ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(1): 876-879
www.allresearchjournal.com
Received: 20-11-2016
Accepted: 22-12-2016

Dr. Ansari N
Assistant Professor
Department of Orthopeadics,
Medical College, Trivandrum,
Kerala, India

Correspondence
Dr. Ansari N
Assistant Professor
Department of Orthopeadics,
Medical College, Trivandrum,
Kerala, India

A prospective study on the prognosis of intraarticular calcaneal fractures by the surgical treatment of open reduction and internal fixation

Dr. Ansari N

Abstract
The objective of this study was to evaluate the outcome of Open Reduction and internal Fixation treatment of displaced intraarticular calcaneal fractures. This prospective study was conducted on 10 patients (8 men and 2 women).
The average age was 37.7 (22–55). The most common cause of injury was a fall from height in eight patients. Patients were operated on within a mean time of 6.2 days of admission (1–11 days) and were followed up for an average period of 12.1 months (6–18 months). Patients were evaluated clinically using the ROWE system. All fractures healed after an average of 8 weeks (7–10 weeks), and patients returned to the routine daily activities after an average time of 4.3 months (3–7 months). Excellent ROWE results were achieved in 4 cases (40%) good in 3 cases (30%), satisfactory in2 cases (20%), only one reported poor outcome.
In conclusion Open Reduction and Internal Fixation is an effective treatment for cases of displaced intra-articular calcaneal fractures.

Keywords: Manet, security, networking, protocols, reactive

Introduction
The literature is full of suggestions for the treatment of calcaneal fracture. Yet it is possible to read hundreds of papers devoted to the calcaneus fractures and still not know which to treat or how to treat them. Closed treatment with early motion is a moderately successful treatment that remains the standard to which new treatments must be compared [1]. However, failure to seek alternatives to closed treatment made us accept impairments beyond a standard that would be acceptable in other intra-articular weight-bearing joints. As we in most orthopaedic conditions, no valid prospective randomized trial has been completed. In the absence of such a trial, we base treatment decisions on training, experience, retrospective studies and, most worrisome, the vagaires of third-party dictum. A meta-analysis of current evidence by Ning Wei *et al*. revealed that Operative treatment of Displaced Intra-Articular Calcaneal Fractures (DIACF) may lead to a higher incidence of complications but has better anatomical recovery when compared with nonoperative treatment [2].
Enthusiasm for open treatment has had ebbs and tides in the literature dating back to the late 1800s. Initial enthusiasm has often followed by a full retreat when complications such as infection and amputation changed the risk/benefit ratio. The current high tide of support for open reduction and internal fixation (ORIF) began with the development of specialized instrumentation for fracture care [3]. Emile Letournel, MD, provided insight into anatomy and technique to apply these new tools of fractures of the calcaneus [4].
These questions remain however which fractures patterns require ORIF, which patients are suitable candidates, and who should treat them? The last question is the easiest to answer; an orthopaedic surgeon with great understanding of the anatomy, well versed in the care of intra-articular fractures and amply experienced in the handing of tenous soft tissues.
The answer to the second question is less concrete. However, the usual criteria apply for elective procedures done for quality of life: an active person with reasonable life expectancy and without significant comorbidity such as peripheral vascular disease; or an inability to comply with post-operative rehabilitation. Poor bone quality and threatened soft tissue envelope are relative contraindications [5].

Factors in favor of ORIF

To answer the first question we are forced to reason backwards from what we know leads to a poor result if untreated. Consistently poor outcomes result from several treatable factors: a wide heel with subfibular impingement; diminished height, as measured by Bohler's angle (which causes secondary derangement of the ankle joint when the talar body rotates downward toward to the plantar surface of the foot); and derangement of the subtalar joint [6]. The first two are part of the same anatomic process, i,e displacement of the tuberosity relative to the subtentacular fragment upward and laterally along the primary fracture line.

