the imagine modality of choice. Treatment includes immobilization and not bearing weight for 6 weeks for



Figure 2. A) Open fracture of talar neck (Hawkins II, Gustilo II).



Figure 2. B) Open reduction and internal fixation with 2 k-wires.



Figure 2. C) Bone consolidation 6 months after surgery.

Figure 2. D) Excellent result without any complications 2.5 years postoperatively.

undisplaced fractures, and open reduction and internal fixation for displaced fractures¹⁶⁻¹⁸. Coronal, transverse and sagittal fractures can be treated surgically in order to restore congruity of the adjacent joints. They present a poor outcome due to high percentage of complications such as malunion, osteoarthritis of the ankle or the subtalar joint and avascular necrosis of the talar body¹⁹. When we have severe comminution or open grade III fracture we may proceed primarily in ankle joint fusion^{20,21}. Talar neck fractures are classified in IV types according to Hawkins classification. For type I conservative treatment is indicated while open reduction and fixation with bone grafting of medial neck comminution -if present- should be used for types II, III and IV. Fixation can be achieved by cancellous screws (cannulated and partially threaded), by k-wires, by plates or by absorbable lag screws²²⁻²⁶. In patients with grade III talar neck fractures we can proceed primarily in ankle arthrodesis, talectomy or tibio-calcaneal fusion²⁷⁻³⁰. Complication rate is high after talar neck fractures and it is progressively increasing from Hawkins type I to type IV. The main complications are avascular necrosis and subtalar osteoarthritis. Avascular necrosis of the talus is not associated with the short interval between the accident and the operation, the age of the patient and the other ipsilateral fractures. It is influenced by the degree of the fracture comminution and displacement and the lesion of soft tissues³¹⁻³⁴. Hawkins' sign (presence of subchondral atrophy) in an anteroposterior roentgenogram after 6-8 weeks of the fracture, proved to be a relatively reliable sign of talar vitality. Magnetic resonance imaging may be helpful in the early diagnosis of avascular necrosis³⁵. The treatment of avascular necrosis when it results in talar collapse and osteoarthritis is ankle fusion. Osteomyelitis of the talus is rare (usually in open fractures grade III) the treatment of choice is total talectomy with or without secondary tibio-calcaneal arthrodesis^{36,37}. Malunion or non union can be treated with corrective osteotomy or removal of pseudarthrosis and internal fixation with screws or without bone grafting^{38,39}. The open fractures due to impairment of local vascularization have higher incidence of complications concerning osteonecrosis, superficial and deep infection, something that was not confirmed in our small series⁴⁰⁻⁴².

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