e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(8); 457-461

Original Research Article

Fracture of Talar Body Treated by Open Reduction and C.C. Screw Fixation

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Received: 30-05-2023 / Revised: 28-06-2023 / Accepted: 29-07-2023

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Conflict of interest: Nil

Abstract:

Background: Due to their rarity and frequent consequences, talar body fractures provide a significant challenge to surgeons. The purpose of this study was to report the mid-term outcomes of displaced talar body fractures fixed internally.

Methods: From July 2020 to December 2021, this retrospective study was carried out at the Department of Orthopaedics, GMCH, Bettiah and Bihar. Retrospective analysis was performed on a total of 18 patients with talar body fractures (12 Male, 6 Female, mean age 31.0).

Results: The fractures were divided into crush fractures (2), coronal fractures (10), and sagittal fractures (6). Two individuals also had concomitant talar neck fractures, while six patients suffered open fractures. Follow-up lasted an average of 26 months (from 18 to 43). Four patients had exceptional function, six had good function, four had fair function, and five had poor function based on the American Orthopaedic Foot & Ankle Society's (AOFAS) ankle-hind foot score. Two superficial wound infections, one partial wound dehiscence, one case of skin necrosis, and one deep infection were among the early sequelae. Other issues included avascular necrosis in seven cases, delayed union in one, and malunion in one patient.

Conclusion: Talar injuries can severely disable a person and impair their ability to move their foot and ankle, thus they are significant. Less favorable outcomes are linked to talar body crush fractures, those connected to open wounds, and talar neck fractures.

Keywords: AOFAS, Talar Body, Crush Fractures, Ankle-hind foot.

Introduction

It is extremely rare for the talar body to fracture. Despite being one of the less common injuries to the body, talar body fractures have an extremely poor prognosis. In comparison to talar neck fractures, they carry a higher risk of avascular necrosis. They account for 13-23% of talus fractures and less than 1% of total fractures. They typically occur after high-energy injuries and are thus linked to severe soft tissue damage. Furthermore, due to the form of the tibiotalar articulation and the overhang of the anterior and posterior tibial plafond, fractures involving the talar body might be challenging to visualize effectively. It is often well-protected by the malleoli on either side and the superior tibial plafond. According to Sneppen et al., only specific non-physical pressures, such as severe caudal compression, pressure during pronation, and particularly supination trauma, would cause damage to the talus's body. They discovered that in terms of talar body fractures, a lateral site fracture was indicative of pronation or pronation-external rotation trauma (compression fracture), whereas a medial site fracture was representative of supination trauma (compression or shear type). A fall from a height, which causes an axial compression of the talus between the tibial plafond and the calcaneus, is the other frequent mode of injury that results in fracture of the body of the talus. These fractures are often associated with other ankle, foot and skeletal injuries which complicate the treatment. Since fastening of seat belts has become mandatory, more patients involved in high-velocity motor vehicle accidents survive, which increases the number of injuries to the distal extremities. Comparing the therapy of talar body fractures to the more frequent talar neck fractures, very few research have previously examined talar body fractures.

Therefore, the purpose of this study was to present the mid-term outcomes of displaced talar body fractures fixed internally. [1-10]

Materials and Methods

An analysis of the outcomes of patients with talar body fractures treated between July 2020 and December 2021 at the Orthopaedics Department of the Government Medical College and Hospital, Bettiah, Bihar, was done retrospectively. Those that were studied received surgical care, with a minimum 18-month follow-up following the injury. Patients who met the exclusion criteria were those with a single transchondral lesion, an isolated posterior process fracture, and a talar neck fracture without a talar body fracture. For this investigation, 18 patients who fit the inclusion criteria were taken into consideration. Twelve cases were men and six were women. With a range of 21 to 48, the average age was 31. Six fractures on the left talus compared to twelve on the right. Fall-related injuries caused seven patients to sustain injuries, motor vehicle accidents (MVA) caused nine, and motorcycle accidents caused two.

The Boyd and Knight classification was used to group the talar body fractures.[2] An individual or mixed surgical strategy was adopted depending on the fracture pattern. If a better exposure was required, medial malleolus osteotomy was also carried out. According to the fracture pattern, cancellous screws (4 mm) were employed. None of the cases involved bone transplantation.