Bohler's Tuber Joint angle is one parameter by which the relative force absorbed by the bone is estimated. Given equivalent conditions-bone quality, position of the foot, direction of application of force-the greater the applied load, the greater the depression of the posterior facet and of Bohler's angel This flattening of the calcaneus reflects the amount of energy imparted and becomes a mechanical derangement in its own right when the talus assumes a position of relative dorsiflexion [7]. The widening of the heel occurs as a result if the lateral translation of the tuberosity and outward backling of the lateral wall. There may be direct impingement against the fibula, compression or displacement of the peroneal tendons and lateral displacement of the weight-bearing surface [8]. These two factors can be improved by manipulation of the tuberosity under some limited ideal circumstances [9]. If these were all that counted, manipulative reduction and internal fixation would satisfy treatment criteria for many fractures.

However, displacement of the joint surface is an important parameter in dysfunction of the subtalar joint [10]. It is difficult to address this problem without ORIF. Empirically, displacement of a weight-bearing joint surface in excess of 2 mm requires reduction. The three facets of the subtalar joint are all part of one surface, and fractures between them and among them are intra-articular [11]. Though smaller than the posterior facet, that anterior / middle facets bear more weight per area and presumably are instrumental in function of the joint. There is some clinical and laboratory evidence that displacement greater than 2 mm may have significant adverse effects.

Some simple guidelines might be drawn from this information. Extra articular fractures may be treated closed unless the fractures interfere with the mechanics of the hind foot or prevents rehabilitation [12]. Simple depressed fractures (I.e single intra-articular fracture) with a joint step off of 2 mm or less can probably be safely be treated with early motion, Intra-articular fractures displaced 3w mm or more and fractures with significant displacement leading to the mechanical problems cited above, are good candidates for ORIF. In addition, whenever the soft tissues are threatened by gross displacement of bone, some type of reduction should be performed. Most importantly, it is unlikely that a complex injury with so many variables can adequately be encapsulated with a few guidelines. The ultimate decision is made at the beside when an experienced orthopaedic surgeon interviews and examines the patient, reviews the imaging studies, and employs his or her best judgment. The threshold for open treatment varies with he risk of the patient, which is, in turn, proportional to the skill and experience of the surgeon.

In summary, there is not an abundance of evidence that demonstrates ORIF provides better outcome' than closed treatment all displaced fractures. However, the results of closed treatment aren't good enough to accept as definitive care. Furtherm it is reasonable to assume that there are some circumstances in which ORIF is a better option. There are known anatomic factors associated with poor outcomes. The fracture patterns that include these are reasonable candidates for ORIF. Treatment options include closed treatment with early motion, manipulative reduction with percutaneous fixation, and ORIF. The appropriate treatment should be selected using good judgement of the trained orthopaedic surgeon.

Objectives of the study

A longitudinal study on the prognosis of intraarticular calcaneal fractures by the surgical treatment of open reductions and internal fixation with reconstruction plate and screws combined with K. Wires and steimann's Pins from an extended lateral approach.

Materials and Methods

During the period from January 2012 to January 2016 of 35 cases of calcaneal fractures were selected out of which, 10 cases of intraarticular fractures of calcaneaum satisfying inclusion criteria were taken for surgery with Regular follow up of one year, at 6 weeks, 3, 6 and 12 months a. the results were evaluated by the ROWE scoring rest pain, possibility of return to preinjury jobs, use of walking aids restriction of physical activities and limbing were also evaluated.

These were classified on the basis of C.T. finding Sanders type II to IV. The Patients with an intraarticular calcaneaum fracture Sanders type II or type IV with articular fracture displacement by more than 1 mm attending Casualty of Orthopedics Department Medical College Thiruvananthapuram were included in the study. Patients with age more than 60 yrs and Patients with Peripheral vascular diseases were excluded. Nature of Trauma, Compounding of the fracture, Radio graphical type of fracture and ROWE scoring (stability, Motion and Function) were studied.

Standared Procedures used for the management

As soon as the patient is brought to the casualty, the general condition of the patient is assessed clinically. A careful history is taken from the patient to assess the nature of trauma. Presence of any neurological involvement and distal pulsation and vascularity is assessed clinically.

Presence of any other fractures of lower limb and spine are also noted. In the case of a compound fracture the wound and surrounding area is thoroughly debrided and dressed with a sterile dressing. Broad spectrum antibiotics and prophylatic antitetanus serum and tetanus toxiod were given. After temporary splinting of the fracture X-rays of the foot are taken both in anteroposterior, lateral and oblique views. Additional view are taken as and when necessary. X-ray of the normal foot is also taken if planning for surgery. After obtaining the x-rays, temporary. Below knee plaster is applied temporarily after closed reduction if there is any displacement. check x-rays are taken to assess the outcome of reduction. Surgery was performed after the oedema was subsided.

Post-Operative Treatment

The extremity is elevated for 48 to 72 hours. Closed suction drainage is performed for 28 to 48 hours. Until drainage is less than 25 ml per 8 hours. Remove he short leg splint at 3 to 5 days postoperatively. If the flap shows uncomplicated healing and the wound is sealed early active range of motion is begun at that time. The full weight bearing of the extremity was allowed not earlier than 3 months. Regular checkups were at 6 weeks, 3, 6 and 12 months and every year. the mid term results were evaluated by the system of ROWE, scoring rest pain, possibility of return to preinjury jobs, use of walking aids restriction of physical activities and limbing. Hardware can be removed if asymptomatic at one year.

Results

of 35 cases of calcaneal fractures were selected out of which, 10 cases of intraarticular fractures of calcaneaum satisfying inclusion criteria were taken for the study of which 8 of them were men and 2 were women The average age was 37.7 (22–55). The most common cause of injury was a fall from height in eight patients. Patients were operated on within a mean time of 6.2 days of admission (1–11 days) and were followed up for an average period of 12.1 months (6–18 months).Open fracture was diagnosed in two cased. (20%), 2 cases were bilateral (20%), combined injury to the musculoskeletal systems in 3 cases (30%) with fractures of radial shaft one case and fracture shaft of tibia in two cases. average hospital stay was about 7-14 days. Early postoperative complications were found in 4 cases. (40%) early infection responding to antibiotic therapy in 2 cases (20%). Deep infection, nonunion or postoperative compartment syndrome was not recorded. Excellent ROWE results were achieved in 4 cases (40%) good in 3 cases (30%), satisfactory in2 cases (20%), only one reported poor outcome.

Discussion

The method of classification and treatment of calcaneal fractures continue to be a frequently discussed topic. The prognosis for an extra-articular calcaneal fracture is uniformly good unlike that for intra-articular types [13]. The technique of ORIF with lateral reconstruction plating has recently been preferred for patients with displaced Sanders type II or III calcaneal fractures [14]. This approach allowed us to observe the fracture, to reduce both subtalar and calcaneo cuboid articulations, to stabilize the fracture by internal fixation and to begin early rehabilitation. Because of the risk of early complications, the timing of surgery and a through considerations of indications and contraindications are of principal importance filling calceaneal bone defects is not necessary. Pre and postoperative C.T. scans are necessary. Fractures developing compartment syndromes are indicated for urgent fasciotomy and ORIFS should be postponed. In patients with multiple trauma and in those with open calcaneal fractures, a temporary stabilization with external fixator is performed first and then converted to second stage ORIF. It is that found a strong correlation between the restoration of normal anatomy (congruity of the subtalar joint, Bohler'sangle, calcaneal height and width, as assessed radiologically) and a satisfactory functional outcome. Stephenson concluded that no patient who had a less than anatomical reduction of calcaneus had a good result [15]. Leung *et al*. found a significant correlation between the radiological assessment and the clinical findings with regard to the subtalar joint [16]. Paley and Hall stated that Bohler's angle is an indirect reflection of both calcaneal height and the arch angle; a small Bohler's angle is associated with a poor result [17]. This implies that preservation of the calcaneal height and arch angle is important.