Wearing an over-the-counter fracture boot with early foot and ankle movements kept patients from bearing any weight for 10 to 12 weeks, or until radiographs and clinical evaluation revealed signs of union. At two weeks, six weeks, ten to twelve weeks, and six months following surgery, anteroposterior, lateral, and mortise radiographs were routinely taken. When necessary, further radiography, computed tomography images, and magnetic resonance imaging were done.

The American Orthopaedic Foot & Ankle Society's (AOFAS) clinical rating scale (100 total points) was used to assess the clinical outcomes. The questionnaire measured alignment, function, and pain intensity. On a scale from 0 to 40, patients were asked to rate their level of pain. Function was determined by adding up the scores for each of the following factors: activity restrictions (0–10), maximum walking distance (0–5), walking surface (0–5), gait abnormality (0–8), sagittal motion (0–8), hindfoot motion (0–6), and ankle–hindfoot stability (0–8). A total of 100 points was awarded for alignment, which was evaluated from 0 to 10 points (good, fair, and poor). A score of 85 or higher was considered excellent, 75 to 84 decent, 70 to 74 fair, and less than 70 low.

Reduced joint space, juxta-articular osteophytes, subchondral sclerosis, and/or subchondral cysts on plain radiographs or computed tomography scans were considered signs of post-traumatic arthritis. The presence or absence of osteonecrosis as detected on conventional radiographs was recorded.

Results

The study cohort consists of the 18 patients who had postoperative clinic evaluations. Boyd and Knight identified the following types of talar body fractures: 11 coronal, 6 sagittal, 2 crush, and 17 type I fractures. One type I, three types II, one type IIIA, and one type IIIB of open fractures were experienced by six patients. A Hawkins type I and a Hawkins type II talar neck fracture was also present in two cases. Seven patients had surgery less than 24 hours after sustaining the fracture, with the average duration from injury to surgery being 2 days; the range was 9 to 13 days. The medial method was used during surgery in six cases, the lateral approach in three, and a combination approach in ten. Six patients underwent a medial osteotomy for improved fracture exposure. There were no fibular osteotomies carried out.

The follow-up period lasted an average of 26 months (from 18 to 43). Four patients had exceptional function, six had good function, four had fair function, and five had poor function, according to the AOFAS assessment system. (Range: 44–94) The average overall score was 68.6. (Table 1) Early problems included two superficial wound infections, one partial wound dehiscence, one case of skin necrosis, and one deep infection and they affected five patients. Additionally considered were late problems. One patient's union was delayed, while another's was malunion.

These two patients experienced fair outcomes. Avascular necrosis (AVN) was a condition that affected 4 patients; 2 of these patients had body and neck fractures, while the other 2 had body-only fractures. The AVN collapsed in five of the cases. Furthermore, subtalar arthritis affected 6 patients, while subsequent ankle arthritis affected 11 patients. There was a high incidence of complications in fractures with open wounds. Avascular necrosis developed in five of the six patients with open fractures (three coronal, one sagittal, and two crush fractures), superficial wound necrosis in two, a deep infection in one, ankle joint arthritis in six, and subtalar joint arthritis in five. Four patients had poor clinical outcomes, whereas two patients had fair results.

Table 1: Average American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hind foot score at the last follow-up

	Score
Pain	27.4
Activity limitations	6.9
Walking distance	3.2
Walking surface	3.0
Gait abnormality	4.4
Sagittal motion	5.3
Hindfoot motion	3.5
Ankle-hindfoot stability	8
Alignment	6.9

Poor outcomes were experienced by two patients (both with coronal fractures and accompanying talar neck fractures). A patient (Hawkins type I) with a grade II open wound also developed AVN and a superficial wound infection. The other patient (a Hawkins II) had AVN and skin necrosis. Radiographs of the ankle and subtalar joints showed osteoarthritic alterations.

Among the numerous talar body fractures, two patients with crush fractures (both had open injuries, grades IIIA and IIIB) had a dismal prognosis. Three patients had a good outcome, one had an outstanding outcome, one had a fair outcome, and one had a poor outcome among the six patients with sagittal fractures (two open injuries, grades I and II).

Three patients had great outcomes, three good, three fair, and two bad outcomes out of the 11 patients who suffered coronal fractures (2 open injuries of grade II and 2 talar neck fractures). Figures 1, 2, and 3 show radiographs of a patient with a coronal fracture.