Conclusions

The surgical treatment of displaced intraarticular fractures that involves open reduction from an extended lateral approach and fixation with a calcaneal reconstruction plate shows very good preliminary results. A C.T. examination is required for the diagnosis and classification of fractures and a correct indications for surgery. Good timing is of principal importance and urgent surgical intervention is necessary in open fractures and in those in which soft issues are squashed by born fragments. In other fractures surgery is carried out after edema subsidence. Food compartment syndrome is a serious complication of calcaneal fractures and an urgent fasciotomy is the only adequate therapy. Full weight bearing of the operated extremity depends on the rate of the bone healing. It is usually allowed 3 months after surgery.

References

1. Bruce J, Sutherland A. Surgical versus conservative interventions for displaced intra-articular calcaneal fractures. Cochrane Database Syst Rev. 2013; 31(1):CD008628.
2. Wei N, Yuwen P, Liu W, Zhu Y, Chang W, Feng C *et al*. Operative versus nonoperative treatment of displaced intra-articular calcaneal fractures. Medicine (Baltimore) [Internet]. 2017, 96(49). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5728905/
3. Zwipp H, Rammelt S, Barthel S. Calcaneal fractures--open reduction and internal fixation (ORIF). Injury. 2004; 35(2):SB46-54.
4. Letournel E. Open Treatment of Acute Calcaneal Fractures. Clinical orthopaedics and related research. 1993; 290:60-7.
5. Calcaneus - Indication - ORIF - plate and screw fixation - Calcaneus, displaced body fractures - AO Surgery Reference [Internet]. [cited 2018 May 28]. Available from: https://www2.aofoundation.org/wps/portal/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOKN_A0M3D2DDbz9_UMMDRyDXQ3dw9wMDAwCTfULsh0VAXc5ElM!/?approach=&bone=Foot&classification=82-Calcaneus%2C%20displaced%20body%20fractures&implantstype=&method=ORIF%20-%20plate%20and%20screw%20fixation&redfix_url=1432024987130&segment=Calcaneus&showPage=indication&treatment=
6. Isaacs JD, Baba M, Huang P, Symes M, Guzman M, Nandapalan H *et al.* The Diagnostic Accuracy of Böhler's Angle in Fractures of the Calcaneus. The Journal of Emergency Medicine. 2013; 45(6):879-84.
7. Nawfar S, Chan K, Idham H, Izani I, Nahulan T. Outcome Determining Factors for displaced Intra-articular Calcaneal Fractures treated operatively. Malays Orthop J. 2015; 9(3):8-16.
8. Peroneal tendon disorders [Internet]. [cited 2018 May 30]. Available from:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5508858/
9. Jayaseelan DJ, Post AA, Mischke JJ, Sault JD. Joint Mobilization in the Management of Persistent Insertional Achilles Tendinopathy: A Case Report. Int J Sports Phys Ther. 2017; 12(1):133-43.
10. The subtalar joint [Internet]. [cited 2018 May 28]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5549175/
11. Mostafa MF, El-Adl G, Hassanin EY, Abdellatif M-S. Surgical treatment of displaced intra-articular calcaneal fracture using a single small lateral approach. Strategies Trauma Limb Reconstr. 2010; 5(2):87–95.
12. Yu G-R, Yu X. Surgical Management of Calcaneal Malunion. Journal of Orthopaedics, Trauma and Rehabilitation. 2013; 17(1):2–8.
13. Pozo JL, Kirwan EOG, Jackson AM. The long-term resultsof conservative management of severely displaced fractures o, 1984.
14. Operative treatment of intra-articular calcaneal fractures with calcaneal plates and its complications [Internet]. [cited 2018 May 30]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2762170/
15. Stephenson JR. Treatment of displaced intra-articularfractures of the calcaneus using medial and lateral approache, 1987.
16. Leung KS, Yuen KM, Chan WS. Operative treatment ofdisplaced in tra-articular fractures of the calcaneum: medium-ter, 1993.
17. Paley D, Hall H. Intra-articular fractures of the calcaneus:a critical analysis of results and prognostic factors, 1993.