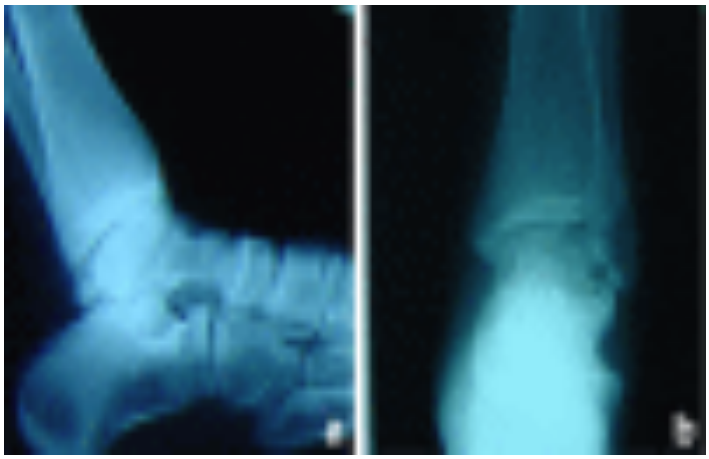

Figure 1:

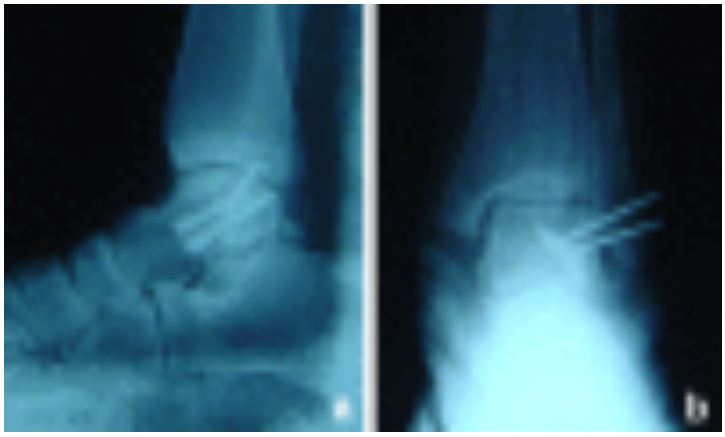

Figure 2:

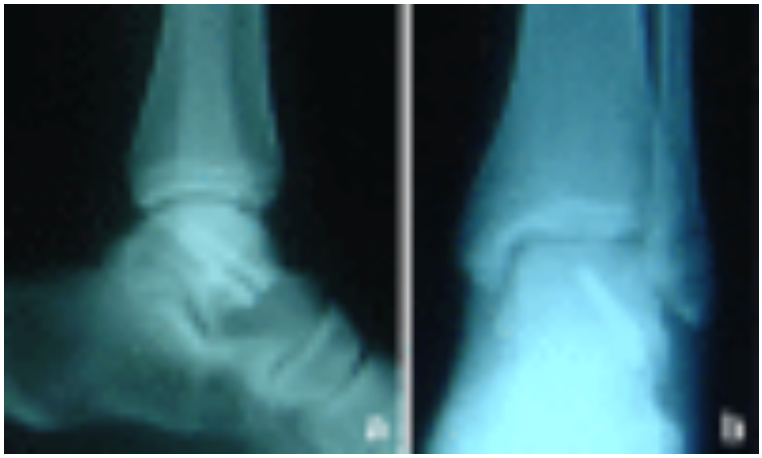

Figure 3:

Discussion

Coltart collected data from the Royal Air Force during World War II and reported the largest series of talus injuries recorded in 2012, which included 15 cases of talar body fracture. According to a literature review, the majority of patients in many earlier trials received nonoperative care, and talar body fractures were not distinguished from other talus fractures.[3]

The talus is a severe target for injury because it forms a vital connection between the subtalar, transverse tarsal, and ankle joint complexes. The hindfoot and midfoot can easily bend due to the diversity of linked motions that result from the motion of this bone or other bones. The universal combined motion of the foot and ankle is impaired if the talus is injured, and this can lead to significant impairment. Inokuchi et al.[9] analysis of the inferior surface fracture line allowed them to distinguish between talar neck and body fractures. A talar body fracture is one in which the fracture line on the inferior surface penetrates the subtalar joint, according to their definition.

The superior surface of the talar neck, the anterolateral surface of the talar body, the inferior surface of the talar neck, the medial surface of the talar body via the deltoid ligament, and the posterior tubercle are the five surfaces by which blood vessels reach the talus body. The main blood vessel feeding the body of the talus is the artery of the tarsal canal. It immediately supplies the middle half to two thirds of the body and, maybe, the entire body by anastomosis. The neck's lower surface is where its greatest branches enter. The deltoid branch, which enters from the medial surface of the talus and provides an additional third of the body due to anastomosis, directly supplies the medial one-third of the body. The artery of the tarsal sinus divides, enters the anterolateral body, and provides direct blood flow to the lateral eighth to half. A little contribution is also made by the superior neck vessels. The majority of the tubercle itself is supplied by the system of vessels over the posterior tubercles. The anterolateral surface of the talar body and the posterior tubercles of the talus are largely avascular due to differences in the vascular supply between the regional parts of the talus.

Talar body fractures have been categorized by Boyd and Knight 2 based on the plane of the fracture line. In contrast to a type II fracture, which takes place in the horizontal plane, a type I fracture is a coronal or sagittal shear fracture. A fall from a height that causes axial loading is the most frequent mode of injury leading to a shearing-type talar body fracture. On plain radiographs, shearing-type fractures of the talar body that are nondisplaced or mildly displaced might occasionally be challenging to identify. An increased incidence of problems including secondary osteoarthritis, osteonecrosis, and malunion may be linked to a delay in diagnosis and treatment. According to a report by Abrahams et al., nondisplaced shear fractures of the talar body should be suspected in patients who have a history of axial loading injury and diffuse ankle swelling when no other fractures, particularly calcaneal fractures, are visible on radiographs.

Significant morbidity is frequently the result of displaced talar body fractures. In their analysis of 26 talar body fractures with a minimum follow-up of one year, Vallier et al.[18] found that 38% of cases of AVN, 65% of cases of post-traumatic tibiotalar arthritis, and 34% of cases of post-traumatic subtalar arthritis occurred. Comminuted fractures, concomitant talar neck fractures, and open fractures were all related with worse outcomes. With a minimum follow-up of 48 months, Lindvall et al.[12] reported on 26 single talar neck and body fractures in 2019. They discovered a 50% incidence of AVN and a 100% incidence of post-traumatic arthritis.

Because the fractures that were stabilized within 6 h did not have a lower incidence of AVN than those stabilized beyond 6 h, the timing of fixation did not appear to alter the outcome, union, or prevalence of AVN in the latter investigation. Both of these investigations came to the same conclusion: despite correct reduction and stable fixation, arthritis is a common result of displaced

talar body fractures and patients with these injuries should be counseled about the long-term implications.

51 individuals with talar body fractures were examined by Sneppen et al. in 2017.[15] They found that in cases of significant talar compression, 50% of patients had ankle osteoarthritis; in cases of talus shearing, 41% of patients had post-traumatic arthritis in both the ankle and subtalar joints, and another 24% had osteoarthritis in either ankle or subtalar joints. They came to the conclusion that the likelihood of talar body fractures is directly correlated with the severity of the first injury and emphasized that the prognosis for the long term is unfavorable if subluxation and articular damage to the subtalar and talotibial joints occurred at the time of the initial injury.

A significant incidence of sequelae, such as osteonecrosis, malunion, nonunion, secondary osteoarthritis, subtalar bone ankylosis, skin infection, and skin necrosis, have been linked to talar body fractures. The occurrence and seriousness of these problems seem to be related to a number of variables, including the intrinsic talar vascular supply, the initial degree of displacement, the presence of concomitant dislocation, and the effectiveness of reduction.

Post-traumatic arthritis and chronic incapacity are prevalent side effects of talus fractures because to this, as well as the fact that the talar dome bears more weight per area than any other joint in the body. Particularly frequent avascular necrosis occurs in the superior component of a horizontal fracture or the posterior fragment of the talar body.

The type of surgical procedure will often be determined by the fracture pattern and location. Access to the posterior portions of the talus is occasionally restricted by the morphologies of the tibiotalar articulation and the overhang of the posterior tibial plafond. It is dangerous to distract the tibiotalar joint during reconstruction procedures when there has been a recent injury. The talar body should be exposed whenever necessary by performing a medial or lateral osteotomy.

Conclusion

In conclusion, talar body fractures are distinct injuries that provide very difficult surgical challenges. Less favorable outcomes are linked to talar body crush fractures, those connected to open wounds, and talar neck fractures.

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